PROMOTING AN AWARENESS OF RESEARCH-BASED BEHAVIOR INTERVENTIONS

IN

AUTISM SPECTRUM DISORDERS

USING AN ONLINE BEHAVIOR MODULE

By

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DEDICATION

I dedicate this doctoral dissertation to my father, late Sri. Dinabandhu Mohapatra who believed in determination and academic success. Without your overseeing figure I could not have completed this journey. I wish I could share this outstanding accomplishment with you. I know you are up there with a prodigious smile, proud as can be.

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ABSTRACT

The recent increase in the number of children being diagnosed with Autism Spectrum Disorder (ASD) has led to increasing demand for information by professionals, parents, students and educators. ASD has been defined as a developmental disorder usually identified in early childhood between 18 and 30 months of age. One of the core symptoms of ASD is a dysfunction in social behavior.

In response to a growing need for information on research-based interventions for ASD, the Burkhart Center for Autism Education and Research at Texas Tech University developed an online format module designed to build the knowledge and skill base of professionals, caregivers and parents working with students with ASD. Research-based interventions provide the framework to incorporate what is known from research into real-world practice in a manner accessible to families, responsive to what children need, and consistent with what providers can accomplish, given available skills and resources.

The module utilizes an online format with several research-based interventions to provide a strong foundation in autism education. The main findings of the research established the behavior module as an effective learning tool in benefitting children with ASD. Subjects who were exposed to the behavior module demonstrated extensive improvement in their content knowledge and showed enormous satisfaction with the module. In other words, the behavior module was certainly helpful to promote participants' content knowledge in ASD.

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CHAPTER I

Introduction

The typical behaviors of individuals with ASD are presented in the diagnostic criteria for ASD, substantiated by the American Psychiatric Association (APA). According to the DSM-IV definition, the behavioral characteristics of ASD lead to a lack of social responsiveness, delays in speech or inadequate quality of speech, restricted or stereotypic interests, delays or abnormalities in social interaction, and lack of symbolic play (APA, 1994). Children with ASD often respond to sensory stimuli by overreacting to touch or sounds. Individuals with ASD can have deficits in explaining their behavior and difficulty understanding that their behavior has an influence on others (Myles, 2000a). Children with ASD have extensive behavioral impairments with many of these behaviors having no function. They display repetitive and compulsive behaviors on a daily basis. These extensive areas appear to have a specific relation to ASD (Scott et al., 2000; Luiselli et al., 2004; and Baron-Cohen, 1988).

The behaviors demonstrated by individuals with ASD are frequently the most troubling to parents and caregivers. These behaviors may be inappropriate, repetitive, aggressive and/or dangerous, and may include hand-flapping, finger-snapping, lack of social skills, deficit in social interaction, rocking, placing objects in one's mouth, and head-banging (Scott et al., 2000). This study examined the use of online modules from the Burkhart Center for Autism Education and Research at Texas Tech University for increasing parent and caregiver knowledge.

Statement of the Problem

Parents of children with ASD face the same challenges that other parents of children with disabilities face. Children with ASD present unique social and educational issues to parents and professionals who work with them (Turnbull et al., 2002). Children with ASD who lack social awareness demonstrate continuous challenges as they fail to respond to social anticipations and cues from peers and adults (Scott et al., 2000; Luiselli et al., 2004). Parents may have trouble learning the skills necessary for successfully managing other problems (APA, 1994; Scott et al., 2000; Luiselli et al., 2004).

ASD reflects a broad scope of disorders, each having their own one-of-a-kind features and teaching implications. There are many red flags for behaviors that may be the symptoms of ASD. A number of the behavioral symptoms of ASD are observable by 18 months of age, including: problems with eye contact, not responding to one's name, joint attention problems, stereotypic or repetitive behaviors, underdeveloped skills in pretend play and imitation, and problems with non-verbal communication and language (ASA, 2006; APA, 1994). These behaviors not only make life challenging for people who have ASD, but also take a toll on their families, teachers, and anyone who comes in contact with them. Parents of children with ASD should be afforded easy access to specialized, parent-sensitive information about problem behaviors (Mullen & Frea, 1995). Therefore, this study will provide useful research-based behavioral interventions outlined in an online module to allow parents to develop skills to anticipate problems and prevent them from escalating.

Purpose of the Study

The online module was designed to build the knowledge and skill base of faculty, students and parents who are working with students with ASD. In order to contribute precisely to the education of parents of children with ASD, the module presents several research-based interventions to provide a strong foundation in autism education. If parents are provided with a substantial knowledge base coupled with easily accessible and systematized resources, they have ample chances of meeting and benefitting their children.

This study will evaluate parental & caregiver knowledge obtained through an online module. To accomplish the purpose, the study involved a pre-test and post-test designed to determine the extent to which knowledge is acquired through the viewing of the module by the parents of children with ASD. Furthermore, the study explored the influence of each individual's knowledge and skills about ASD on his or her perception of the module's content.

Research Questions

The purpose of this study was to determine whether the online module embellished the understanding of behavior problems of ASD for parents of children with ASD. In addition, the study provided pragmatic demonstration as to whether or not the online module positively elevates parental & caregiver knowledge. Specifically, the study addressed the following research questions:

Research Question 1

Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Research Question 2

Was the Behavioral Module developed for parents learning about children with ASD such that it is appropriate and accessible?

Research Question 3

Do parents who have been trained through the Behavior Module select research-based methods for behavioral intervention from a list of interventions more often than those who have not been trained?

Theoretical/Conceptual Framework

The field of special education has been subjected to substantial changes over the past several years. Individuals working or living with disabilities play a vital role in pushing present research to support parents and personnel represented within those categories. In 1975, The U.S. Congress passed Public Law 94-142, the Education for All Handicapped Children Act (EAHCA), opening doors to all children with disabilities by providing special education for them. P. L. 94-142 was reauthorized and renamed The Individuals with Disabilities Education Act (IDEA) in 1990 (P.L. 101-476), defining ASD as a federal disability category. The recent increase in the number of children being diagnosed with ASD has lead to increased demand for information by professionals, parents, students, and educators. ASD has been, and continues to be, the focus of intensive study (Zager, 2005).

ASD is a neurological disorder that appears during the first three years and interferes with the verbal and nonverbal communication, social interaction, and sensory development. One of the core symptoms of ASD is a dysfunction in social behavior. The social problems can be classified into three categories including: socially avoidant, socially indifferent, and socially awkward (Baron-Cohen, 1988). Many people with ASD engage in repetitive activities like rocking or rigidly following familiar patterns in their everyday routines, as well as exhibiting sensitivity to sound, touch or smell. They may engage in self-mutilation such as biting their arms or banging their heads (APA, 1994; Scott et al., 2000). Highly structured intervention may lead to substantial developmental achievement for many children with ASD, so it is important to educate people (Mundy, 1986; Rogers & Vismara, 2008; Weiss, 1999).

Autism Spectrum Disorders

Autism and pervasive developmental disorders (PDDs) are highly complex. Symptoms and characteristics change with developmental maturity and vary with the degree of correlated cognitive involvement (Filipek et al., 1999). With DSM-III (APA, 1980), the term *Pervasive Developmental Disorders* (PDD) was first used to describe disorders:

> "characterized by distortions in the development of multiple basic psychological functions that are involved in the development of social skills and language, such as attention, perception, reality testing, and motor movement. The term Pervasive Developmental Disorder was selected because it describes most accurately the core clinical disturbance: many basic areas of psychological development are affected at the same time and to a severe degree." (p. 86)

The *DSM-IV (*American Psychiatric Association, 1994) defines ASD under the umbrella category of Pervasive Developmental Disorders (PDD), while medical professionals refer to both PDD and autism as autistic spectrum disorders (Filipek et al., 1999).

The diagnosis of ASD requires that at least six developmental and behavioral characteristics are apparent and that problems are evident before age three. The five *diagnostic subcategories* of Pervasive Developmental Disorders given in the DSM-IV are: autism, pervasive developmental disorder - not otherwise specified (PDD-NOS), Asperger's disorder, Rett's disorder, and childhood disintegrative disorder (DSM-IV-TR, American Psychiatric Association, 2000). Autism is referred to as a spectrum disorder, meaning the symptoms and characteristics of ASD can present themselves in a wide variety of combinations, from mild to severe (Lord et al., 2000).

Prevalence of Autism Spectrum Disorders

The prevalence of ASDs is substantially greater than previously recognized. Current statistics indicate that the number of children diagnosed with ASD has escalated to approximately one in 91 children in the United States (Kogen et al., 2009). The Centers for Disease Control and Prevention (2007) has established the Autism and Developmental Disabilities Monitoring (ADDM) Network. It indicates that the number of children with ASDs has risen over the past decade. Bello (2007) stated that the diagnostic criteria for this condition has changed and broadened, and differences of opinion regarding diagnostic issues and diagnostic terminology continue. For decades, the best estimate for the prevalence of ASD was four to five per 10,000 children. The Centers for Disease Control and Prevention (CDC) partnered with the American Academy of

Pediatrics (2004) to show that as many as one in 166 children have an ASD. Reports of the prevalence of ASDs range from 3.3 to 10.6 per 1000 children with an overall mean prevalence of 6.6 per 1000 children (1/152 children). The reported increase in ASD prevalence from 1/1000 in the early 1990s to 1/152 in 2002 has resulted in much concern (CDC, 2002). This change may be due to greater recognition of ASD in more able children (Keen & Wade, 2004). ASD is the fastest growing developmental disability in America with a 10 to 17 percent annual growth (ASA, 2006). The prevalence of all ASD combined was 6.7 cases per 1000 children (Bertrand et al., 2001).

Behavioral Issues Related to ASD

Social reciprocity deficits are a core feature of ASD (Lord et al., 2000; Baron-Cohen, 1988). Socialization deficits are a major source of impairment regardless of cognitive or language ability for individuals with ASD. Individuals with ASD suffer consequences related to social interaction deficits either directly or indirectly (as cited in White et al., 2007). The social impairments in individuals with ASD are diverse, often involving interpersonal interaction (Lovaas, 1987). Children with ASD demonstrate core deficits in reciprocal social interactions and restricted and repetitive behaviors or interests (APA, 1994, 2000). Children with ASD prefer to stay aloof from other children or adults and tend to play alone by themselves away from others (Filipek et al., 1999). They exhibit multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction. They do not like to be cuddled or stiffen when held and often do not look or smile when making a social approach (Scott et al., 2000; Filipek et al., 1999; APA, 1994).

Younger children with ASD demonstrate an apparent lack of awareness for peers or other children. They often fail to share enjoyment, interests or achievements with other people and often do not point things out or use eye contact to share the pleasure of seeing something with another person, known as joint attention *(*Snyder-McLean, 1984; Filipek et al., 1999; Wetherby, 1986; APA, 1994). Odem et al. (1999) mentioned in their literature that young children with ASD engaged in less social play, had fewer social interactions, and did not establish social competence without appropriate intervention.

Short Description of Behavioral Interventions

As mentioned earlier, over the past decade, there has been an immense increase in the number of students identified with ASD in the United States (Steege et al., 2007). The philosophy of intensive behavioral intervention states that individuals with ASD differ in degree with their unique characteristics and may benefit from different treatments or interventions once an appropriate treatment plan is in place. ASD is a disorder marked by considerable resilience for which there was the hope of recovery, given appropriate intervention (Rogers & Vismara, 2008). Effective intervention training and support services are necessary for children with ASD whose typical behavioral challenges interfere with learning and who need extensive intervention or strategies (Mundy, 1986; Rogers & Vismara, 2008; Weiss, 1999). "Researchers have documented unprecedented success in educating some young children with autism, although not every child makes dramatic developmental gains" (Weiss, 1999, p. 3). The intensive behavioral intervention strategies incorporate Applied Behavior Analysis **(**ABA), Discrete Trial Training (DTT), Pivotal Response Training (PRT), Picture Exchange, Communication System (PECS), Joint Attention Routines (JARs), and Social Stories. These interventions

are designed to optimize the child's level of independence in life (Scott et al., 2000; Rogers & Vismara, 2008; Weiss, 1999).

Parent Knowledge of Behavioral Interventions

The behaviors exhibited by children with ASD are frequently the most troubling to parents and caregivers. These behaviors may be inappropriate, repetitive or dangerous, and may include hand-flapping, finger-snapping, rocking, placing objects in one's mouth, or head-banging (Scott et al., 2000). Parents or caregivers face serious challenges in identifying research-based interventions, competent models, and well-trained therapists. It is vital that parents receive substantial or continuous training to work with their child with ASD in the home setting (Rogers & Vismara, 2008; Weiss, 1999). The behavior module was created and reviewed by two directors of the project website, two experts on ASD from Health Science Center, four special education doctoral students, and two parents with children with ASD. It was referenced by literature review and textbooks, and was presented for feedback to experts in autism education to improve the module content. The module was accessible on the TTU website on May, 2006. The behavior module was reviewed, revised, and reevaluated to ensure the content validity before it was implemented by this study.

The online behavior module provides parents with the knowledge and information for quality behavior interventions which can be implemented in the home setting. It is intended to increase their knowledge of various intervention procedures such as reinforcement, functions of behavior, and how to reduce inappropriate behavior **(**Lock et al., 2005)**.**

Short Description of the Behavior Module

The online behavior module addresses the different types of social and behavioral issues of individuals with ASD. It is a good source for parents to enlighten themselves about the factors involved in ASD. Many intervention approaches are discussed in the behavior module to address the range of social, language, sensory and behavioral difficulties. These include: Applied Behavior Analysis (ABA), Social Stories, Discrete Trial Training (DTT), Pivotal Response Training (PRT), Positive Behavior Support, social skills programs, Picture Exchange Communication System (PECS), Cognitive Picture Rehearsal, self-management, Environmental Supports, Joint Attention Routines (JARs), and cognitive management philosophy (Lock et al., 2005).

Assumptions

Assumptions employed in this study were:

1. The participants will not have accessed the online module for children with ASD previously.
2. The participants will devote the pertinent amount of time to complete the module content in its totality.
3. The participants already have a fundamental knowledge of computer usage that will allow them to successfully access the website and navigate within the module.
4. The participants will respond honestly based on their past understanding of behavioral issues related to ASD and on the knowledge gained from viewing the module without randomly guessing.

5. The participants will answer questions very honestly based on their own personal opinions.
6. The participants will read and understand each question presented in the survey without difficulty.

Definitions of Terms

Professionals from divergent disciplines instigated the field of special education and each explores the terminology of the field from their perspective (Heward, 2006). The following definitions are provided to ensure the explanation and insight of the terms that will be used in the framework of this specific study.

Autism

The Individuals with Disabilities Education Act (IDEA) regulations (1999) define autism as follows:

> A developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change, or change in daily routines, and unusual responses to sensory experiences. The term does not apply if a child's educational performance is adversely affected primarily because the child has a serious emotional disturbance (U.S Department of Education, 1999, p. 12421 as cited in Smith, 2001). (p. 508)

According to the American Psychiatric Association (2000):

> Autism is a pervasive developmental disorder marked by differences in the areas of communication, socialization, and repetitive behavior. Individuals with autism exhibit varying degrees of difference in each of these areas (Lord et al., 2005; National Research Council, 2001 as cited in Carnahan et al., 2009). (p. 37)

According to Sparks et al. (2002):

> Autism is a clinically defined behavioral syndrome that initially manifests in early childhood and is thought to reflect underlying neurodevelopmental abnormalities. Core symptoms of autism include abnormal or unreciprocated interpersonal and emotional interactions, disordered language and communication, and repetitive and stereotypic behavior. (p.185)

Autism Spectrum Disorders - The term pervasive developmental disorder (PDD) is reciprocally employed in the field of special education (Heward, 2006; APA, 1994; Scott et al., 2000). Pervasive Developmental Disorders (PDD) is a term used in the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (*DSM-IV;* American Psychiatric Association, 1994) to describe a group of five disorders that includes delays or impairments in the development of many fundamental skills. Pervasive developmental disorders (PDD) include five different conditions: Asperger's syndrome, Autism Spectrum Disorders (ASD), Childhood Disintegrative Disorder (CDD), Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS), and Rett's syndrome. These disorders are associated together because of the similarities between them. The three most common shared problems involve communication skills, motor skills, and social skills (Heward, 2006; APA, 1994; Filipek et al., 1999; Scott et al., 2000).

Applied Behavior Analysis (ABA) – ABA is a systematic intervention approach intended to increase skills in play and social interaction while decreasing behaviors that interfere with learning (Schoen, 2003; Stahmer et al., 2003; Scott et al., 2000).

ABC Recording - ABC recording is a direct observational recording procedure used to observe students individually. ABC refers to: a) Antecedent, the events that occur immediately before the target behavior, b) Behavior, the behavior itself, c)

Consequences, stimuli that occur immediately after the behavior (Conroy et al., 2005; Kerr & Nelson, 2002; Pratt & Dubie, 2008).

Behavior Deficits – According to the (DSM-IV-TR; APA, 2000), "autism is characterized by qualitative impairments in social interactions and communication coupled with restricted, repetitive, and stereotyped patterns of behavior, interests, and activities" (as cited in Cowan & Allen, 2007, p.701) .

Chaining - "Chaining is the reinforcement of successive elements of a behavior chain or sequences" (BBB Autism, 2002).

Changing Criterion Design - The changing criterion design is a variation of a multiple-baseline design with initial baseline observations on a single target behavior. After a stable baseline has been observed, the intervention phase is applied through an array of advancement in criterion levels (Hartmann & Vance Hall, 1976).

Contingency Contracts - A contingency contract is an agreement between a student and teacher that specifies the behavior to be increased or decreased. The student receives the reinforcers or rewards contingent upon achievement of contract terms (Kerr & Nelson, 2002).

Cueing - Cueing is a visual stimulus (sign) that may be used to remind a child to approach an adult and ask for attention (Gaze et al., 2008). Cueing system involves a non verbal signal like a bell or clapping and verbal reminders about what a student should be doing (Shabani et al., 2002).

Developmental Disabilities - According to Section 102(8) of the Developmental Disabilities Assistance and Bill of Rights Act (P.L. 160-402) of 2000, the term "developmental disability" is:

> a severe, chronic disability of an individual that: 1) is attributable to a mental or physical impairment or combination of mental and physical impairments; 2) is manifested before the person attains age twenty-two (22); c) is likely to continue indefinitely; 3) results in substantial functional limitations in three or more of the following areas of major life activities: (I) self care, (II) receptive and expressive language, (III) learning, (IV) mobility, (V) self-direction, (VI) capacity for independent living, (VII) economic self-sufficiency; and 5) reflects the person's need for a combination and sequence of special, interdisciplinary, or generic care, treatment, or other services which are of lifelong or extended duration and are individually planned and coordinated; except that such term, when applied to infants and young children means individuals from birth to age five, inclusive, who have substantial developmental delay or specific congenital or acquired conditions with a high probability of resulting in developmental disabilities if services are not provided.

Differential Reinforcement – Differential reinforcement is a reinforcement procedure to decrease or eliminate inappropriate behavior using positive reinforcement in a prescribed manner (Kerr & Nelson, 2002; Scott et al., 2000).

Differential Reinforcement of Alternate Behavior (DRA) – DRA is defined as "when one behavior is placed on extinction and another behavior is reinforced," (Vollmer & Iwata, 1992 as cited in Volkmar et al., 1999, p. 9).

Differential Reinforcement of Incompatible Behavior (DRI) - DRI involves reinforcing behaviors that are physically incompatible with the undesired target behavior (Kerr & Nelson, 2002; Scott et al., 2000).

Differential Reinforcement of Other Behavior (DRO) – DRO technique involves reinforcing a student if an undesired behavior is not displayed during a designated time period behavior (Kerr & Nelson, 2002; Scott et al., 2000).

Discrete Trial Training (DTT) - DTT involves breaking down complex skills and teaching each sub skill through a series of expanded teaching trials. In DTT, the learning environment is highly structured using a system of repetition, positive reinforcement, and prompting (Steege et al., 2007; Stahmer et al., 2003).

Extinction - Extinction is used to eliminate an undesired behavior by unexpectedly withholding or terminating the positive reinforcer that maintains an inappropriate target behavior (Strain et al., 1979).

Functional Analysis/Assessment (FA) – FA can be defined "as collection of methods for gathering information about antecedent, behavior, and consequences in order to determine the reason (function) of the behavior" (Gresham et al., 2001, p.158).

Functional Relations - FRs are demonstrated when a behavior differs consistently with the application of an intervention procedures (Kerr & Nelson, 2002; Gresham et al., 2001).

Joint Action Routines (JARs) - The goal of JARs is to create spontaneous conversation and increased social understanding (Snyder-McLean, Solomonson, McLean, & Sack, 1984). JARs intervention is designed to teach children with ASD novel play behaviors (Ingersoll & Schreibman, 2006).

Mand Training - "A 'mand' may be defined as a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation" (Skinner,1957 as cited in Drash et al., 1999).

Modeling – Modeling is an instructional strategy by which teachers engage students in imitation of particular behaviors that encourage learning (Kerr & Nelson, 2002; Scott et al., 2000).

Module – American Heritage Dictionary (2000) defined a module as "a unit of education or instruction with a relatively low student-to-teacher ratio in which a single topic or a small section of a broad topic is studied for a given period of time" (Retrieved 2010). This module is suitably gauged to meet specific outcomes. The purpose of this module is to provide a platform to increase knowledge about students with ASD.

Overcorrection – Overcorrection is a behavioral modification technique used to decrease undesired behavior through an exaggeration of experience (Iwata et al., 1994).

Perseveration - Perseveration means that individuals with ASD do certain actions over and over like shutting a door, lining up toys, rubbing hands together, or repeating a phrase or word (Scheurmann & Webber, 2002; Scott et al., 2000).

Picture Exchange Communication System (PECS) - PECS is developed for use with children with ASD and other social-communication deficits. Therapists teach communicative social interaction that is functional for the child with ASD. The fundamental objective of PECS accords when a child reaches for the desired object or

activity after a picture is introduced in between the child and their desired object or activity (Bondy & Frost, 1994, 2001).

Pivotal Response Training (PRT) - PRT is a behavioral treatment intervention used to increase motivation by including components such as child choice, turn-taking, reinforcing attempts and interspersing maintenance tasks. This technique has been used to target language skills, play skills and social behaviors in children with ASD (Koegel et al., 1999 ; Schreibman, 2000; Stahmer et al., 2003).

Preference Assessments – "Preference assessment can be described as a systematic process to identify an individual's preferences for objects or activities" (Didden & Moor, 2004, p. 107).

Prompting – Prompting is defined as "instructions, gestures, demonstrations, touches, or other things that we arrange or do to increase the likelihood that children will make correct responses (Krantz & McClannahan 1999, p. 37 as cited in MacDuff et al., 2001).

Punishment – "Punishment refers to a situation in which a behavior is followed by the delivery of a stimulus and the probability of the behavior occurring in the future is thereby decreased" (Slifer & Amari, 2009, p. 145).

Reinforcement - The act of following a specific response with a reinforcer is called reinforcement (Kerr & Nelson, 2002 & Scott et al., 2000).

Reinforcement Schedules - A schedule of reinforcement is the protocol for determining when responses or behaviors will be reinforced. These are scheduled at particular time intervals for the purpose of maintaining or increasing behavior (Kerr & Nelson, 2002).

Self Injurious Behavior (SIB) - When an injury is inflicted by a person upon their own body**,** it is called Self Injurious Behavior (SIB). For example, biting one's hand, scratching or hitting the face are all Self-Injurious Behavior (Filipek et al., 1999; Scott et al., 2000).

Self-Instruction – Self –instruction is a procedure that one gives oneself while performing complex task (Nelson et al., 1991).

Shaping – Shaping is a process of reinforcing a series of responses successfully closer and closer approximations to a desired target behavior (Peterson, 2004).

Social Stories - Social stories is a promising teaching tool designed to address a particular problem situation where the student with ASD learns what behaviors are expected of them and the behaviors to avoid in a social settings (Crozier & Sileo, 2005).

Stereotypic Behavior – Stereotypic behavior includes rhythmic and uncontrolled repetitive behavior that produces no immediately discernible adaptive effects in children with ASD (Bodfish et al., 1995 as cited in Lee et al., 2007).

Stimulus Control - Stimulus control occurs when teaching students to respond accordingly to specific antecedent stimuli at the appropriate time, in the proper place, and

in response to specified instructions or other cues (Touchette et al., 1985; Kerr & Nelson, 2002).

Target Behavior – An identified observable and measurable behavior to be changed is called the Target Behavior (Kerr & Nelson, 2002; Scott et al., 2000).

Task Analysis – The process of breaking down the complex task or behavior in its constituent components (subtasks) (Scott et al., 2000).

Limitations of the Study

Exploring the limitations of this study will promote future inquisition in the field of professional development opportunities for parents working with or living with individuals with ASD. The primary limitation is the sample size itself because the study could not be administered over a larger part of the population. This renders random sampling of the whole population unrealistic. The generalization of the results will include only those who completed the web module and exclude those who could not access it. A second limitation was that the survey was developed by the researcher during which there was a window of time between each pre-test and post-test format. During this window, participants could memorize specific facts about ASD instead of garnering a proper comprehensive understanding of module. Third, participants exploring the module may not be able to dedicate the required time needed to complete the module. Fourth, the ability of the responder to verify and gather accurate information upon request is a further limitation. Finally, the reliability and validity of the instrument itself may have affected the results seen during the study. The method being used is derived from several former

studies in which reliability and validity had been recognized; however, there was no trial study carried out that confirmed the reliability and validity of this specific method.

Significance of the Study

Studies within the past decade have suggested an increase in the number of children diagnosed with ASD among U.S. children (ASA, 2006; Steege et al., 2007). Children with ASD face unique challenges including social and educational interaction between parents and professionals committed to teaching these children. Due to this growing number of children with ASD, the need for early intervention necessitates research that focuses on the needs of the children. Thus, the study will review the most effective interventions needed to help each individual with ASD reach their full potential (APA, 2000; Heward, 2006). The existing research - addressing research-based strategies for working with children with ASD and lack of initiative to distribute this information for intervention services - makes this study even more important to those individuals currently working in the area. The insights gained from this study can be beneficial to school leaders, parents and special education teachers who seek to provide the best possible services for the children diagnosed with ASD.

Due to the overwhelming significance of practically evidenced materials related to ASD that are now being distributed, the purpose of the online behavior module is to investigate the information and develop a reasonable structure to assist parents, teachers, and professionals. The study has united foundations of knowledge about ASD, behavior related issues, and interventions to foster knowledgeable providers in both educating children with ASD and functioning as resourceful partners to the parents.

Organization of the Study

Five chapters will be presented in this study. Chapter one offers an introduction to the general purpose of the study including the statement of the problem, research questions, theoretical and conceptual framework, assumptions, definition of terms, limitations, the significance of the study and summary as a whole. Each section involves an extensive understanding of the importance of assessing the effectiveness of the online professional development module for children with ASD.

Chapter Two will consist of an overview of the literature associated with ASD including the developmental characteristics and behavior issues, and types of research-based effective intervention approaches recommended for early intervention that are of particular interest to parents and professionals. Chapter Three will explore the research methodology used in this research including the research questions, rationale, context of the study, data sources, data collection methods, data analysis, a data management plan, and the validity and generalizability of the study. Chapter Four will present the analysis and organization of the collected data. Finally, Chapter Five will discuss the previous four chapters, provide a discussion of the findings, and offer recommendations and implications for future research.

Summary

The increase in the diagnosis of ASD in the United States has resulted in a need for a greater awareness of research-based intervention techniques. This research investigated the impact of an online behavior module on parents' knowledge of these interventions. Generally,

individuals who are working and/or living with ASD may have the basic skills needed to accomplish their goals. To solve this situation, extensive and accessible information should be attainable by providing up-to-date, research-based information in a concise framework that would serve as a foundation for effective treatment by all parents, caregivers, and professionals who work with children with ASD. The professional online behavior module was meant to be a resource for parents and others who are interested in working with children with ASD or who lack experience in this field. The study evaluated how well the online behavior module provides valuable information to parents working with children with ASD.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The literature describes many approaches, processes and findings to form a knowledge base regarding the behavior of students with autistic spectrum disorder (ASD). This wide variety of information creates difficulties for parents as they seek to determine appropriate services for their children with ASD. Effective intervention and support services are necessary for children with ASD whose behavioral challenges interfere with learning and need extensive intervention strategies. Often, however, parents may be attracted to interventions described on the internet, parenting books or other popular resources without knowledge about the research which supports or negates these strategies. Many parents need guidance to increase their knowledge as well as to understand the behavior issues faced by their child with ASD. The information gathered from this research will help determine if parents of children with ASD can improve their knowledge of research-based behavioral interventions through the completion of an online, behavioral module.

Autism Spectrum Disorders

The incidence of ASD has greatly increased in the past several decades. ASD is the most common type of developmental delay in the United States, with more than 1.5 million diagnoses in students and adults (Scott et al., 2000). That number has continued to increase through the past decade. ASD affects the way a child behaves, thinks, communicates and interacts with others (Scott et al., 2000). Students with autism

present particular behavior and communication challenges within the residential and classroom settings. “One hallmark feature of children with autism is deviant or delayed speech and language skills” (Charlop-Christy et al., 2002, p. 213).

Definition

Autism is a developmental disability that was identified more than 60 years ago by Leo Kanner (1943). It is characterized as a spectrum of disorders in which pronounced impairments are present in social and language communication domains accompanied by ritualistic and challenging behaviors (National Research Council, 2001). ASD is diagnosed in the early childhood period, often as early as 24 months, but usually by 42 months (Wolery, 2005). ASD includes five disorders that fall under the umbrella of Pervasive Developmental Disorders. They are behavioral defined disorders (Scott et al., 2000) which manifest in delays of "social interaction, language as used in social communication (both verbal and non-verbal), or imaginative play. They are usually evident by age three.

Autism, as defined by the America Society of Autism, is a “neurological disorder that appears during three years of age and affects the areas of social interaction and communication skills” (ASA, 1999, p.1). The ASA further describes ASD as “a complex developmental disability that typically appears during the first three years of life and affects a person’s ability to communicate and interact with others.”

The *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (*DSM-IV;* American Psychiatric Association, 1994) defines autism under the umbrella category of Pervasive Developmental Disorders (PDD), while medical professionals refer

to both PDD and autism as *autistic spectrum disorders* (Filapek et al., 1999). According to *DSM-IV's* definition, the behavioral characteristics of ASD lead to a lack of social responsiveness, delays in speech or inadequate quality of speech, restricted or stereotypic interests, delays or abnormalities in social interactions, and lack of symbolic play. Autism is among disorders with the higher incidence of the low-incidence disorders (Scott et al., 2000).

The DSM-IV includes autism in the more general category of Pervasive Developmental Disorders. The five diagnostic subcategories of Pervasive Developmental Disorders given in the DSM-IV are: autistic disorder, pervasive developmental disorder - not otherwise specified (PDD-NOS), Asperger's disorder, Rett's disorder, and childhood disintegrative disorder. To receive a diagnosis of autism based on the criteria in the DSM-IV, a child must demonstrate limitations in the areas of social interaction, communication, and stereotypical patterns of behavior, interests, and/or activities. The DSM-IV diagnostic criteria are generally thought to be the most widely accepted criteria used in the United States.

Common Problems in Children with ASD

Children with ASD typically exhibit overwhelming characteristics as follows: (a) difficulty in expressing needs, using gestures or pointing instead of words, (b) repeating words or phrases in place of normal, responsive language, (c) preferring to be alone, aloof manner, (d) insistence on sameness; resistance to change (Wolery, 2005). The Individuals with Disabilities Education Act (IDEA) of 2004 definition of ASD specifies a broad range of characteristics in language development, communication, social interaction, repetitive behavior, and no eye contact (Scott et al., 2000). "To be classified

as autistic, a child must have a total of six of 12 characteristics and must have at least two of the prescribed social impairments and at least one communication and behavior manifestation" (Scott et al., 2000, p. 31). "Individuals with autism who typically have difficulties with verbal and non-verbal communication behaviors are a discrete action that has functional meaning" (Fucilla, 2005, p. 44).

Communication

Communication is a process of sharing information or ideas with other individuals which involves encoding and transmitting the destined or planned message (Shames & Wiig, 1990). "Communication always occurs through some sort of vehicle, such as speech, gesture, sign language, written form, cartoons, facial expression, vocal tone, and so forth" (Landa, 2005, p. 247). While speech is the verbal means of communication, language is one method of communication. Shames and Wiig (1990) explain that language is the accumulation of shared meaning of the common ground through which knowledge, belief and behavior can be experienced and explained. Children with ASD are often impacted by decreased communication abilities. The DSM-IV (APA, 1994) delineates the qualitative impairments in communication as: (a) delay or lack of spoken language; (b) significant inability to initiate or sustain conversations; (c) repetitive, stereotyped, and /or idiosyncratic language; and (d) deficits in social, spontaneous, and /or creative play (Scott et al, 2000, p.13).

Some children with ASD never learn to use spoken language, while others will only learn the basic language specific to their needs (Lord & Paul, 1997). A child may mostly repeat what he or she hears (echolalia). Others develop advanced speech, but have problems in their ability to express feelings or ideas, or in knowing the right way or time

to say things (Turnbull et al., 2004). "Communication development in children with ASD does not proceed in a typical manner" (Scott et al., 2000, p.12). Some individuals with ASD do not develop enough natural speech to meet their daily communication needs. Differences in communication may be present from the first year of life and may include delayed onset of babbling, unusual gestures, and difficulty communicating with speech or with gestures. Individuals with autism have difficulty starting or continuing a conversation (Turnbull et al., 2004; Scott et al., 2000).

A second area of communication difficulty for children with ASD is joint attention. Joint attention is a social ability that helps individuals regulate, respond to and engage in social interactions with others (Snyder-McLean et al., 1984). It is the process whereby an adult and child are both focused on the same thing, sharing one's experience of observing an object or event by following gaze or pointing gestures (NRC, 2001; Wetherby, et al., 2000). This is critical for social development, language acquisition, and cognitive development (Snyder-McLean et al., 1984). Joint attention is one of the crucial types of communication for children to understand and initiate communication. It refers to the ability to correspondent or correlate attention with a social partner around a situation. Absence of joint attention skills appears to be an early sign of developmental disability, such as autism (Landa, 2005).

Another communication problem is perseveration. Perseveration refers to the uncontrollable repetition of a particular response (Waterhouse & Fein, 1982). Children with ASD take the repetitive phrases and repeat them in a loop, sometimes for many hours; "to infinity and beyond' and 'I am not a number" are a few examples.

Finally, some children with ASD have trouble interpreting nonverbal cues like gestures, eye gaze, body language, and touch (Wetherby, 1986). Most individuals with ASD have problems with eye contact and have poor attention span. They are often unable to use gestures as a primary means of communication, as in sign language, or to assist verbal communication, as in pointing to an object they want. Children with ASD also do not understand the social use of language. They are unable to integrate gestures into conversation and understand humor or the meaning of a conversation (Scott et al., 2000; Wetherby, 1986).

Social Interaction

Welton et al. (2004) addresses the basic skills critical to success in life. Such skills include, but are not limited to, common social interaction, appropriate language, and development of various interests. Children with ASD demonstrate social struggles, language difficulties and limitation of interests, inoperative to diagnosis. The extent to which these characteristics are shown varies largely among individual with ASD. Additionally, people with ASD have impaired reciprocal social interaction and often lack the intuition about others that many people take for granted. Social impairments become apparent early in childhood and continue through adulthood. People with ASD show less attention to social stimuli, smile and look at others less often, and respond less to their own name. They prefer to remain aloof, be alone, and not respond to verbal cues (acting as if deaf) (Stevenson, 2000). In addition, children with ASD also have trouble comprehending the emotional states of others and express themselves nonverbally (NRC, 2001).

Joint attention deficits may reflect a fundamental component of the social disturbance of ASD. One of the four core social symptoms of autism in DSM-IV is now described as a lack of spontaneously seeking to share enjoyment and interests with others. One of the major aspects of individuals with ASD is their lack of facilitative behaviors, (i.e., behaviors such as touching and hugging that strengthen social bonds). Children with ASD rarely exhibit cooperative social behavior (Mundy et al., 1986). Quite often, they will not allow anyone to cuddle them or show any affection (Stevenson, 2000).

Lord and Paul (1997) state that children with ASD engage less in give-and-take social interactions with caregivers, siblings and other close relations. The actions of others are confusing to these children and they may withdraw from social interactions. Many have difficulty with interactive play. They may have difficulty picking up social clues so their actions may not be appropriate for the situation.

Behavioral Issues

Serious problems arise in the personal and social behaviors of many children with ASD. The most significant issue displayed by children with ASD is "markedly restricted repertoire of activities and interests" (Scott et al., 2000, p. 166). This behavior typically exhibits temper tantrums when the day-to-day routine or everyday schedule is altered. Changes to routines can cause stress and anxiety, which may be displayed as behavior problems. These children have limited interests, which undermines their ability to move from one activity to another and isolates them from social interaction. Children with ASD display some behaviors that are viewed as "excessive" and appear in higher frequency and longer duration than with other children. Some behaviors viewed as "deficits" appear in less frequency and shorter duration, e.g. frustration in

communication results in tantrums. This makes it all the harder for them to integrate with others at home or school. Individuals with ASD often experience problems making friends and can experience loneliness and frustration as a result (Tunbull et al. 2002; Scott et al., 2000).

ASD is associated with a wide range of repetitive behaviors. Stereotypy, in the form of repetitive, invariant motor responses, is a defining characteristic of children with ASD (APA, 1994). Common stereotypic behaviors include hand flapping, body rocking and head shaking (Luiselli et al., 2004). An individual with ASD may show restricted, repetitive or ritualistic behaviors, interests or activities (i.e. prefer certain clothing or eating only certain foods, flap their hands, make odd hand and body gestures, spin or like to spin objects, rock themselves, be self-injurious, show ease of aggression, resistance to change, and becoming angry or upset if their daily routine changes in any way) (Scott et al., 2000). Stereotypy can involve any one or all the senses: a) flipping fingers in front of the eyes, flapping arms or hands are visual sense of stereotypy, b) tapping ears is auditory sense of stereotypy, c) scratching is tactile sense of Stereotypy, d) rocking front to back or side-to-side are a vestibular sense of stereotypy, e) placing body parts or objects in one's mouth or licking objects are taste sense of stereotypy and f) smelling objects is a smell sense of stereotypy (Edelson, 1995).

Stereotypy is a concern because it interferes with learning, competes with acquisition of adaptive skills, and is socially stigmatizing (Luiselli et al., 2004). The occurrence of stereotypy has been associated with impaired learning (Kennedy et al., 2000). Stereotyped activities such as hand flapping and closing car doors in a prescribed order may be meaningfully combined into a single repetitive action (South et al., 2005).

Repetitive and stereotyped behaviors are not only an intrinsic part of ASD, but also characterize the wider and much more common phenotypic expression that extends to PDD (Rathwell, et al., 2006).

Finally, an injury inflicted by a person upon their own body is called Self-Injurious Behavior (SIB). Biting one's hand, scratching or hitting the face are all examples of SIB (Scott et al., 2000; Turnbull et al., 2002). SIB can take many forms and proves most destructive in the classroom environment. Children with ASD who engage in SIB have difficulty in many learning environments and require specific and intense intervention to alleviate the behavior.

Students with ASD often engage in these and other maladaptive behaviors impacting their ability to learn. In some cases, stereotypic or repetitive behaviors can be harmful to the child's welfare. In the next section of this chapter, Applied Behavior Analysis (ABA) will be described as the theoretical foundation or methodology for a variety of related research-based interventions. Then, the following interventions will be described: Discrete Trial Training, Joint Action Routines, Pivotal Response Training, Picture Exchange Communication Systems, and finally, Social Stories. Each intervention will be described, followed by a discussion about how it impacts children with ASD. Next, the positive contributions of the interventions will be reviewed and the stages in the intervention will be presented. Finally, selected studies, which demonstrate the success of the behavioral intervention, will be presented.

Applied Behavior Analysis

ABA is a blend of psychological and educational techniques that are emphasized based upon the needs of individual children. ABA is used to measure behavior, teach functional skills, and evaluate progress (Hilton & Seal, 2007). ABA improves human behavior as it objectively defines and measures behavior, as well as focuses on socially significant behavior. Socially significant behaviors include reading, academics, social skills, communication, and adaptive living skills (ie fine motor skills, personal self-care, dressing, domestic skills, and work skills) (Baer, et al., (1968). "Behavioral treatment has been defined as synonymous with ABA, and as the application of the principles of learning to human behavior for the resultant effect of improved socially significant behaviors" (Kates-McElrath et al., 2006, p. 242).

Definition from the Literature

The defining characteristics of ABA are clearly described by Baer, et al., (1968) as including "(a) the systematic application of interventions based upon the principles of behavior to (b) improve socially significant behaviors, and to (c) demonstrate that the interventions employed are responsible for the improvement in behavior. ABA focuses on the reliable measurement and objective evaluation of observable behavior" (Culig et al., 2005, p. 37). ABA uses systematic and planned teaching techniques designed to increase desired behaviors and decrease stereotypic/problem behaviors (Schoen, 2003). ABA is based on the assumptions that behavioral problems result from past and present environmental circumstances and that modifying a student's present situation will promote more productive responses (Kates-McElrath et al., 2006).

ABA as a Process

When teachers and therapists use ABA to help students with ASD to acquire more positive responses, they describe present behaviors in desirable and observable terms and identify one or more effective reinforcers. In addition, they develop a specific intervention plan. During the intervention, they measure behaviors and monitor the program for effectiveness by observing how behavior changes over time (Hilton & Seal, 2007). During ABA treatment, behaviors of children with ASD are carefully observed to assess exactly what behaviors are performed, when these behaviors are performed, at what rate the behaviors are occurring, and what happens before and after the behaviors (Culig et al., 2005). ABA uses antecedent stimuli and consequences, based on the findings of descriptive and functional analysis, to produce practical changes in behavior (Baer et al., 1968).

An important part of the intervention process for children with ASD is the identification and the monitoring of goals related to the behavior and development of children with ASD. Such goals might include establishing a regular toilet routine or increasing the ability to make needs known (Dunlap, 2006). To teach new skills such as functional life skills, communication skills and social skills to children with ASD, the instructor breaks skills into feasible steps to be taught systematically using reinforcement. Positive reinforcement is provided to increase desired behaviors in children with ASD by rewarding the child in order to increase on-task behavior or to increase their attempts to initiate play in a social interaction. Inappropriate behaviors can be reduced by modification of the child's environment or redirecting the child to a more appropriate activity e.g., redirecting the child to a functional activity (Simpson et al., 2005).

Procedures that strengthen desired behavior and/or decrease undesirable behavior are used as part of an individualized intervention plan (Scott et al., 2000).

The Impact of ABA

> "ABA methods are used to support persons with autism and related developmental disabilities in at least five ways: (a) to teach new skills (e.g., systematic instruction and reinforcement procedures to teach functional life skills, communication skills, or social skills), (b) to reinforce and maintain previously acquired skills, (c) to generalize behavior from one situation to another (e.g., teaching and transferring social skills to natural settings), (d) to restrict or narrow conditions under which interfering behaviors occur (e.g., modifying the learning environment; antecedent modification), and (e) to reduce interfering behaviors by discontinuing their reinforcement and reinforcing competing replacement behaviors. These methods are incorporated into ABA educational programs and are comprised of two major components. The first is assessment of behavior in the educational context, and the second is intervention based upon the assessment to improve academic, vocational, life-skills, and social behavior" (Steege et al., 2007, p.92).

ABA is a specific type of behavioral therapy that has been shown to be effective in influencing developmental problems when applied intensively over an extended period of time and when applied in a way that accounts for individual differences in children with ASD. It has demonstrated success with disorders such as speech problems and problems interacting with other children. There is also evidence that it can positively influence language functioning. ABA is a repetitive form of treatment that is focused on building social and language skills through a highly structured presentation of stimuli and direct feedback in the forms of reward.

Planning an ABA Intervention

According to (Baer et al., 1987), the effectiveness of the ABA intervention process incorporates the following features or components that constitute a favorable and accountable approach to behavior change. The first step in any ABA program is to observe the child and develop a plan to change interfering behaviors. The behaviors requiring modification are observed to determine the antecedents and consequences of the behavior. Second, the goals are identified to determine which particular behavior will be addressed in intervention and in what order the new behavior will be broken down into smaller steps in order to teach the specific skills necessary to develop the target behavior. Next, a method of measuring target or undesirable behaviors, before treatment (baseline level) and during treatment, is developed. Then, the treatment program is evaluated for effectiveness by observing how various behaviors change over time. Next, the interventionist takes steps to promote generalization of newly acquired behaviors (e.g. by having student practice the behaviors in a variety of realistic situations). Continuous measurement of target behaviors to determine the effectiveness of the intervention is undertaken. Gradually, the interventionist phases out the treatment after the desired behaviors are acquired (Baer et al., 1987). Data collection and continual reinforcement are important components (Dunlap, 2006). The data is recorded on individual level, usually by graphing process (Schoen, 2003).

The process of ABA is very systematic and children with ASD are first individually studied to assess the behavior that needs to be corrected or changed. Once the behavior is identified, the intervention strategies are induced to correspond to the situation and modify the behavior. Children with ASD are taught by breaking down

desired skills into manageable steps (task analysis) and teaching the steps through repeated presentation of skills. During the intervention process, the instructor (teacher or parent) presents reinforcement to obtain and maintain the desired behavior. Evaluations are made throughout the modification process to assess the efficacy of intervention. The behavior that is targeted for change must be observable and measurable (Schoen, 2003).

Deciding to Use ABA

ABA is broadly used for educating and treating children with ASD. ABA targets consistency in the child's environment (Steege et al., 2007). Application of ABA principles offer a reasonable probability of gains in functioning in areas such as language, play, social and self-help skills, self injurious, and stereotypic behavior (Stain & Schwartz, 2001; Hilton & Seal, 2007). ABA is data driven and is based on analysis of the data. Data is taken every time work is done with a student and changes to teaching strategies are made based on that data (Carr et al., 2002). Within the school setting, significant increases in the use of integrated classrooms (students with and without disabilities) have led to the need for more effective methods for changing maladaptive behaviors. The use of ABA therapy can increase the desired behavior and reduce undesired behavior in children with ASD, therefore, significantly enhancing the effectiveness of the teaching environment (Schoen, 2003).

In the next section of this chapter, Discrete Trial Training, an ABA-based intervention will be discussed.

Discrete Trial Training

Discrete Trial Training (DTT) is based on the principles of ABA with emphasis on the organized presentation of learning opportunities, prompting accurate response, delivery of positive reinforcement, and correcting response errors (Belfiore et al., 2008). The systematic and exclusive use of DTT in the treatment of children with ASD was pioneered by Ivar Lovaas at UCLA (Lovaas, 1993). DTT is a unit of instruction that is usually incorporated one-on-one in a distraction-free setting. It uses behavioral terminology to describe instruction but translates it to understandable and clear terms (Leblanc et al., 2005). "DTT is an orderly and intensive instructional methodology that involves four components: (a) presentation of a discriminative stimulus (SD), (b) occurrence or approximation of the targeted response, (c) delivery of a reinforcing consequence, and (d) a specified intertrial interval" (Steege et al., 2007, p. 94).

Defining DTT

DTT uses a single teaching unit or trial (Lovas, 1981) to teach new skills to children. The components of a trial include 1) the teacher's instruction (presentation of a discriminative stimulus), the child's response, and the consequence. Then, there is a pause before the next instruction is begun (Simpson et al., 2005, p. 98). "Providing or withholding a positive consequence marks the end of a teaching trial and the start of a brief period of time called an inter-trial interval (or ITI for short), separating each trial from the next trial. The inclusion of an ITI is a defining feature of discrete trials teaching" (Ghezzi, 2007, p.669). Another way of describing DTT could be (a) the cue, (b) the prompt, (c) the response, (d) the consequence, and (e) the pause after the consequence before presenting the next trial (Smith, 2001, p. 86).

The Process of DTT Intervention

DTT is used to explicitly teach skills which are often broken into discrete or component parts such as clear, concise, repetitive, and well paced instruction. Then, behavior is prompted and prompts are systematically faded until skills can be performed independently. Approximations of success are rewarded and finally, simple skills are mastered before new learning opportunities are presented (Kates-McElrath et al., 2006). A discrete trial consists of a therapist asking a child for a particular behavior. If the child complies, he/she is given a "reinforcer" or reward in the form of a high five or any other reward that means something to the child. If the child does not comply with the behavior, he/she does not receive the reward and the trial is repeated (Choutka, 2004). Smith (2001) states that DTT is an instructional method that breaks down learning task into smaller components/skills and teaches them in a consistent manner, focusing on one particular skill at a time. It provides substantial repetition of a particular task in order to ensure acquisition, uses a structured prompting procedure , and requires the use of positive reinforcement. DTT typically involves repeated and frequent instructional opportunities during more structured teaching sessions.

The Impact of DTT

DTT pattern is most useful for acquisition level skills. The procedure requires a defined response by the learner (Downs et al., 2007). DTT is accomplished by simplifying requests, prompting the child with ASD to make the correct response and providing abundant reinforcement for socially appropriate behaviors. At the same time, failures are minimized. Ensuring the child's motivation to participate in the learning process is a key element in behavioral interventions (Newman et al., 2002).

DTT instructional procedures can be used to teach young children with ASD a wide range of skills and has proven particularly effective in teaching children with ASD new behaviors. Children with ASD who were previously completely non-verbal have been successfully taught to speak (Downs et al., 2007). "Other research has shown that DTT is an effective instructional method that can be used to teach children with autism and developmental delays with problems such as a lack of generalized imitation (Coe, Matson, Fee, Manikam, & Lanarello, 1990; Young et al., 1994), poor receptive language (Lovaas, 1977), underdeveloped expressive language (Howlin, 1981), inadequate conversational skills (Krantz & McClannahan, 1981), reduced grammar and syntax (Risley, Hart, & Doke, 1972), impaired play skills (Coe et al., 1990), and inferior social-emotional skills (Downs & Smith, 2004)" (as cited in Downs et al., 2007, p. 3).

The Steps of DTT Intervention

In a DTT program, the teacher and student are usually situated at a desk or table facing one another. Instruction is introduced in an environment where distractions are minimized to include removable physical barriers. New concepts are often introduced in isolation with expectation of mastery. During teaching, there is mainstay on visual cues, such as picture schedules to prompt learners' behaviors throughout the day (Kates-McElrath et al., 2006).

The DTT approach incorporates using a basic procedure to teach a new skill and repeating it until the child learns. In the DTT procedure, a cue is provided to the student to engage in the behavior to be taught (e.g. 'pick up the cup'; if needed, following it with a physical or verbal prompt such as pointing at the cup). Students may need a gestural cue (sign or picture) to go along with verbal direction. Next, once the cue is provided the

student makes a response or is assisted to make correct response. Then, the student is reinforced for making correct response. DTT is usually taught in a series of fifteen to thirty trials per lesson in order to teach a skill. Next, data is collected after each trial to determine whether any changes are needed. Finally, once the student has mastered the skill, the level of reinforcement is attenuated until it is constructed in the natural environment (Simpson et al., 2005; Scott et al., 2000). DTT is supported by an instructor who breaks down lessons into easy steps. DTT integrates modeling, prompting, and reinforcement to promote skill acquisition (Newman et al., 2002). Implemented correctly, DTT clearly is one of the most powerful tools available for teaching children with autism (Steege et al., 2007).

Choosing to Implement DTT

DTT is the best-known intervention, based on ABA methodology, to treat ASD. DTT is the oldest of ABA teaching methods and is used in numerous variations ranging from rote memorization to abstract forms (Steege et al., 2007). DTT is a proven methodology for behavior change in specific areas of skill acquisitions. DTT, as an intervention for children with ASD, has the potential to produce positive outcomes. DTT should be selected if the teacher wants to teach (a) new forms of simple responses or behaviors or (b) discriminations among responses or behaviors based on an operant framework for learning. DTT can be used to teach new forms of behavior including language skills like receptive and expressive language; these are areas that have typically been targeted in the language comprehension and production of different language content and forms. It can also be used to decrease self stimulatory behaviors, motor movements, social interactions, and aggressive behaviors. The high degree of structure that is inherent in the DTT procedure makes it unique from other teaching procedures.

DTT allows a high number of teaching trials to take place during each session. This plays a vital role in providing a wide variety of opportunities to the children with ASD for practicing skills until proficiency is manifested. DTT has been used to acquire phonological skill, complex sentence structures, and language skills such as: plurals, adjectives, pronouns and acquisition of sign language (Luiselli et al., 2008).

Studies that Support DTT

Hilton and Seal (2007) studied DTT intervention with monozygotic twin brothers, age two and 4 years old, with severe speech–language delays and ASD. The parents were offered help for their sons.. The boys attended 16 of 18 sessions (the 60-min session) which typically included five activities with 10 correct responses set as criterion. The initial and final sessions were devoted to testing of communication skills. A traditional, school-based approach to encourage communication was used in a school system. During DTT sessions, activities were presented as discrete tasks, consisting of one step (‘‘point to cow’’) while signing the noun. Primary reinforcers (cereal) were initially offered and later replaced with a token reinforcement that included a choice of activities (e.g., blowing bubbles). Following the stimulus–response reward, the cycle was repeated. During the floor time sessions, the same materials were presented as during the DTT sessions. At least one session was videotaped. Communication and behavior data were collected during each session. Vocal, gestural and verbal responses to communication opportunities and negative behaviors were tallied from the videotapes. The DTT child showed improvement in three areas: gestural and vocal communicative means and social-affective signaling. The child with school-based intervention only showed losses in reciprocity and symbolic behaviors. Reciprocity is addressed in DTT in

its stimulus response reinforcement cycle. Behavioral data revealed an increase in both number and duration in DTT sessions (Hilton and Seal, 2007).

According to Newman et al. (2002), DTT is a powerful technique that can be used for teaching new skills to children with ASD. Speed of skill and competing behavior such as aggression, temper tantrums, and escape attempts were measured in this study. Three male students with ASD, ranging from seven to 12 years old, participated in this study in a classroom setting for an unidentified period of time. Prior to this study, two conditions, "teacher selects day" and "student selects day," were created. "Teacher selects day" was where the teacher chose the reinforcers to be used and the order in which the programs were conducted, and "student selects day" was where the student chose the order of programs and the reinforcers to be used. Three programs were isolated for analysis for each student. Daily lesson started with the teacher and student moving to a teaching table while the classroom sat facing each other, with teaching material on the table. Two students were able to make word sentences to make primary requests and another student who was non-verbal communicated through *Picture Exchange Communication System*. The student was shown a variety of primary and activity (toy) commodities and the these items were selected based on student's reinforcer inventory. In the pre-teaching instructions at the outset of "teacher selects day", the statement was made to the student that the teacher would choose the work (name of the program) and would specify the reinforcers. At the outset of "student selects day," the statement was made to the student that the student would choose the work (name of the program) and would specify the reinforcers.

Following the pre-teach instructions, the DTT instruction took place. In both conditions, the students received continuous reinforcement for correct responses. If the student responded incorrectly, a physical prompt was provided to guide the behavior as well as the correct response was modeled. Ten trials of each program (30 trials for three programs) were conducted each day. Inter-trial interval ranged from three to five seconds. The data was collected in both conditions and found that competing behavior was lower in the "student selects day" than "teacher selects day." In other words, competing behavior was decreased when student choice was introduced. Nothing changed in the teaching process except the order. The major findings of this study suggest that increasing student choice has no cost but has the advantage of reducing competing behavior in the teaching process. Additionally, the study indicated that DTT was effective in changing student behavior on either day.

Tarbox, et al. (2006) stated that children with ASD may particularly benefit from the use of a token economy to obtain desirable target behaviors. The purpose of this study was to demonstrate how token reinforcement may be used to increase the attending behavior of a young child with ASD during DTT. Adam, a five year old boy with ASD who was significantly delayed in his expressive communication and social skills as compared to age equivalent peers, participated in this study. All sessions were conducted in a small therapy room adjacent to a larger classroom. The sessions were five days per week and 10-trial sessions were conducted per day. DTT was conducted in the corner of a therapy room at a table with two chairs and Adam was allowed to play anywhere in the therapy room during breaks.

Tokens were provided for positive responses. Adam received laminated star stickers with Velcro adhesive and he placed them on a 'token board' with corresponding adhesive strips. The board was visible on Adam's work table across all sessions during which tokens were provided. The number of adhesive strips on the board corresponded with the number of tokens required per condition. The token board was removed and back-up reinforcement was available when all of the adhesive strips on the board were filled with stickers in conditions without tokens. A reversal design was used to check out different parameters of a token economy in relation to the attending behavior of a young child diagnosed with ASD.

During baseline, Adam was prompted through non-vocal prompts for eye contact to attend to the tutor at the start of each instructional trial. When Adam made correct eye contact for three times during five opportunities, eye contact was recorded. If Adam did not attend to the tutor after the initial prompt was provided, incorrect eye contact was scored and a vocal prompt was given to him by the tutor to look at the tutor. If Adam did not attend to the tutor after a vocal prompt was provided, the same vocal prompt was given a second time and no additional prompts were provided. The tutor proceeded to deliver a task-related instruction, prompting and reinforcing correct responses with social praise, as appropriate. Adam received a break after each 10 trial teaching session and Adam was allowed to play with a selection of preferred toys. During token reinforcement condition, Adam received a token (a star sticker) immediately for attending to the tutor after the tutor provided the initial prompt. A statement was made to Adam stating that he could earn stickers to get a break. If Adam attended to the tutor contingent on the initial prompt, a token and social praise were provided. Adam did not receive a token for

attending to the tutor following a vocal prompt. When Adam earned all 10 tokens, the tutor provided social praise (e.g., 'great job, you can take a break). The findings of this study showed that token reinforcement in DTT sessions increased the attending behavior of a young child with ASD and tokens required for back-up reinforcement can be increased without sacrificing the strength of attending.

According to Downs et al. (2007), DTT is one of the instructional strategies that has been used to successfully promote the developmental and educational outcomes of young children with ASD and can be ingrained throughout the ongoing daily activities of the preschool setting. DTT can be relatively easily implemented by early interventionist, teachers, paraeducators and caregivers across a wide range of preschool settings and has proven particularly effective in teaching children with ASD new behaviors and skills. The concise instructional segment used in DTT can lead to fast skill acquisition and is particularly appropriate for young students with ASD with limited participation in instructional tasks and formats. This method can also be used flexibly depending on the needs and resources of each student. Seven boys and five girls (12 participants) who were enrolled in a publicly funded developmental preschool located in a rural community in Washington State took part in Downs et al. (2007) study. Students, ranging from 32 to 63 months, participated in a period of 27 weeks of intervention at an average of 1.30 to two hours of DTT per week. Nine of the children were white, three were of mixed ethnicity and all came from homes where English was the primary language. DTT methods were used to teach the students skills in several developmental areas including receptive and expressive language (e.g., identification of objects, behaviors, emotions, colors, shapes), socialization (e.g., conversational skills, turn-taking), pre-academics

(e.g., letters, numbers, counting), daily living skills (e.g., following directions), and fine motor skills (e.g., drawing, cutting).

Students in the control group received equal individual attention as students in the intervention group. Each DTT block of instruction lasts for approximately 3-10 seconds.

Each student's level of cognitive, language, adaptive, behavioral and social-emotional functioning were assessed with an appropriate instrument respectively. Several analyses were conducted examining the students' adaptive behavior in the areas of communication, socialization, daily living skills and motor skills and indicated significant changes in adaptive behavior from baseline to post-intervention for students in the DTT group, especially in the domains of daily living skills and socialization. The results of this study indicate that DTT has potential to be used practically and productively within existing public school programs to positively influence the development of students with ASD. It also suggests that even small amounts of DTT (i.e., less than 1.5 h/w) may lead to significant developmental gains in school readiness for children with various developmental disabilities.

The next intervention to be reviewed will be Joint Action Routine. A description, usage, and research support will be presented.

Joint Action Routines

Impairments in communication are an essential feature of ASD involving delayed and/or lack of functional language, impairment in triggering or sustaining conversations, stereotyped or repetitive use of language, and a lack of discrete and spontaneous make-

believe play (APA, 1994). Effective communication needs coordinated attention. Interacting with others tends to be confusing and unpredictable for children with ASD. As a result, many children with ASD have difficulty participating in social events or avoid them altogether. When interactions are made more predictable and logical, children with ASD are better able to participate and communicate with others through JARs approach (Snyder-McLean et al., 1984).

Definition from the Literature

McClean and Snyder-McClean (1984) established the concept of Joint Action Routines (JAR). JAR is a repetitive interaction between two or more people that is relevant, predictable and intermittent. JAR is an intervention method that can be used by parents and professionals to help preschool low-functioning children, elementary-age children, and middle or high school-age students (Ben-Arieh, 2007 attain new skills because individuals with ASD benefit from routines, repetition and structure. JAR can take place while children play with toys, prepare a project, or complete a daily living routine, but the activity to be included in joint action routine must be predictable, reasonable and repeatable over a period of time (Snyder-McLean et al., 1984). "Joint attention is defined as visually coordinating attention with a partner to an external focus, showing social engagement and an awareness of the partner's mutual interest for the purpose of ''commenting'' rather than ''requesting'': (Schertz and Odem, 2007, p. 1562). "Joint attention is defined as the simultaneous engagement of two or more individuals in mental focus on the same external thing" (Murray et al., 2008, p. 5). "Joint attention occurs when two people, for example a young child and his or her parent, share

intentional focus on interesting object and events in their environment" (Jones et al., 2006, p. 782).

The JAR Process

JAR uses a natural language paradigm (Simpson et al., 2005) to blend behavioral techniques with a child centered approach to promote language acquisition. In this approach the teacher follows a child's leadership by teaching objects and words that are high interest to the child (Scott et al., 2000). JAR is based on the principle that children with ASD lack understanding of communicative behavior and of the didactic and reciprocal nature of the communicative events (Snyder-McLean et al., 1984). JAR depends on social pragmatic fundamentals with emphasis on the contextual nature of learning how to communicate (Prizant et al., 1998). Like receptive and expressive verbal language, joint attention appears in both responding and initiating forms and is displayed by following another's eye gaze or by showing or pointing to objects (Kasari, Freeman, & Paparella, 2001).

JAR Impact on ASD

Children with ASD have problems with acquiring meaning from what others say and do in social interactions. They are better able to participate and communicate with others when interactions are made predictable and relevant. JAR improves interactions by providing frequent repetition and rehearsal of target language within a functional or motivating activity (Jones et al., 2006; Snyder-McLean et al., 1984).

Charman et al. (1997) and Bruinsma et al. (2004) reveal that children with ASD demonstrate significant deficits in both initiation of and response to joint attention. Joint

attention has been divided into initiation and responding segments. "Initiation of joint attention is defined as the initiation of a communicative act that is used to direct another's attention to an object, event, or a topic of a communicative act (Wetherby & Prizant, 1993). These joint attention acts may include the use of eye contact, declarative pointing, or showing gestures to share an object or event with another. Response to joint attention is defined as the act of responding to a joint attention bid of another" (Murray et al., 2008, p. 5).

Joint action routines can be set up near a normally occurring situation such as snack, play, or household chores. For example, in a joint action snack routine, the child with ASD is presented with the most preferred snack beyond his/her immediate reach with one or two non-preferred items to work on the pragmatic functioning (e.g. refusing). Individuals who do not display communication may use eye gaze to indicate their preferences. JAR can be an excellent channel for building functional vocabulary and pro-social skills such as sharing (Gabriels & Hill, 2007; Naber et al., 2008).

The Steps of JAR Intervention

JAR teaches an acquired communication format where a sequence of acts is rehearsed systematically in a "routine". The participants of JAR play their role from the perspective of extracting a specific reaction from others and providing scaffolding to encourage children to use language. There are generally three types of routines: (a) preparation or fabrication of a specific end product (ie snack preparation, art, building a block tower, and product assembly); (b) organization around central plot line including pretend play (e.g., pretending to be firefighters) and community living skills (e.g., shopping in a grocery store); and (c) cooperative turn-taking games (ie playing "peek-a

boo," blowing bubbles, and cooperative team games that may occur during activities like morning circle routine) (Simpson et al.,2005; Snyder-McLean et al., 1984). A key element of joint attention is the division and alternation of the child's attention between the communicative partner and an object. This alternation involves one of the most identifiable deficits of children with ASD; a lack of eye contact (Bruinsma et al., 2004).

Effective JARs consist of several crucial components. First, the teacher determines the theme or purpose of the JAR. Effective routines must have themes that are motivating, meaningful and outcome oriented. Themes are used to make the activity more recognizable to the child and themes are set around normally occurring events. Students must understand what the activity is about and must want to be involved (Snyder-McLean et al., 1984; Woods & Goldstein, 2003). A theme is considered to be effective if participants enjoy and understand their role in it. Many children with ASD demonstrate limited motivation. In order to increase the child's motivation to participate in the theme play, it is important to include interesting materials or activities that interest the child. Through successive repetition, individuals with ASD learn their role and their motivation to participate in the theme play increases (Snyder-McLean et al., 1984).

Second, a JAR needs a joint focus meaning that participants attend to the same event and respond accordingly. Joint focus is designed to emphasize reciprocity and turn taking within consistent patterns of interaction. The adult responds to the child's signal by imitating the child's request or by modeling a more sophisticated communication target. Then, the teacher initiates the routine and signals the child to respond (Woods & Goldstein, 2003; Schertz & Odem, 2007). Using a puppet or blowing a single balloon are

examples of activities that increase the possibility of shared attention and turn taking (Schertz & Odem, 2007).

Next, roles must be clearly defined so that students are able to learn how to speak or act differently based on the role they are given. In more complex routines it is important for children to learn to play different roles within the same activity in order to learn the reciprocal nature of interaction (Woods & Goldstein, 2003; Snyder-McLean et al., 1984).

Fourth, a logical sequence of events and structure for turn taking is established in order to make the routine predictable and repeatable. This is done by breaking the routine down into small steps and modeling all the steps of the activity to make the routine familiar to the child. Each step of the process indicates a communication opportunity. Therefore, students can predict what to do in each step of the process. Activities such as preparing a peanut butter sandwich and making one's own bed all involve steps that follow a specific order. They have an obvious beginning and end. The teacher has to model what he/she wants the child to say or do and keep the sequence of the activity exactly the same each time until the child knows the routine very well and is able to take his/her turns persistently and properly (Schertz & Odem, 2007; Woods & Goldstein, 2003; Snyder-McLean et al.,1984).

Fifth, the teacher repeats the routine as frequently as possible. Repetition of words or actions needs to be planned into routines. The teacher should make a habit of communicating during a JAR, rephrase unclear vocalizations and word approximations with words, phrases, or sentences that match the child's actions or intentions. Children with ASD who rarely use language in conversations need to have frequent interactions to

learn to converse and converse more frequently when adults respond to their intentions, rather than correct their speech or language. A child learns to anticipate what to say or do through repetition (Naber et al., 2008; Woods & Goldstein, 2003; Snyder-McLean et al., 1984).

Finally, planned variation of routine gives children with ASD an opportunity to change what they say or do within the framework of an adequate routine. JAR is defined by a framework of individual events in a predicable sequence, but the routine is not valuable for intervention if there is no plan for variation and growth. Children with ASD get "locked" into what they say or do and they have problems expanding their responses. By interrupting the routine the same way many times, the child gets used to initiating and introducing new materials or new vocabulary. Variation must be well planned and individualized for each child as some children may immediately change what they say or do and some may respond very negatively to even the smallest change in the routine (Woods & Goldstein, 2003; Snyder-McLean et al., 1984).

Choosing to Use JAR

Children with ASD often display memory skills and a desire for routine in their daily lives. Therefore, they learn new skills when instructional strategies take these learning styles into practice. JAR allows children with ASD to use their rote learning virtue by providing them with relatively predictable, reasonable and repeated communication opportunities. They learn from adult modeling and cues that are highly organized and predictable, so they understand what to say or do. The child basically learns a "script" for the routine. When a routine is internalized it becomes a script (Snyder-McLean et al., 1984; Schertz & Odem, 2007; Shwalb et al., 2005). A JAR is a

highly predicable event that provides a script for all the participants. The structured interaction allows the child to know what exactly is expected because events are routine and anticipated. The child learns their roles by participating with others in the scenarios. Thus, JAR can provide structured opportunities to positively proceed through the steps of social interactions (Snyder-McLean et al., 1984; Schertz & Odem, 2007). Educators use JAR to teach specific and usually functional skills. The objective of JAR is to develop spontaneous conversation and increased social understanding (Jones et al., 2006; Snyder-McLean et al., 1984).

Studies Using JAR

Children with ASD generally present with notable deficits in joint attention (Murray et al., 2008). Murray et al. (2008) studied joint attention and initiation of joint attention in relation to specific components of receptive and expressive language in children with ASD. Initiation of joint attention (includes the use of eye contact, declarative pointing, or showing gestures to share) is characterized as the initiation of a communicative act that is used to direct another's attention to an object, event, or a topic of a communicative act. Twenty children with ASD (16 boys and 4 girls) between the ages of 40 and 71 months participated in this school-based study. A receptive language subtest was administered to calculate a receptive language score and the test items were administered until the child missed three consecutive items. Caregivers were told to engage the participants in a 15-minute videotaped play interaction which provided a more naturalistic context for interaction and classic performance. The examiner stayed in the room but did not participate in the play interaction. Ten minute segments of this videotaped interaction were analyzed for each participant. The results of the study

indicated that the children using JAR significantly increased their receptive and expressive language scores.

Naber et al. (2008) investigated numerous types of joint attention behaviors such as Basic Joint Attention (BJA, including the behaviors 'pointing' and 'gaze following'), Associated Joint Attention (AJA, including the behaviors 'following pointing' and 'checking') and Joint Visual Attention (JVA) at the age of 24 and 42 months, as well as their development over time. The aim of this study was to investigate the development of joint attention skills in children with and without autism spectrum disorders (ASD). The study took place at the University Medical Center of Utrecht at the Department of Child and Adolescent Psychiatry within a period of five weeks. In this study, two comparison groups were formed. One group consisted of children with developmental delays that matched the chronological and mental age of the children with ASD. The other group consisted of normally developing children who were matched on mental age with the children with ASD. Pointing and gazing were included in Basic Joint Attention (BJA) because they are closely related to the development of language. It was expected that the BJA behaviors would be reduced over time when language took over their communicative role. JVA was coded in percentage of time, whereas the other behaviors were coded in frequencies per minute.

In a time span of 25 minutes during maintenance task with the experimenter, an array of tasks were conducted to exercise checking, gazing, pointing, follow pointing and joint visual attention of the child. During maintenance task with the mother, the child and mother were left together in the room and the mother was instructed to change toys every three minutes in order to perform tasks such as playing with doll, peek-a-boo, drawing a

picture, and sing a song. Videotapes were made and the joint attention behavior was coded by the Observer Software System. *The Mullen Scale of Early Learning (*MSEL), a standardized developmental test, was used to assess the developmental level of the participating children at age 24 and 42 months. The results showed high correlations between the measures for joint attention, autistic symptoms, and developmental level. Correlations were computed to assess the relations between JA behaviors, cognitive development, and number of ASD characteristics. Children with ASD showed significantly less joint attention behavior at the age of 24 months but not anymore at the age of 42 months. In conclusion, overall joint attention may be used to differentiate between children with and without ASD, but only at the age of 24 months. At both 24 and 42 months, children with ASD only differed invariably on JVA from the other groups.

Next, Pivotal Response Training (PRT) will be described. PRT will be defined, its usage discussed, and the research support will be presented.

Pivotal Response Training

Pivotal Response Training (PRT) is a naturalistic approach to intervention to treat children with ASD developed by Robert L. Koegel and Laura Schreibman. Unlike most traditional ABA programs, these trials take place in a more natural play setting. PRT is a behavioral intervention based on the principles of ABA, which assume that children's impairments can be improved with environmental manipulations(ie reinforcement, consequences, extinction and responsivity to multiple cues). (Baker-Ericzén et al., 2007). PRT has demonstrated positive changes in the "pivotal behaviors," (i.e. crucial for the behaviors which depend on them) exhibiting widespread effects on many other behaviors

associated with language and social interaction. PRT provides a guideline for teaching skills and has been most successful for language, play and social interaction skills in children with ASD (Koegel & Koegel, Harrower, and Carter, 1999).

Definition from the Literature

PRT seeks to (a) teach the child to respond to multiple learning opportunities in naturalistic settings, (b) decrease the need for constant coaching and directing of the child's behavior, and (c) decrease the time the child is being instructed outside natural settings (Koegel et al., 1999). PRT teaches children with ASD a common set of "pivotal" behaviors or skills in order to produce improvement across a number of behaviors (Koegel, Koegel, and Carter, 1999, p. 577). Teaching children to respond to multiple cues is one of the pivotal behaviors targeted in PRT (Cowan & Alen, 2007, p. 704).

Baker-Ericzén, Stahmer, and Burns (2007) have identified four pivotal areas in need of intervention in children with ASD including responding to multiple cues, motivation, self-management and child self-initiations. PRT relies on naturally occurring teaching opportunities and naturally occurring consequences, it is child-directed, and it gives children the opportunity to trigger learning events (Schreibman, 2000).

The Process of PRT

Simpson et al. (2005) reported that PRT uses the principles of ABA in a way that eliminates negative interactions, decreases dependence on unreal prompts and is easily implemented by families. Target behaviors are taught in natural environments using pictures/objects that are age appropriate and reinforcing to the child. "In PRT the child is allowed to choose activities, they are provided with multiple examples of the behavior to be acquired within their chosen activity, and then they are systematically rewarded using

natural reinforcers. Easy-to-achieve maintenance tasks are included with tasks involving new learning in order to maintain the child's experience of success" (Stahmer, 1999, p. 30).

Another important aspect of PRT is the ability to respond to multiple cues. This feature has been called "stimulus over selectivity" and it involves reacting to multiple cues and stimuli in an educational setting. A child with ASD typically responds to very few of the cues in his/her environment. For example, when a teacher points to a picture of a cat and says "cat" and if the child with ASD looks at the picture but does not "hear" the spoken word, the child will not learn this association. Similarly, if the child hears the spoken word but does not attend to the picture, the child will not learn the label. Thus it is possible that this attention deficit can have very negative effects on the learning of children with ASD. Therefore, it qualifies as an important pivotal behavior (Koegel et al., 1988; Cowan & Allen, 2007).

PRT Impact

PRT is designed to help children learn skills that are essential for more effective functioning. PRT helps the child with ASD be more motivated in daily activities. Children with ASD are often characterized by a lack of motivation and respond with temper tantrums, crying, noncompliance, inattention, fidgeting, staring, and trying to leave the situation. PRT is used to increase motivation while developing important skills to teach turn-taking, appropriate responding, and frequent task variation. PRT training has proved very successful in increasing language skills in children with ASD. Additionally, symbolic play deficits are another characteristic feature of ASD. Differences in the play behavior of children with ASD during natural and elicited play

situations is due to the pervasive lack of motivation seen in children with ASD. Lack of motivation is exclusively distinct when teaching difficult and abstract skills such as language and symbolic play. In order to teach children with ASD to accomplish symbolic play actions, the teacher must provide a context in which the children are motivated to play in (Stahmer et al., 1995).

Social deficits present another primary diagnostic characteristic of ASD (APA, 2000). Social deficits can display in a variety of areas, including impairments in joint attention, decreased levels of eye contact, and a restricted affective range. Researchers indicated that embedding social interactions into the reinforcers resulted in increases in child-initiated social engagement during communication, improved nonverbal dual orienting, and improvements in general child affect (Koegel et al., 2009). PRT is very convincing in producing positive changes in the social behavior of children with ASD (Pierce & Schierbman, 1997).

Steps in PRT Intervention

Stahmer (1999) describes the various components of PRT involved in teaching the pivotal behaviors to children with ASD. First, the instruction question or other opportunity being given to the student must be clear, appropriate to the task, undisturbed, and the child had to be attending to the task at hand. It is important to make certain to have the child's attention first. Second, maintenance tasks (tasks that child has already mastered) should be interspersed with new and challenging tasks. Next, the child is allowed to choose the tasks to be used in training, thus enhancing motivation and performance. This is called shared control in that it involves turn taking (the teacher and child take turns) and it allows the child to have a great deal of control over the teaching

interaction (Koegel et al.,1988; Stahmer, 1999). Finally, it is also important to structure the learning environment in such a way as to increase the child's ability to respond to multiple cues.

Attempts are reinforced according to child's accurate responses. The reinforcement contingencies should be broad so that either the exact correct response or an approximation is reinforced (Thorp et al., 1995). Then, reinforcement includes both goal-directed and fully correct responses. Finally, natural consequence reinforcers related to the task are given.

Choosing PRT Intervention

The primary purpose of PRT is to improve the pivotal behavior of motivation leading to advancements in language skills. Most evidently, a motivated child tries harder and is more interested in the educational setting and is more likely to transfer the learned behaviors to other settings. This intervention method has been found to be effective in teaching language, social skills and play skills (Koegel et al., 198; Simpson et al., 2005). PRT has been extensively used to boost the motivation to increase language skills. Currently the technique has proved to be intensely successful for increasing manipulative play, symbolic play (Stahmer, 1995), and sociodramatic play (Stahmer, 1999).

Baker-Ericzén, Stahmer, and Burns (2007) found that children's adaptive functioning improved as a consequence of PRT intervention. Koegel et al. (1998) established that a naturalistic treatment approach resulted in increased use of functional speech in a variety of settings. Koegel et al. (1999) utilized the PRT technique to demonstrate increases in spontaneous social initiations, leading to the inclusion of children with autism in social circles of typically developing children with ASD.

Thorp et al. (1995) tried to teach an advanced level of social play, socio-dramatic play, using PRT. As a constructive method of socio-dramatic play training, PRT increased the child's motivation as well as provided multiple opportunities to increase the probability of new play. It also encouraged play as a reinforcing activity through the reinforcement of the child with ASD using various toys. The criterion of PRT was used to teach symbolic play skills to children with ASD (Stahmer, 1995). PRT provides opportunities to prepare children with ASD for learning conditions likely to occur in the typical classroom setting (Cowan & Allen, 2007). Stahmer and Gist (1997) stated that parents can be successfully taught to use PRT to increase manipulative and functional skills in their children with ASD and other pervasive developmental disorders.

Studies Using PRT

Stahmer (1995) looked at the use of PRT as a means of increasing symbolic play (play where something simple like a box can serve as a boat or a house) in children with ASD. The purpose of this study was to assess the practicability of teaching symbolic play skills to children with ASD, who are developmentally ready, by using PRT technique and examining individual differences that affect acquisition of these skills. Seven male children with ASD participated in this study; each of the children had a mental age of at least 2.5 years and had a chronological age of no older than 7.5 years. The study took place in a family room at home and an empty classroom at school for a period of eight weeks.

Baseline measures were attained before symbolic play training (SPT) or language training (LT) began. Two children with ASD in the LT condition (control condition) participated in a free play assessment. Five of the children with ASD initially symbolic

play training and treatment sessions were conducted three times weekly for one hour per session. Symbolic play training began in correspondence with the (PRT) manual. The treatment was adapted to use symbolic play as a target behavior instead of language. The following guidelines were highlighted during treatment: The experimenter presented toys according to the child's selection of a preferred toy by eye gazing, touching, or verbal request. The toys varied frequently based on the child's interest and the experimenter played with the toys while modeling the symbolic actions. When the child failed to respond, the experimenter played with the toy and modeled the response again and either the exact correct response (i.e., a symbolic play act) or an approximation was reinforced. The child's response was reinforced with the opportunity to play with the instructional material and with praise; functional play was interspersed with symbolic play to increase variation in play style and to reduce the risk of stereotyped play. In addition to this, the experimenter used turn-taking to provide a prototype and to increase the child's social interaction skills; as the child improved at symbolic play, he was expected to engage in more complex play. The results of this study stated that all seven of the children with ASD who participated in the symbolic play training showed an increase in symbolic play.

According to Baker-Ericzén et al. (2007), PRT differs from other behavioral techniques in that it relies on naturally occurring teaching opportunities and naturally occurring consequences and it is child-directed as opposed to therapist- or parent directed. It provides children the opportunity to initiate learning events. The purpose of their study was to provide a preliminary assessment of whether PRT would be effective if executed in a large-scale community-based setting and to determine whether specific child variables such as age and gender are associated with the result. This study involved

a large sample of parents and their children, with a range of ASD who were enrolled in an accelerated parent education program at a children's hospital in southern California, and parents were taught PRT. Parents who had a child with a diagnosis of ASD and who completed assessments at both pre- and post-intervention were included in the study sample. Children, ranging in age from 24 months to 113 months, participated in this study and families met individually with the therapist for one hour per week, for a total of 12 weeks.

During the course of the program, the parents learned PRT techniques in conformity with the PRT manual as well as several strategies for increasing motivation. Sessions took place in treatment rooms that contained a variety of developmentally appropriate toys (e.g. board games, dollhouse with furniture and dolls, piano, toy food) and children chose toys based on their own preference at each session. During intervention, the parent first presented clear instruction, question, or other opportunity to respond. Second, tasks the child already performed were interspersed with acquisition (new) tasks. Next, to maximize the child's interest in the learning situation, a variety of materials (e.g., toys, games, snacks) were presented and the child was allowed to select an activity or object. Then, the parent was taught to use direct reinforcers, which were directly related to the response. For example, the verbal response "car" would be access to a toy car as opposed to food. Finally, reinforcers were administered following any attempts to respond and contingent upon the behavior.

The survey form from the *Vineland Adaptive Behavior Scales* was administered to the participating parent of each child by the treating therapist at the end of the first and last sessions of treatment. The Vineland measures four domains of adaptive functioning

including communication (receptive, expressive, and written language skills), daily living skills (self-care, domestic, and community living skills), socialization (interpersonal, play, and coping skill), and motor skills (fine- and gross-motor skills). These were used for children under the age of six years. Scores from all four of the domains and the Adaptive Behavior Composite were used in the current study. Results indicated that the total sample of children with ASD, regardless of gender or age, did improve significantly from pre- to post treatment in a brief, 12 week parent education program. The results measured communication, daily living skills, socialization, motor skills, and Adaptive Behavior Composite domains of the *Vineland Adaptive Behavior Scales*. The same pattern of results emerged; that is, children showed significant improvements in each domain except in the communication domain for the girls and the daily living skills domain for children 6 years and older. This study, which used a community sample, demonstrated that children's adaptive functioning improves as a consequence of PRT intervention. One limitation of this study was that mastery of the PRT techniques used by parents, and whether or not parents applied the technique in an appropriate manner was not known.

Pierce and Schreibman (1997) attempted to replicate an earlier finding of successful social-skills intervention for children with ASD using peer-implemented PRT and to assess the degree of generalization across untrained peers. Two children with ASD, Derek and Stan, and typical peers participated in this study. Derek and Stan had nonverbal IQ scores of 76 and 50, respectively. Training took place during recess in the classroom for Derek and in a recreation room for Stan for period of two months. The generalization setting took place in a new third-grade classroom in which inquiries were

taken when most students were outside at recess. Researchers used 40 toys in training and generalization settings. Derek's and Stan's peer trainers were eight and nine years old respectively and were from different classrooms. They served as generalization peers and interacted with target children at baseline and post treatment without any special training.

A multiple baseline design was used across peer trainers, and was replicated across the two participants. During baseline inquiry, toys (training or generalization) were placed in the middle of the room. The child with ASD and his typical peer were told to play together without any other instructions. Baseline probes were conducted in the training setting, in a generalization setting, with a generalization peer, and with generalization toys. Baseline probes extended from several weeks to two months with Derek and Stan's peers (1 to 3 respectively). Derek and Stan both engaged in low levels of interaction at baseline. Each peer was taught PRT strategies according to multiple baseline design protocol. After peers had learned PRT strategies and began to implement treatment, Derek began to increase his social interaction, substantially reaching high interaction levels. The major finding of this study was that peer-implemented PRT technique could be used to increase the levels of social behavior for children with ASD. In general, however, the importance of these and previous findings was that, in the school setting, the use of peer trainers was feasible and a substantially effective option.

In the next section Picture Exchange Communication System **(**PECS) will be discussed. A review of the definition, its usage and research support will be presented.

Picture Exchange Communication System

Lori Frost and Andy Bondy pioneered the development of the *Picture Exchange Communication System* **(**PECS) beginning in 1985 within the state of Delaware. It is a

unique augmentative/ alternative training program that allows individuals with ASD and other communication deficits to initiate and develop effective functional communication (Scott et al., 2000). PECS is a modified applied behavior analysis program designed for nonverbal symbolic communication training. PECS is an effective program to assist individuals with ASD to become more effective communicators. PECS is a form of augmentative and alternative communication (AAC) that uses pictures instead of words to help children communicate; it was designed especially for children with ASD who have delays in speech development (Ostryn et al., 2008).

Definition from the Literature

PECS is a unique augmentative/alternative communication training protocol that has received worldwide recognition for focusing on the initiation component of communication (Bondy & Frost, 1994). "PECS teaches children to exchange picture symbols, and to mand and tact items" (Tincani, 2004, p. 152). It is a pictorial system developed for children with social-communication deficits (Bondy & Frost, 1994). The system uses basic behavioral principles and techniques such as shaping, differential reinforcement, and transfer of stimulus control via delay to teach children functional communication using pictures (black-and-white or color drawings) as the communicative referent" (Charlop-Christy et al., 2002, p. 213). PECS is designed specifically to minimize difficulties with communication skills experienced by individuals with ASD (Ganz & Simpson, 2004. p. 395).

The PECS Process

One hallmark feature of children with ASD is delayed speech and language skills (Charlop-Christy et al., 2002). The purpose of PECS is to initiate communication in a

social context and give a picture of a desired object to a communication partner in exchange for the object (Mirenda, 2001). Children are taught to exchange a single picture for a desired item and eventually to construct picture-based sentences and use a variety of attributes in their requests (Bondy & Frost**,** 2001).

The pictures are kept by the child on a PECS board with Velcro tape. The child is taught to use his or her PECS board to create a ‘‘sentence’’ by selecting picture cards (e.g., ‘‘I want’’ card plus ‘‘juice’’ card) and deliver the cards to a communicative partner as a request for a desired item (Charlop-Christy et al., 2002; Scott et al., 2000).

PECS is an approach for individuals with ASD to communicate without relying on verbal communication and it is a highly structured program involving the development of a collection of cards that feature pictures, symbols, words or photographs. Each card represents a task, action or object (Ganz & Simpson, 2004). PECS focuses on requesting objects rather than labeling objects and uses concrete reinforcement (food, toys, stickers) because it is more motivating for children with ASD rather than social reinforcement (verbal praise) (Ostryn et al., 2008).

The Impact of PECS

PECS teaches people with ASD to initiate communication by exchanging their PECS cards with another communication partner. For example, a child might exchange an object card if they want that object. Cards may be used to make requests, to ask and answer questions, or for more advanced tasks like making comments. The basic notion behind PECS is that students with ASD are able to use visual input more easily than auditory input. Delivering pictures is easier for students with ASD because the stimuli remain in the visual activity as needed. PECS provides an alternative means of

communication for students with ASD by using a system of picture cards to make requests, have their needs met, make comments and answer other people's questions (Spencer et al., 2008; Scott et al., 2000). Communication becomes an arch between the child and the desired items by having items available but inaccessible without assistance (Ganz & Simpson, 2004; Scott et al., 2000). In PECS, when a child uses an appropriate card, they are rewarded with the desired object or action. This reinforces the child's behavior and in turn, it increases the likelihood that the child will continue to use the cards for communicating needs and desires (Tincani, 2004).

Description of the Steps of PECS Intervention

PECS training is based upon a six-phase system in which the child with ASD initiates social communication. In order to begin PECS, the child is trained to reach for something that she/he desires (Ganz & Simpson, 2004; Scott et al., 2000). In other words, prior to beginning PECS training, it is necessary to determine what items will be so motivating to the child to initiate communication with an adult to request them. After identifying a number of reinforcing materials, phase I training can begin.

Phase I involves teaching the physically assisted exchange. The child and the trainer or teacher (serves as a prompter who sits behind the child and provides physical assistance to the child) are seated at a table. The child is presented a group of objects to determine which objects are preferred by the child frequently. Once the highly preferred item has been identified, the other objects are removed. As the child reaches for the desired object, the trainer or teacher assists the child to pick up a picture for the desired object. The child is physically assisted to give the picture to the trainer who must be physically close to the communicator. As the student learns to exchange pictures for

objects, the physical guidance is faded. No verbal prompting is used. The teacher provides many opportunities for practice and keeps it fun. Once the child initiates requests by independently picking up and handing a picture to another person, it is time to move on to phase two " (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

Phase II focuses on increased spontaneity for the child. The child becomes a persistent communicator by actively seeking out PECS cards and going to the 'communication partner' to make requests. It is important to not only increase the number of items but also the variety of reinforcers. Communicative partners need to steadily look for and have available preferred items to maintain a high rate of requesting using picture exchanges. The partner/teacher gradually moves away from the child so that the child must first take the picture off the communication table, and then stand up and reach to give the picture. During this phase the student learns to remove the picture from a display board for the exchange (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

Phase III develops discrimination training. In this phase, the student learns to select the target picture from a choice of multiple pictures from the communication board that differ in various dimensions. The child is presented with two pictures, one with preferred and the other with non-preferred item. If the child gives the preferred item, then the child is given the item. If the child gives the picture of a non-preferred item, the child is guided to choose the preferred item picture. As the child's ability to discriminate increases, the partner adds pictures so the child can begin to request from numerous items. Some learners learn best with photos, and others with graphic images that

approximate the appearance of an object exchange (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

Phase IV involves building sentence structure. The child learns to use sentences to make requests such as 'I want (name of desired object)'. This process of framing a request assists in differentiation of sentences later. During this phase, the student combines the object picture with the phrase "I want" on a sentence strip and gives the strip to the communication partner. The "I want" card is placed on a sentence strip and the student is assisted to place the picture of the desired object next to the "I want" card. The sentence strip is removed and given to the teacher in exchange for the item. The student is taught to place both of the cards on the board (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

In Phase V, the student learns to respond to the question "What do you want?" by exchanging the sentence strip. The communication partner begins by pointing to the "I want" card and asking "What do you want?" The goal is for the child to complete the sentence strip with the "I want" picture and follow through the exchange (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

Phase VI is commenting in response to a question. In this phase, the child builds on the skills learned in the earlier phases by learning to comment on things by responding to more detailed questions. The trainer holds one of the items, then places the "I see" card, the picture representing the item and the sentence strip on the communication board. The trainer holds up the item and asks "What do you see?" The trainer then points to the "I see" symbol on the board. Once the child is able to respond to "What do you

see?" the trainer begins to mix the questions "What do you see?" with "What do you want?" in order to teach differentiated responses. Finally, the "I see" card is placed below the "I want" card in communication board. The trainer gives the student the requested item when he uses "I want" and verbally acknowledges while providing alternative reinforcement when he uses "I see" (Scott et al., 2000; Bondy & Frost, 1994; Yokoyama et al., 2006; & Bondy & Frost, 2001).

Choosing PECS Intervention

PECS intervention is developed for non-verbal children with ASD and aims to teach spontaneous social-communication skills by means of symbols or pictures. This is done through reinforcement techniques. Behavioral strategies are implemented to teach the child to use functional communicative behaviors to request desired objects. PECS can be employed in a school and home settings (Howlin et al., 2007; Bondy and Frost, 1994). PECS instruction begins by teaching a social approach to another individual, a key deficit in ASD. PECS teaches functional communicative behaviors that are likely to be supported in natural environments (Charlop-Christy et al., 2002).

PECS is appropriate for individuals who do not use speech or who may speak with limited effectiveness and those who have lack of initiative in communication (Bondy & Frost, 1994). Without having to use spoken words, a child is able to turn an inner desire into an external reward. PECS also helps improve social interactions. Because the child is in charge of approaching the communication partner, the child learns how to make the first move. For children with ASD, approaching another person socially can be difficult. However, in PECS, the child is not expected to speak. Therefore, the initial approach may be less intimidating (Charlop-Christy et al, 2002; Bondy and Frost,

1994). Children with ASD are able to use PECS to communicate throughout their school days, not just during the training sessions (Kravits et al., 2002).

PECS Studies

According to Kravits et al. (2002), PECS is a promising instructional intervention and it is structured in a way that resembles a more naturalistic approach to teaching communication initiated by the child rather than controlled by adult verbal cues. Kravits et al. (2002) studied to evaluate the effectiveness of teaching PECS on the spontaneous communication skills of an elementary-aged child with ASD across home and school environments and also to examine the effects of the PECS for social interaction. Molly, a 6-year-old girl with ASD, whose speech was difficult to understand, used gestures and eye contact to communicate. Her frequency of initiations was very low. She used more verbalizations at home with her mother than with teachers or peers at school (center activities and journal time). Therefore, the PECS was chosen to provide an effective communication system to the girl across settings and to increase her spontaneous initiations and interactions with others in her environment. Material such as food (e.g., popcorn and candy), toys (e.g., Casio piano, Slinky, markers), and graphic symbols/icons (line drawings) were used in this study. Molly participated in this study for a period of thirty weeks.

The experimental conditions included two baseline conditions and two treatment phases which occurred during play activities at home and school. During the first baseline condition, Molly was observed in play situations across all settings before teaching using the PECS. Data was collected on the frequency of spontaneous language and social interaction across four weeks in all settings (i.e., home, centers, and journal time) and

verbalizations was typical to all settings. During the second baseline condition, the communication board with symbols was introduced across all environments but she was not prompted to use it and the data was collected under the same conditions as baseline one condition. During treatment phase, the Phases I–III, as outlined in the training protocol, were conducted, including reinforcer assessment (informally offering the student a number of items or foods to determine which are most highly preferred). Phase I consisted of exchanging the pictures independently without the prompter's assistance and without the open-hand cue from the trainer for 80 percent of the teaching period trials. Phase-II consisted of three steps such as the introduction of the communication board, an increase in the distance of the receiving trainer and student, and an increase in the distance of the board from student. The student made 80 percent correct independent request. Phase-III consisted of discrimination between multiple pictures on the communication board. Phases I–III were taught in the home setting and then treatment was implemented in classroom settings. The procedures of the PECS were taught during the teaching periods followed by the free play periods. With the PECS instructional protocol, Molly demonstrated successful use of the augmentative system. An increase in initiations at home was noticed as materials taken from the reinforcer assessment indicated choice as a vital aspect to increasing spontaneity within PECS. Verbalizations also showed increases in home and journal time and the duration of Molly's peer interactions increased in journal time. The findings of this study demonstrated effectiveness of PECS in increasing spontaneous communication skills for a young child with ASD.

Ganz and Simpson (2004) examined the role of PECS in improving the number of words spoken, increasing the complexity, and decreasing the non-word vocalizations of three young children with ASD. Three students (two male and one female) with ASD ranging from three to seven years of age participated in this study in an elementary school classroom, located in low socioeconomic neighborhoods in a large, urban school district. These participants had no prior experience with the PECS and had limited functional speech. Prior to PECS training, parents, teachers, and paraprofessionals completed a checklist of preferred reinforcements for each participant. During this research, two to five PECS training sessions took place per week (15 trials per session) until participants' mastered the first four phases of PECS. Each phase was continued for a minimum of five sessions. Training followed the procedures outlined by PECS training protocol. Materials used in PECS training included communication binders and each picture had Velcro on the back and was stored in the participants' communication binders and plastic sentence strip with Velcro on each side.

Participant one, Gail, did not respond to her name, label items, follow one-step directions, or interact with peers. Participant two, Ramon, could say over 30 words (e.g., names of teachers and classmates), had limited vocabulary, was generally knowledgeable, rarely initiated greetings or requests. Finally, participant three, Ben, could say over 20 words (e.g., colors, numbers, letters, states, names of his classmates). During PECS training sessions, the observers collected data on each participant's proficiency relative to the PECS phase criteria and recorded whether the child performed the desired response independently or with prompting for each trial. The observers also recorded the number of intelligible words spoken and non-word vocalizations and

videotapes were observed to collect samples of speech occurring during trials during the first and last sessions of each phase.

At the completion of PECS intervention, an analysis of the data indicated that all three participants were using high levels of words per trial, compared to their number of words during

Phase I. Gail made gains in Phase IV, while Ramon and Ben made gains in Phase III and complexity of sentences increased. Prior to Phase I, all participants were speaking in one-word utterances and ended Phase IV speaking in three or four-word phrases. In corresponding to this data, the current research supports the assumption that PECS may be influential in encouraging speech in individuals with ASD.

Liddle, (2001) stated that PECS intends to teach the student to communicate as opposed to 'how to talk'. The focus is on functional communication, not speech. For this study, PECS training was organized through the school's training program. Twenty-one children participated. Six children with little or no functional language were selected for initial PECS training. A firm diagnosis of ASD had been made and their classroom teacher had attended a two-day PECS training course. The parents agreed to attend parent training sessions. The PECS training intervention took place for a period of one year. The children then progressed through the phases. PECS was used in the classroom and the children had weekly sessions with the speech and language therapist. Six phases of PECS teaching protocol was followed during training. The initial findings obtained during the first month of using PECS were very encouraging. Only one child out of seven did not achieve Phase One.

Depending on the initial results of this study an additional fifteen children with ASD were introduced to PECS over the next year and followed the same pattern of intervention as the initial training. Children were in different classrooms and were selected by their teachers for their lack of communication skills. The results show that all twenty children, except one, learned to use PECS to request preferred items. Eleven children learned to use sentence strips to request items and the remaining nine children all improved in their ability to interact with others by being able to initiate requesting. The findings of this study indicated that the use of PECS increased initiated communication and requesting. Classroom teachers reported that several of the children improved in their ability to take part in classroom activities, particularly group activities (Liddle, 2001).

Social Stories will be discussed in the upcoming sections. A definition, usage and studies supporting the intervention will be reviewed.

Social Stories

Carol Gray created *Social Stories* in 1993. Social stories are short stories based on the evaluations and observations of a child and they target a problematic behavior or social skill. They are written from a first person perspective, short and individualized, presenting clear explanations to guide the child through a troubling social scenario (Gray & Garand, 1993).

Definition from the Literature

A social story is one type of proactive behavior intervention developed for use with students with autism and extended for use with students with ASD. While individuals with ASD may display deficits in the areas of social and communication

skills, they can display great intelligence, sensory integration difficulties, repetitive behaviors, difficulties with social interactions or social cues, language difficulties, and trouble with emotional responses. Each person with ASD may exhibit different combinations of these traits. As a result, their educational needs can differ greatly (Simpson, de-Boer-Ott & Smith-Myles, 2003). In describing social stories, Gray (2003) has stated that:

> A social story is a process that results in a product for a person with autism spectrum disorder (ASD). First, as a process, a social story requires consideration of and respect for the person with ASD. As a product, a social story is a short story defined by specific characteristics that describes a situation, concept, or social skill using a format that is meaningful for people with ASD. The result is often renewed sensitivity of others to the experience of the person with ASD, and an improvement in the response of the person with ASD (p. 1).

"A social story is a short simple story written from the perspective of the student to review or describe positive, appropriate social behaviors" (Crozier & Sileo, 2005, p. 27). They are individualized short stories written to explain challenging social situations through visual supports and text (Gray & Garand, 1993). The primary purpose of a social story is to provide descriptive information concerning a social concept or situation, including the people involved, the sequence of events, and the thoughts and feelings of others (Sansosti & Powell-Smith, 2008, p. 163).

Social Story Process

Social Stories have been described as a visual and auditory means for introducing information in a format that is understandable to an individual with ASD by explaining social concepts or situations, describing the necessary elements, and suggesting expected responses (Ivey et al., 2004). The stories are individually written to address the needs of a

particular student. Generally, they are written in first person with present or future tense verbs. Photographs, drawings and icons may be used to illustrate the desired behavior through scripted scenarios of social situations. Scripts are social scenario stories without pictures and script can be used for older students or changed into another format with pictures (Scott et al., 2000). Some students with ASD respond to stories written on a single page, while others may respond to book style stories with a very general picture or icon on each page. The story should be able to be generalized to other similar situations for the targeted skill and be as clear and specific as possible (Ivey et al., 2004; Gray & Garand, 1993; Smith, 2001).

Impact of Social Stories

The goal of a social story is to share accurate social information and improve social understanding, but not to change behavior. Social Stories are a medium for explaining what is happening and expected within environmental settings rather than a form of social skill instruction (Ivey et al., 2004). A good social story will focus on a particular social situation or interaction. According to Gray and Garand's (1993) description, social stories can be used effectively with any individual who has some basic language skills and slight deficits in learning ability. By teaching the concepts and strategies behind social skills before students enter the actual social situations, it helps students to identify positive social behaviors that would be required in a social setting (Scott et al., 2000).

Social Stories Intervention Steps

To ensure maximum benefit of social stories intervention, the interventionists should follow a systematic checklist for writing and using social stories. Gray and

Garand (1993), Crozier and Sileo (2005), and Scott et al. (2000) identified six steps necessary for the effective use of social stories.

First, through regular observation, the interventionist must identify student's target behavior. Second, the team should conduct functional assessment through behavioral observations, interviews and self-assessments. Third, team must make a plan to include social stories. Based on the collected data, the team should establish a baseline data and develop a hypothesis of why the behavior occurs. Once the team has agreed on the behavior plan, they can create the social story. Fourth, the team writes a social story based on the information gathered from the functional assessment using the guidelines established by Gray and Garand (1993). For a complete social story, one should include between two and five perspective, descriptive, cooperative, and/or affirmative for each directive or control sentence. Stories must be within the comprehension level of the target student either in present or future tense (Gray & Garand, 1993; Ivey et al., 2004; Crozier & Sileo, 2005; Scott et al., 2000).

Fifth, the social story is paired with simple line drawings, pictorial icons or photographs to support comprehension for students who have limited reading skills without picture cues. Picture cues are important tools for students with poor reading comprehension. Finally, have the student read the social story or read it to them, ask a few questions to ensure comprehension, and rehearse the desired social behavior (Gray & Garand, 1993; Ivey et al., 2004; Crozier & Sileo, 2005; Scott et al., 2000). After the student has started to use the social story, the team should continue to collect data on the target behavior in the same way it was collected during the functional assessment. If the desired behavior does not occur within two weeks, modify the story. Once the student has

mastered the skill, the story can be expanded in other situations. Use of the story can be faded once the individual with autism successfully accomplishes the skills or appropriately responds in the social situation illustrated (Gray, 1994).

Choosing Social Stories

Social Story intervention programs teach appropriate social behavior to children with ASD ((Rust & Smith, 2006). They can help individuals with ASD to become more independent in routines, know how to do an activity, understand how to ask for help, and discover how to respond appropriately to feelings of anger and frustration. Social stories can help individuals to cope with numerous things, such as new situations, transitions and changes in daily routines, social interactions, academic tasks, and any situation that may cause anxiety (Ivey et al., 2004; Crozier & Sileo, 2005). Inappropriate behavior among students with ASD can negatively affect their ability to participate in the community, as well as in the classroom (Gray & Garand, 1993; & Hagiwara & Myles, 1999). "Social stories have a long pedigree in a teacher's family of strategies" (Crozier & Sileo, 2005, p. 26).

In addition, social stories give individuals with ASD direct contact with social information through pictures and text, notable areas of weakness for children with ASD. Finally, social stories provide opportunities to practice the skills often and on the child's terms (Smith, 2001; Norris & Dattilo, 1999). Social stories can be used in inclusive classrooms, self-contained classrooms, and residential settings (Scattone et al., 2002; Gray & Garand, 1993; Crozier & Sileo, 2005). They have also been effective in decreasing inappropriate behaviors in the home when implemented by family members (Lorimer, Simpson, Myles, & Ganz, 2002). Social stories can be used to teach important

information about life skills, including communication, problem solving, appropriate behavior, safety, or daily living skills and vocationally related skills (Gray & Garand, 1993; Hagiwara & Myles, 1999; Crozier & Sileo, 2005; Scott et al., 2000).

Studies Using Social Stories

The use of modified social stories can be a very effective intervention for the disruptive behavior in children with ASD. Social stories provide an individual with accurate information about those difficult situations that delivers instruction on appropriate social behaviors (Gray & Garand, 1993). Croziner and Tincani (2005) studied a social stories intervention program consisting of cue cards, role-play, and multimedia medium. The participant in this study was an 8-year-old boy with ASD named "Alex" who attended a private school for students with challenging behaviors. The intervention took place for a period of two weeks in a private preschool classroom, in a major metropolitan area, for children with developmental disabilities and challenging behaviors. The target behavior identified for Alex was talking out. Talking out was defined as speaking to teachers or other adults without raising his hand or being called on to speak. A reversal design intervention was used to compare the effectiveness of the modified social story with and without verbal prompts. The authors examined the effects of a modified social story, with and without verbal prompts, in his preschool classroom. The modified social story was seven pages long, text was printed in 14-point with a maximum of two sentences per page, included known vocabulary words as much as possible, and key words were repeated throughout the story. Each page included a line drawing illustrating the main point. The print appeared at the same place on each page in order to be clearly separated from the pictures and words were separated for easy pointing.

The disruptive behavior decreased during both phases of the intervention but it decreased to a greater extent when the story was paired with prompting. The major findings of this intervention revealed that a modified social story is not only effective in reducing disruptive behavior but it is also likely to be accepted by teachers and incorporated into typical classroom settings.

Chan and O'Reilly (2008) stated that social stories are most often used as a treatment method for children with ASD. Social stories have been experimentally incorporated in home settings, self-contained special education and resource classrooms, and also in general education inclusionary settings. To include students with ASD in general education classrooms may create meaningful social problems for peers without disabilities. Therefore, these researchers studied the use of a social stories intervention on the social communication behaviors of students with ASD enrolled in full-inclusion kindergarten classroom. Matt, a six year-old Asian-American boy and Ted, a five-year-old Caucasian boy, attended general education kindergarten classrooms full-time at a public elementary school participating in this study. The intervention sessions occurred one to four times per week. Matt received intervention for five weeks with 13 intervention sessions. Ted received 10 weeks of intervention consisting of 18 intervention sessions. Target behaviors for Matt and Ted were inappropriate social interactions (causing peers to lean or move away), appropriate hand-raising, and vocalizations (comments irrelevant to classroom activities). During the baseline design, data were collected after hour long observation of the students. During the intervention phase, participants received intervention on an individual basis. One story per target

behavior was written for each participant using Gray's guidelines. A total of six stories were used in this study.

The intervention package consisted of three steps: (a) reading the story (read aloud or read silently), (b) answering comprehension questions, and (c) role play. First, the participants were instructed to read the story aloud or silently based on their choice. Then, the instructor asked three questions for each story. If the students failed to answer the questions correctly, they were prompted to reread the story that was relevant to the question. The final step was a role play where the instructor verbally described the situation and target behavior. Then, the instructor and participant acted out the target behavior. Next, the instructor read a short passage from a book and asked a question. The participant then raised their hand and waited to be called on to give an answer. Verbal prompts were provided depending on the difficulty completing any of the three steps and praise was given after successful completion of each of the three steps. The results of this intervention package showed an increase in hand-raising and appropriate social initiations for Matt and Ted. Follow-up data for both participants indicated that positive behavior changes were maintained over time, in which both participants had been promoted to the first grade and had new teachers. The major findings of this study demonstrated that social stories did not require any intensive supervision of child's behavior, making it suitable for a regular education inclusive classroom.

Adams et al. (2004) studied the efficacy of Social Stories in decreasing socially inappropriate and undesirable behaviors in a child with ASD. They reported that students with ASD have deficits in understanding and effectively using social skills to interact and communicate with others and may also misunderstand social cues such as body language,

gestures, and facial expressions. Due to the misunderstanding of these social cues, these children may behave inappropriately. A single subject design and ABAB design was used to determine the efficacy of social stories in decreasing socially inappropriate and undesirable behaviors in a child with ASD. Peter, a seven-year-old Caucasian male, attended a developmental full-time preschool program and entered mainstreamed kindergarten classes while receiving speech–language support services in the 2000–2001 school years. Peter often displayed repetitive behaviors, such as arm-flapping or finger-flicking. The study took place in a home setting. During each phase of the ABAB research design, data was collected for three weeks, resulting in a total of 12 homework sessions for each phase for a total of 48 homework sessions.

The experiment was divided into four phases: the first phase was the baseline phase (A1), during which the researchers observed distracting behaviors during homework time. The second phase was the intervention phase (B1), during which the social story intervention was used to target distracting behaviors. The third phase was the withdrawal phase (A2), during which the social story intervention was withdrawn. In the fourth phase (B2), the social story intervention was reintroduced. During the baseline phase, the distracting behaviors found to be most frequently occurring were crying, falling, hitting and screaming. All were targeted in the same social story. A functional analysis of Peter's distracting behaviors revealed that the four targeted behaviors (e.g., crying, falling, hitting, and screaming), were serving one function in response to his homework. The quantitative findings showed that crying behaviors were decreased to 48%, screaming to 61%, falling to 74%, and hitting to 60% from Phase A1 to Phase B2. After the study was completed, qualitative findings documented that after the

intervention, Peter was able to find appropriate words and understood that he could ask for help, decreasing the frustration behaviors. According to Peter's first-grade classroom teacher, the behaviors targeted at home decreased in the classroom settings without direct intervention. The teacher reported that at the beginning of the school year, Peter demonstrated frustrating behaviors such as crying out, hitting his desk, and falling on the floor throughout the school day. But after the social story intervention, Peter was able to ask for help rather than screaming or crying when he needed assistance. The study suggested was that the social story not only helped decrease the frequency of inappropriate and unacceptable behaviors, but also provided a solution to Peter and his parents to deal with frustration. According to parent and teacher reports as well as quantitative data, the social story intervention was a beneficial tool for decreasing undesirable behaviors (Adam et al., 2004).

Hagiwara and Myles (1999) investigated the effects of interventions using multimedia social story programs for children with ASD. Three Anglo elementary students, ranging from seven years three months to nine years 11 months, participated in this study in resource and general education classrooms in a mid-western state for a period of twenty-four days. A Macintosh computer was used to develop multimedia stories. A video camcorder recorded the students' actions. The stories were developed by teachers, paraprofessionals and investigators to address required skills for each participant. The target behavior for participant I and II was "washing hands". The target for participant II was self-stimulatory behavior. The multimedia social story intervention produced an attractive presentation of visual stimuli and sound. A multiple baseline design across settings was used. For participant I, "washing hands" was observed in three

settings (before the morning snack, before lunch, and after recess). In the baseline condition during the morning snack setting, a prompt was provided to complete the step of putting soap on his hands and physical assistance was used to rub both of his hands under the water. In the intervention condition in the morning snack setting, after the introduction of the multimedia social story program, participant I completed all the steps of the hand-washing task without any prompt or physical assistance on the last day of observation. In the baseline condition of the before-lunch setting, the performance of the target behavior was similar to that in the morning snack setting. In the intervention condition of the before the lunch setting, participant I completed all the steps of hand-washing task. In the baseline condition in the after recess setting, participant I's performance was maintained at 87 percent over six consecutive days in the other two settings without introduction of multimedia story program. In the intervention condition in the after recess setting, the participant I required verbal prompts to wash his hands under water on 21st, 22nd, and 23rd day. But on 24th day, participant I completed all the steps of the hand-washing task, although he was prompted to turn on the water, which resulted in a 92% completion rate.

For participant II, "washing hands" was observed in three settings (before going to the resource room, before lunch, and after recess). In the baseline condition, before going to the resource room setting, participant II demonstrated a deterioration of performance. In the intervention condition in the before resource room setting, participant II needed physical assistance to rub both the hands under the water. Participant II's level of performance was maintained in baseline condition in the after recess settings. In the intervention condition in the after recess setting, after the introduction of multimedia

story, the performance was improved from 83 to 95% completion of target behavior and did not require any technical assistance to operate the multimedia story program.

For participant III, self stimulatory behavior was observed in two settings (lunch and resource room). Intervention in the general education class could not be conducted because the activities were not appropriate for participant III. The data on participant III indicated partial improvements in his off-task behavior. Multimedia social story program does not require modification of software or special technique to operate the program. Multimedia social story program can be implemented in daily schedule. Thus intervention has greater applicability in educational settings. The findings of this study revealed that, overall, the social story intervention using a multimedia social story program had positive effects with children with ASD. The need for Parent Education will be examined in the finale section of this chapter.

Parent Education

Parents may experience continuing disappointment and grief at all stages of the child's and family's life cycle when a child is diagnosed with ASD (Wallis, 2006). The stress of the parents of children with ASD includes trying to figure out what they can do for their child to improve their success in education and in life. In spite of their tremendous battle, there are many techniques that parents can use to help minimize their stress level (Turnbull et al., 2002). These resources include books, seminars, and research-based website including informational modules.

Web-based Modules for Improving Parent Knowledge

Since the early 1990s, the World Wide Web (WWW) has fully played a key role in the area of education (Harrison & Stephen, 1996). Parents of children with ASD face elevated levels of parental burden and psychological stress. Parents put a high priority on gaining knowledge and skills that will promote positive behaviors in their children. Parents deserve easy access to specialized and parent-sensitive information about current treatment and research-based strategies of ASD behavior. (Scott et al., 2000). Under these assumptions, families may benefit from interventions delivered online that eradicate barriers to treatment such as time, distance, and the lack of insightful or well-rounded providers. A considerable amount of online parenting information yields consistent information that is parent-friendly. Families may be able to successfully use and benefit from an online intervention program to improve their child's behavior. The Web-based approach facilitates reductions in behavioral ramification and helps parents learn new skills for managing their child's behavior (Wade et al., 2005).

Tsai (2001) and Murir-Herzig (2003) referred to such web-based instruction as a channel or tool for constructivist learning. Constructivism is a reflective process in which ideas and experiences are processed into newly learned material. It is designed to facilitate extrapolation and fill in open gaps (i.e. going beyond the information given). With the proper education and support systems, families will be able to flourish (Murir-Herzig, 2003).

Description of the ASD Behavior Module

The College of Education at Texas Tech University houses behavior module which provides resources for parents of students with ASD. Researchers at Texas Tech University created The ASD Behavior Module to address a variety of different types of behavioral issues of individuals with ASD. The behavior module is a good source for parents to enlighten themselves about research-based interventions available for improving their student's behavior. The behavior module specifically addresses the following research-based interventions: Applied Behavioral Analysis, Discrete Trial Training, Joint Action Routines, Pivotal Response Training, Picture Exchange Communication Systems, and Social Stories. The module uses text and videos to provide parents with information about the particular interventions and to describe how they work in the classroom. This study will examine parents' increase in knowledge of these research-based interventions to determine if The ASD Behavior Module is effective for improving parental understanding of these pivotal strategies.

Summary

The recent increase in the number of children being diagnosed with ASD has become a major special education category leading to increase demand for information by professionals, parents, students and educators. The comprehensive review of literature addresses an understanding of what information recently exists for professionals, parents, students and educators. The immensity of needs associated with ASD amazes most individuals like those working with children with ASD. Although many research-based

interventions obtained for treating the behavior issues related to ASD, finding the most suitable intervention still remains in question.

Research-based interventions provide a framework to incorporate what is known from research into real-world practice in a manner that is accessible to families, responsive to what children need, and consistent with what providers can accomplish given available skills and resources. If parents are provided with substantial knowledge-based foundations that are easily accessible and systematized resources, they have ample chances of meeting and benefitting their children.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this chapter was to explore and clarify the research methodology used in this study. The chapter provided a rationale for the research questions proposed by the study, the research design, the context of the study, information on the data sources executed, data collection, data analysis procedures, a data management plan, and the validity and generalizability of the study. The study used a pretest-posttest control group design. In this design, each group was assigned a pretest and the experimental group was provided a treatment activity. Finally, a posttest was administered to both groups.

In order to analyze the change in behavioral knowledge in Autism Spectrum Disorders (ASD), the two groups (control and experimental group) were measured twice: once before the treatment and again after the treatment. Participants were randomly assigned to both an experimental group and a control group. The experimental group was exposed to view a web-based module designed by researchers at Texas Tech University as an experimental treatment activity. The purpose of the module is to enhance the participants' knowledge of the intervention options related to behavior in ASD.

The survey questionnaire consisted of three sections. The first section was focused on demographic information of each of the participants taking part in the study. The second section, both the pretest and posttest, measured the extent to which

participants valued the content knowledge relating to behavior issues in ASD. The last section, the posttest exercise specifically designed for those viewing the behavior module, evaluated the participant's perceptions of the web module content as well as their increased knowledge.

Research Questions

This study sought to discern whether or not an online module, developed by the Burkhart Center for Autism Education and Research at Texas Tech University, enhanced parents' understanding and knowledge of behavioral interventions related to ASD for parents working with children with ASD. The study evaluated the efficiency of the Behavior Module in providing a platform for parents working with children with ASD. Specifically, the study addressed the following research questions:

Research Question 1

Do parents who complete the behavior module demonstrate increased knowledge concerning the behavioral intervention needs of children with autism spectrum disorders?

Research Question 2

Was the behavioral module developed for parents learning about children with autism disorders such that it is appropriate and accessible?

Research Question 3

Do parents who have been trained through the behavior module select research-based methods for behavioral intervention from a list of interventions more often than those who have not been trained?

Rationale

The ultimate goal of educational research is to incorporate orderly procedures to acquire reliable results or conclusions to educational issues, which in turn lead to improvements in education (Sowell, 2001). Educational research serves its purpose based on the researcher's interests or topic to contribute to scientific development (Sowell, 2001). The fundamental principle of educational research is to increase the understanding of educational processes, issues and practices (Gay & Airasian, 2003). The reason to study educational research is to understand the discussions regarding research technique and issues in the broad field of education (Johnson & Christensen, 2008). Educational practice occurs within the four categories of knowledge: (a) descriptive knowledge investigates the natural phenomena, (b) predictive knowledge uses prior information to figure out consequences in the field of education, (c) the third type of knowledge corroborates the effectiveness of different interventions to boost educational practice, (d) explanatory knowledge integrates descriptions, predictions, and interventions, explaining educational issues and eventually establishing educational theories (Gall et al., 2003).

This particular study enforced the principles of research knowledge to elevate the field of prediction and improvement as discussed by Gall et al. (2003). Effectiveness of the behavior module to increase parental information has educational implications for using the web-based modules as a learning tool. Completing a study that looks at parents' ability to use a web-based module provides a real-world understanding. Applied research is focused on solving real-world questions or current educational problems (Gay & Airasian, 2003).

Applied research answers current problems or questions in education and provides immediate solutions to educational practice. It usually contributes to the growth of interventions intended to improve social and educational circumstances (Johnson & Christensen, 2008).

Creswell (2002) and Thome and Giesen (2002) further define quantitative research as cited in Borrego et al. (2009) as:

> Data collected, often through surveys administered to a sample or subset of the entire population, allow the researcher to generalize or make inferences. Results are interpreted to determine the probability that the conclusions found among the sample can be replicated within the larger population. Conclusions are derived from data collected and measures of statistical analysis (Creswell, 2002; Thome and Giesen, 2002 as cited in Borrego et al., 2009, p. 54).

Gay and Airasian, (2003) and Leedy and Ormrod, (2001) stated that quantitative research methods include descriptive or survey research, correlational designs, causal-comparative approaches, and experimental procedures. In order to confirm the efficiency of the behavior module for parents, this particular study will integrate the experimental, descriptive and correlation approaches of quantitative research.

The first research question seeks to determine whether or not the parents who complete the behavior module demonstrated increased knowledge of the research-based behavioral interventions for children with ASD. In order to respond to this question, an experimental design was applied in the pretest-posttest control group format.

"True experimental researchers control the selection of participants for the study, divide the selected participants into two or more groups that have similar characteristics

at the start of the research experiment, then apply different treatments to the selected groups" (Gay & Airasian, 2003, p. 13). The purpose of the experimental research is to examine cause-effect relationships. The experimental researchers manipulate independent variables and experiment using the quantitative approach that provides a greater degree of control over the research (Gay & Airasian, 2003).

The second research question endeavored to substantiate whether or not parents learning about children with ASD found the behavior module to be appropriate and accessible in its content. In quantitative descriptive research, (survey) data is collected from the questionnaire that participants fill out, and that data is typically numeric. Researchers depend on the chosen participants to make time to provide the required information. Surveys are carried out to obtain information about the interests, attitudes, practices and concerns of some people.

"Research is a viable approach to a problem only when there are data to support it" (Leedy & Ormrod, 2001, p. 94). Survey research is broken down into three segments, which are: (a) providing an array of questions to a group of participant, (b) using measurements to compile the responses, and lastly, (c) drawing inferences about a selective population based on the responses derived from that population. Data is ever-changing and survey research illustrates a short moment to enhance our understanding of the present (Leedy & Ormrod, 2001).

The last research question examined a range of multiple independent variables, which included the participants being trained through the Behavior Module. A research-based behavioral intervention list was provided and the data was examined to determine

if more trained participants select interventions than participants who have not been trained. Co-relational research attempts to determine whether, and to what degree a relationship exists between two or more quantifiable (numerical) variables. A correlation is a quantitative measure between two or more variables that either establish relationships or use existing relationships to make predictions (Gay & Airasian, 2003).

Context of the Study

The behavior module focuses essentially on constructing knowledge about behavioral issues and research-based behavioral interventions for parents working with children with ASD. The web-based format of the behavior module permits dissemination of information to extend beyond the west Texas region. Nevertheless, there are several limitations to this research study. The primary limitation is the sample size itself. Another limitation to this study is the ability of the responder to determine and gather the correct requested information. This study used an available sampling in Memphis, Tennessee.

The use of parents working with individuals with ASD came about due to the usefulness and practicability of obtaining participants from available organizations. As discussed in the literature review, the growing prevalence of individuals with ASD affects parents throughout the country. Parent populations were selected because they were in a position to identify the effectiveness of the behavior module and to judge whether the behavior module provided enough content knowledge to meet their needs. According to The Centers for Disease Control and Prevention (2007), 1 in 150 children are affected by ASD, and it has become the second most common developmental disability. In order to render the deficits in behavior in children diagnosed with ASD,

exposure to diligent intervention is critical. The focus of this research is specific to the intervention practices provided to children diagnosed with ASD.

For the purpose of this study, in order to receive necessary information to access the behavior module, all participants were assumed to have knowledge of web and computer use and have access to it.

Data Sources

The purpose of many quantitative researchers is to analyze the results from their research findings and make generalizations that apply to the majority of the population. The goal of the quantitative study is to predict, control, confirm and test hypotheses (Best & Kahn, 1998). Gay and Airasian (2003) differentiated between the target population and the accessible population in educational research and identified target populations about which information is desired and actually surveyed.

According to Gay and Airasian (2003), "The population that researchers would ideally like to generalize to is referred to as the target population. The population that the researcher can realistically select from is referred to as the accessible or available population" (p.102). As Gay and Airasian (2003) stated, selecting a sample plays a vital role in conducting a quantitative research study, and an ideal sample establishes the meaningfulness and generalizability of research findings. It is not feasible to draw conclusions from large populations. Therefore, researchers usually pay attention to an accessible population that could realistically be included in the sample.

Subjects discussed previously, the ability to gather a random sample from the entire population of parents, will prove impractical. Therefore, drawing from an

accessible population of parents within the Memphis area appears appropriate, and for convenience, selected accessible parents of children with ASD from Autism Solution Center located in Memphis, Tennessee were studied. There were 60 subjects that participated in this study, making 30 per group. All participants were adults of children with ASD with a variety of severity, ages, and grade level. There was no limit to their (children with ASD) age or grade level.

Charles (1995) stated that random sampling aims to provide the validity of research findings that can be generalized to the entire population. Random sampling is referred to as probability sampling, as researchers attempt to specify the probability or chance that each participant of a defined population would be selected for the sample. In the process of quantitative data, identifying a suitable sample size has important implications for the research findings. The purpose of a quantitative study involves the use of random sampling from the defined population to promote generalization and selection of an adequate sample size. Acceptance of adequate sample size reduced the probability of selecting participants whose general features differ considerably from that of the target population (Gall et al., 2003; Gay Airasian, 2003).

Although random sampling has the best opportunity to avoid sample bias, it is not always possible for researchers to use random sampling. The opposite of probability sampling is non-probability sampling; this means sampling without using random selection methods. Non-random sampling includes convenience sampling that is often used in educational research. With non-probability sampling, population elements are selected on the basis of their availability (e.g., because they volunteered or the researcher's personal judgment). Portions of the population who did not volunteer are

excluded. It is convenient because the researcher used whatever individuals were available rather than selecting from the entire population (Gay & Airasian, 2003; Creswell, 2005).

The pretest-posttest control group design requires at least two groups, each of which is formed by random assignment. Random assignment of participants to treatment groups must take place in order to maintain the true experimental design of the study. In random assignment, the researcher does not expect that the groups created will be exactly the same (Gay & Airasian, 2003). Random assignment occurred after completing the selection of cooperating population. Randomization of this type of sampling ought to remove some of the limitations, even though the ability to make generalizations declines with the use of convenience sampling.

The terminal aspect to consider when establishing sampling of participants involves the sample size; the sample determines the meaningfulness and generalizability of the research findings. Creswell (2005) stated that the study must be of adequate size and relative to the goals of the study. Appropriate sample sizes are indicated distinctively by different statisticians and there are not specific guidelines as to what sample size is large enough (Gay & Airasian, 2003). A large sample size will have results similar to the entire population; however, in reality, it is not practical to access a large number of potential research participants to draw valid generalizations for this study (Creswell 2002). Adversely, in conducting experimental research, a small sample size may be best judged through statistical analysis of research data (Best & Kahn, 1998).

Since this study relied on pretest-posttest control group design, a sample size of 60 was estimated to infer higher generalization for the population. All participants were assigned into one of two groups: control groups and experimental groups. For the experimental section of this study, half of the total sample size of 60 participants was asked to join the treatment group and the other half in the control group, making 30 for each group. Participants were recruited by the organization's director. The director posted the cover letter of the research project, provided by the researcher, on the Facebook website and asked for volunteers to participate in the study. Subjects were recruited through a detailed recruitment letter sent out through email by the organization director in which the study was fully explained. The letter stated that participation is voluntary.

Data Collection Procedure

Module Design

The behavior module unified both the content knowledge of fundamental behavioral issues and research-based intervention practices related to ASD in a web-based format. The development occurred over a span of one and a half academic years. Team members included two co-chairs in the special education program at Texas Tech University, a group of doctoral students in special education, and parents with children with ASD. Members held ongoing meetings to discuss updated research-based intervention practices in ASD and deliberated novice ideas to amend the quality, reliability and validity of module. The behavior module was accessible on the website at http://www.edsp.ttu.edu/EDSP/burkhartproject in May of 2006.

The design of the behavior module centered on transferring vital information to enhance an understanding of typical types of social and behavioral issues of individuals with ASD and effective interventions for them. It also would provide a positive resource for parents to enlighten themselves about the condition. The module integrated researched data and current research-based intervention practices for embellishing behavior in children with ASD. In addition, this module provides awareness using video explanations from parents and professionals within the community.

In a collaborative effort with a team of ASD specialist and parents, various intervention approaches have been discussed and presented in the behavior module to address the range of social, language, sensory and behavioral problems. These approaches include: Applied Behavior Analysis (ABA), Social Stories, Discrete Trial Training (DTT), Pivotal Response Training (PRT), positive behavior support, social skills programs, Picture Exchange, Communication System (PECS), Cognitive Picture Rehearsal, self-Management, environmental supports, Joint Attention Routines (JARs), and cognitive management philosophy.

The aim of this study was to evaluate the general effectiveness of the behavior module by examining the usefulness and accessibility of its implementation, surveying the range of knowledge acquired by viewing the module, and analyzing the intensity of individual's prior experiences and knowledge affecting their perceptions of the module's content.

Instrumentation

The research instrument for this study consisted of an online survey which asked several questions referring to behavioral issues in children with ASD, as well as research-based intervention techniques in order to collect data to answer the specific research questions. The research survey was created by the researcher hosted by Surceymonkey.com and modified or adapted from two other similar surveys to collect data on specific questions. The survey questionnaire was reviewed by a special board working with children with ASD, and many suggestions were made as to content and usage in order to increase the clarity and appropriateness of the survey. Parents were surveyed through a link attached to their email ID that could be accessed through a computer. In addition, paper-based module and survey questionnaires were also provided to parents without computer or internet access. They were given a one week time frame to complete the viewing of the behavior module before they were given the posttest. Treatment group survey was provided a check-off statement to state that they have viewed the behavior module.

The instrument used in this study involved three sections. The first section of the instrument inquired about individuals' personal background information. The second section, a pretest-posttest design, measured the participants' content knowledge about behavior issues related to ASD, before and after the treatment. The content knowledge section of this study contained ten questions related to behavioral issues in ASD. Ten of the multiple choice questions determine knowledge about normal behavioral development, behavior issues related to ASD, a set of research-based strategies with their implications for working with behavior in ASD, and areas of specific concern to parents.

Lastly, a survey questionnaire designed particularly for those using the behavior module was provided containing information concerning the participants' perceptions and attitudes toward web-based learning.

This section of the instrument consisted of fourteen questions designed to obtain the participant's perceptions and attitudes concerning the efficiency of the module. A Likert scale was completed by the participants to measure the degree of effectiveness after viewing the module. The scores of 1, 2, 3, 4 and 5 corresponded to the responses of "strongly disagree", "disagree", "neutral", "agree", and "strongly agree", respectively. "Strongly disagree" and "strongly agree" are the two extremes of this measurement.

In order to ensure the reliability and validity of the survey questionnaire, the questionnaire has been utilized two times already and the third time was used by the researcher. The introductory module was used by a doctoral student with undergrad students and were piloted by South Plains Autism Network (SPAN) members, where as the communication module was used by another doctoral student with graduate students. Finally, the behavior module was used by the researcher for the third time by parents with children with ASD.

Procedure

The purpose of the study was clearly pointed out to the participants, both control and treatment groups, prior to the survey being conducted. For this study, all participants were required to complete a set of pretests and posttests; in addition, the experimental (pretest) group was required to complete the treatment activity by exposing them to the

behavior module. All participants were provided clear instructions and explanations for the pretests and posttests.

Furthermore, participants received an informed consent letter to indicate the purpose of the study's data collection; this provided assurance that the information would remain confidential and that it would be approved by the Texas Tech University Institutional Review Board for the Protection of Human Subjects. Participants who decided to participate in the study signed the consent forms. Participants who decided not to participate in the study were assured that they would not incur any negative consequences for withdrawing from this study and were thanked for their time and participation. Upon receiving the consent, all participants obtained an instructional letter intended to help in their introduction to the study; all participants also received identical instructions.

The participants from both control and treatment groups were permitted nearly 30 minutes to complete the pretest questionnaire. The research instrument used in this study consisted of an on-line survey hosted by Surveymonkey.com and a paper-based survey as well. The experimental Group A was instructed to view the behavior module while holding on to their instructional guidelines. Group A had almost two to three weeks to complete the module by accessing the TTU web site, and they also took the posttest.

Participants from each group completed the posttest. Participants in Group B completed a posttest with a similar subject knowledge questionnaire as the pretest. Participants in Group A received a posttest that included the same information as the pretest with additional survey questions intended to collect their attitudes and perceptions of web-based learning after exploring the module. Based on the group assignment,

participants took 35 to 45 minutes to complete the posttest. Those who failed to complete all of the sections were dropped from the study.

The data collection process took approximately three months, but the process for each individual participant stretched over two to three weeks. After the pretest was administered, the director, on behalf of the researcher, took enough care to make sure all the participants completed the posttest. Both groups were administered a pretest and a post-test. The treatment group's posttest was accompanied with supplementary questions with reference to their perceptions and attitudes of the module. This posttest section provided data for the survey and the correlation part of the study. After the study was completed (Post tests), the control group was provided the link to get the information through viewing the modules.

Data Analysis

Processing Data

In order to analyze the collected data, the data needed to be sorted into categories based on the responses received from the arranged survey questions from the pretest and posttest questionnaire. The pretest and posttest for the control and treatment groups had different sections that necessitated recoding before the process of analyzing the data began.

The pretest included a personal background information section with age, gender, ID number, ethnicity (Caucasian, African-American, Hispanic, Asian, and Other), level of education (high school diploma or equivalent, associate or trade school degree, bachelor degree, bachelor's plus, graduate degree, graduate plus, and other), current

profession (general education, special education related field, counseling, instructional specialist, administrator, and full time student / other), and need for information on ASD. Percentages were used to reflect the responses of the participant's personal background information and subject matter knowledge. Gender of the participants was recorded as "M=1" or "F=2". The posttest for Group A measured the content knowledge and an evaluation of survey, while Group B only measured the content knowledge.

The content knowledge data was interpreted in percentages of correct, correct with guessing, incorrect with guessing, and false responses, and data results were depicted in a bar graph. The module evaluation and attitude uses a Likert-type scale for numerical representation. Comprehensive numeric code categorization for the content and evaluative sections of the study are shown in Table 1.1.

Table 1.1. Numeric Code Categorizations

	Original	Recorded
Content Knowledge		
	Correct Answer	4
	Correct Answer Guessing	3
	Incorrect Answer Guessing	2
	Incorrect Answer	1
Module Evaluation	Strongly Disagree	1
	Disagree	2
	Neutral	3
	Agree	4
	Strongly Agree	5

Analyzing Data

The data was analyzed on the pretest and posttest scores and identified by giving a scale of 4 to 1 where T=4, TG=3, FG=2, and F=1. The survey questions (multiple choice) had four choices. For example, a) ability to relate, mood, intelligent; b) inability to relate, lack of functional language, sensory processing deficits; c) dislike, loves to read, interactive play; G) Guessed. Participants were provided a statement in the survey questionnaire stating "Remember to Check off "G" if you felt that your answer was a guess." The participant who responded with the correct answer was recorded as T-Correct; the participant who responded correctly and checked off "G" was recorded as TG-Correct but guessed; the participant who responded incorrectly and checked off "G" was recorded as FG- incorrect but guessed and the participant who responded incorrectly and did not check off "G" was recorded as F-incorrect.

Once the data was organized, variables were separated as pretest scores for the independent variables and posttest scores for the dependent variables. The data was analyzed based on the research questions provided. Furthermore, group averages of the pretest and posttest scores were analyzed for each group. Independent sample *t* test analysis of variance was undertaken to evaluate the difference between the pretest and posttest mean scores of the control and treatment groups.

The mean score helped to determine whether parents exhibited an extensive knowledge regarding the behavior needs of children with ASD, after completion of the behavior module. The Independent sample *t* test compares the mean scores of two of the groups on a given variable. The paired sample *t* test was used to determine whether the mean scores of the difference was significant within the groups. Thus, the study utilized a

paired sample *t* test by analyzing the variation in mean scores for the experimental group's pretest and posttest scores and the control group's pretest and posttest scores.

The second research question aimed to determine whether parents consider the module as appropriate and accessible. Percentages and frequency counts were used to analyze the survey (Leedy & Ormrod, 2001). Thus, the scores derived from the Likert-type scale, percentages and mean scores, were used to answer this question. The third research question was also analyzed through percentages & frequency counts.

Data Management Plan

Data analysis takes place with the data collection, but the first step begins with managing the data, which facilitates analysis. The data can be interpreted easily when broken down and classified into categories (Gay & Airasian (2003). The survey questionnaire (both the pre and posttest) was done through the use of Surveymonkey.com, an online survey and paper –based survey tool that collects responses and analyzes the surveys and responses used in this research study. In order to avoid fallacious data entry, the results downloaded from Surveymonkey.com were assembled in an excel format. In order to facilitate the analysis of the collected data, the researcher used a statistical software program called Sigma Plot and Sigma Stat. Sigma Plot was used to create graphs and Sigma Stat was used for statistical analysis. Data was also described using descriptive statistics in order to construct these comparisons and generalizations. This study used data-graphing approaches for appropriate analysis. The research data results were depicted in the bar graph as well.

Summary

This study employed a pretest-posttest control group design, one of the quasi-experimental methods commonly used in the educational research. The participants of the study were nearly 60 parents of children with ASD from the Autism Solution Center located in Memphis, Tennessee. The data collection process took place during a two week period.

The study answered the following research questions: Do parents who complete the Behavior Module demonstrate increased knowledge concerning the behavioral intervention needs of children with autism spectrum disorders? Was the behavioral module developed for parents learning about children with autism disorders such that it is appropriate and accessible? Do parents who have been trained through the behavior module select research-based methods for behavioral intervention from a list of interventions more often than those have not been trained?

Different statistical procedures were used to answer each research question. The study employed independent and paired sample *t* tests to examine whether the participant's exhibited increased content knowledge upon viewing the behavior module. Percentages and frequency counts inquired demonstrated the general effectiveness of the behavior module. Percentages and mean frequency counts were also used to determine if trained parents recognized research-based interventions more readily than non-trained parents.

CHAPTER IV

DATA ANALYSIS AND RESULTS

Introduction

This chapter is classified into four sections. The first section stipulates a concise introduction that is appropriate to the data analysis. The second section is a restatement of the research questions. The third section addresses the results of the study and states the descriptive statistics, interpretation of the data related to research questions. Once the data collection process was completed, the researcher analyzed the information using analytical software known as Sigma Plot. The fourth section summarizes research findings.

The purpose of the study is to evaluate the overall effectiveness of an online format behavior module by analyzing the appropriateness and accessibility of its implementation. Additionally, the study examined the extent to which an online format behavior module increased the awareness of behavioral issues related to ASD for parents working with children with ASD.

Three research questions were examined during this study. A survey questionnaire was used to collect the data, and an independent-sample *t* test design compared the control and experimental groups pretest scores as well as post-test scores. Also a paired-sample *t* test was completed to compare the experimental group's pretest and posttest scores and the control group's pretest and posttest scores. Each research question was described with the detailed results obtained. Furthermore, tables and graphs were used to represent these results.

Restatement of the Research Questions

In order to bridge the gap between the growing rates of children with ASD and parents facing challenges with the problem behaviors of ASD, an online format module was created describing several research-based interventions for parents, professionals and caregivers working with children with ASD. This study is intended to answer the following research questions to provide practical evidence as to whether or not the behavior module significantly promoted parental knowledge base.

Research Question 1

Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Research Question 2

Was the Behavioral Module developed for parents learning about children with ASD such that it is appropriate and accessible?

Research Question 3

Do parents who have been trained through the Behavior Module select research-based methods for behavioral intervention from a list of interventions more often than those who have not been trained?

Descriptive Statistics

Demographic Information

The sample involved in this study included 60 parents with children in various ages and grades with ASD within the Memphis, Tennessee area through the Autism Solution Center. At the beginning, 75 participants were invited to participate in the study, but only 62 participants sent their consent forms to volunteer for the study. Sixty

participants were randomly selected for the study. Participants were randomly divided into two groups, thirty in each group, experimental and control groups respectively.

The demographic profiles of the control group participants were identified as follows. The control group sample consisted of 80% female participants and 20% male participants. More than 23.3% of the participants were among the age group of 46 to 50 years old, 6.7% were 26 to 30 years of age, 10% were 21 to 25 years of age, 13.3% were 31 to 45 of years of age, 20% were above the age of 50. Nearly 83.3% of the participants acknowledged their ethnicity as Caucasian, 13.3% specifying other, 3.3% as Asian, and none identified as Hispanic or African-American.

Descriptive statistics for the control group also identified the participants' level of education and their current professions. Over 33.3% of the participants had bachelor's degrees, 33.3% had high school diplomas or equivalent, 10% had graduate degrees, 3**.**3% had graduate plus and 6.6% specified other. In addition, nearly 76.7% of all participants declared their current professions as other, 10% held positions in special education related field, and 3.3% of the participants identified their profession in counseling and general education field.

The demographic descriptions of the experimental group participants reflected the following. Female participants constituted 73.3% of the sample and 26.7% were male. More than 36.7% of the participants were in the 41 to 45 age group. The smallest percentage was Caucasian, 20% as African-American, 6.7% identified as Hispanic and the final 3.3% specifying other. 3.3% for the 21 to 25 years and 50 plus age groups. In addition, the remaining participants were in the following age groups: 26 to 30 (6.7%); 31 to 35 (10%); 36 to 40 (23.3%); and 46 to 50 (16.7%). Almost 70% of the participants

addressed their ethnicity as Caucasian, 20% as African-American, 6.7% identified as Hispanic and the final 3.3% specifying other.

Table 4.1 Descriptive Statistics

Characteristics	Frequency (N)	Percent (%)
Gender		
Experimental Group		
Male	8	26.7
Female	22	73.3
Control Group		
Male	6	20
Female	24	80
Age		
Experimental Group		
21-25	1	3.3
26-30	2	6.7
31-35	3	10
36-40	7	23.3
41-45	11	36.7
46-50	5	16.7
50+	1	3.3
Control Group		
21-25	3	10
26-30	2	6.7
31-35	4	13.3
36-40	4	13.3
41-45	4	13.3
46-50	7	23.3
50+	6	20
Ethnicity		
Experimental Group		
Caucasian	21	70
African-American	6	20
Hispanic	2	6.7
Asian	0	0
Other	1	3.3
Control Group		
Caucasian	25	83.3
African-American	0	0
Hispanic	0	0
Asian	1	3.3
Other	4	13.3

Descriptive statistics identified the participants' level of education and their current professions in the experimental group. Over 33.3% of the participants had bachelor's degrees, 20% had high school diplomas or equivalent, 3.3% graduate degrees, 33.3% associate or trade school degrees, and 10% specified other. In addition, almost 93.4% of all participants indentified their current professions as other, 3.3% held positions in a special education related field, and 3.3% as school administrators. All in all, the total number of male participants equated to 46.7% and female participants to 53.3%.

Research Question One: Changes of Parents' Content Knowledge

The content knowledge portion of the survey contained seven multiple choice questions, one fill-in-the-blank, and two true/false questions related to behavior issues and related research-based behavioral interventions for working with children with ASD. A *t* test analysis of variance was implemented on both pretest and posttest scores of the two groups to determine differences between the groups. The independent variables for this study were the treatment groups (e.g. those viewing of the module), and the dependent variables consisted of the pretest and posttest scores for each group. The learning aftermath was determined by comparing the mean score on both the pretest and posttests within each group and between the two groups. In order to determine the reliability of the instrument, data was analyzed on the pretest and posttest scores and identified by giving a scale of 4 to 1 where T=4, TG=3, FG=2, and F=1 as seen in Table 4.2.

Table. 4.2. Additional Numerical Code Categorizations (Scale 4-1)

T - Correct	4
TG- Guessed Correctly	3
FG- Guessed Incorrectly	2
F- Incorrect	1

Assumption 1: Control Pretest Score = Experimental Pretest Score

The initial purpose of the first hypothesis test was to establish a precondition for all supplementary analyses relating to this research question. In order to confirm the accurate findings, the precondition should be instituted all through the study. Before conducting further analysis, several basic assumptions were discussed. First, the precondition in content knowledge about the research-based intervention needs of the children with ASD should be approximately equal for both groups (experimental and control). Therefore, the independent sample *t* test was performed to evaluate the difference between the pretest score means of the two groups. The participants in the treatment (N=30) and control group (N=30) were asked ten questions involving the content knowledge of ASD in the pretest survey and a comparison of each question was analyzed in percentages as follows.

In the control pretest questionnaire, 96.7% participants responded correctly to question one and 3.3% responded correctly but guessed. Of the thirty subjects (N=30) in the treatment pretest questionnaire, 86.7% answered correctly along with 3.3% responded correctly but guessed, 6.7% incorrectly guessed, and 3.3% responded incorrectly.

In the control pretest questionnaire, 86.7% participants responded correctly to question two and 6.7% responded correctly but guessed, 3.3% answered incorrectly,

3.3% responded incorrectly but guessed. In the experimental pretest questionnaire, 73.3% of the participants responded correctly to the same question, 20% guessed true, and 6.7% incorrect.

For questions three, 46.7% responded correctly in the control pretest and 40% guessed true, 6.7% responded incorrectly (F), and 6.7% guessed incorrectly (FG). Some 60% of participants in the experimental pretest survey responded correctly to question three including 33.3% who guessed correctly, and 6.7% answered incorrectly.

For question four, 60% of the participants of the control pretest responded correctly along with 30% who answered correctly but guessed (TG), and 10% who guessed incorrectly. In the experimental group, 53.3% answered correctly to the same question in the experimental pretest including some 40% who were correct but guessed (TG), and 3.3% incorrectly guessed (FG).

Question Five included 76.7% of the participants of the control pretest who responded correctly as well as 16.7% who guessed correctly, .3% who answered incorrectly, and 3.3% incorrectly guessed. In the experimental group, 56.7% answered correctly in the treatment pretest to question five, but 56.7% correctly guessed (TG), and 3.3% answered incorrectly.

Some 96.7% of the participants of the control pretest responded correctly to question six along with 3.3% who answered correctly but guessed (TG). Some 83.3% answered correctly to the same question in the treatment pretest along with 16.7% who answered correctly but guessed (TG) and none who responded incorrectly.

For question seven, 76.7% of the participants of the control pretest responded correctly. Some 13.3% guessed correctly, 6.7% answered incorrectly, and 3.3% guessed

incorrectly. Over 66.3% answered correctly to the same question in the treatment pretest along with 33.3% who guessed correctly, and 3.3% who answered incorrectly.

Questions eight had 53.3% of the participants of the control pretest who responded correctly and 13.3% who guessed correctly, 26.7% were incorrect, and 6.7% guessed incorrectly. In the treatment group, 63.3% answered correctly to the same question along with 10% who guessed correctly, 10% who answered incorrectly, and16.7% who guessed incorrectly.

For question nine, 76.7% of the participants of the control pretest responded correctly, some 6.7% guessed correctly, 6.7% answered incorrectly, and 10% guessed incorrectly. Furthermore, 60% answered correctly to the same question in the treatment pretest along with 23.3% who guessed correctly and 10% who answered incorrectly.

Finally, 66.7% of the participants of the control pretest responded correctly to question nine with 30% guessing correctly, and 3.3% answering incorrectly. Sixty percent (60%) answered correctly to the same question in the treatment pretest. Some 26.7% responded correctly but guessed (TG) and 6.7% responded incorrectly (F).

When comparing the combined responses of these four categories (T, TG. FG. And F) of control and experimental pretest scores, no statistical significant difference (P = 0.102) was established. The combined data is as follows: in the pretest control group 73.7% participants responded correctly, 16.4% responded correctly with guessing, 4.4% incorrectly with guessing, and 5.7% responded incorrectly. In the experimental pretest group, 69.3% participants responded correctly, 18.4% correctly with guessing, 3.7% incorrectly with guessing, and 8.6% answered incorrectly. Control and experimental pretest analysis of subjects' responses were shown in Table 4.3.

Table 4.3. Control and Experimental Pretest: Analysis of Subjects' Responses of Content Knowledge

T	TG	FG	F		T	TG	FG	F
29 (96.7%)	1 (3.3%)				26(86.7%)	1(3.3 %)	1(3.3%)	1(6.7%)
Control Pretest: Question 1					Treatment Pretest: Question 1			
T	TG	FG	F		T	TG	FG	F
26 (86.7%)	2 (6.7%)	1(3.3%)	1(3.3%)		22(73.3%)	6(20%)		2(6.7%)
Control Pretest: Question 2					Treatment Pretest: Question 2			
T	TG	FG	F		T	TG	FG	F
14(46.7%)	12(40%)	2(6.7%)	2(6.7%)		18(60%)	10(33.3%)		2(6.7%)
Control Pretest: Question 3					Treatment Pretest: Question 3			
T	TG	FG	F		T	TG	FG	F
18(60%)	9(30%)	3(10%)			16(53.3%)	12(40%)	1(3.3%)	1(3.3%)
Control Pretest: Question 4					Treatment Pretest: Question 4			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	5(16.7%)	1(3.3%)	1(3.3%)		17(56.7%)	11(36.3%)	1(3.3%)	1(3.3%)
Control Pretest: Question 5					Treatment Pretest: Question 5			
T	TG	FG	F		T	TG	FG	F
29(96.7%)	1(3.3%)				25(83.3%)	5(16.7%)		
Treatment Posttest: Question 6					Treatment Pretest: Question 6			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	4(13.3%)	2(3.3%)	1(6.7%)		19(66.3%)	10(33.3%)		1(3.3%)
Control Pretest: Question 7					Treatment Pretest: Question 7			
T	TG	FG	F		T	TG	FG	F
16(53.3%)	4(13.3%)	2(6.7%)	8(26.7%)		19(63.3%)	3(10%)	5(10.7%)	3(10%)
Control Pretest: Question 8					Treatment Pretest: Question 8			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	2(6.7%)	3(10%)	2(6.7%)		18(60%)	7(23.3%)	2(6.7%)	3(10%)
Control Pretest: Question 9					Treatment Pretest: Question 9			
T	TG	FG	F		T	TG	FG	F
20(66.7%)	9(30%)		1(3.3%)		18(60%)	8(26.7%)	2(6.7%)	2(6.7%)
Control Pretest: Question 10					Treatment Pretest: Question 10			

The results of independent sample *t* test suggested that content knowledge related to ASD between the experimental and control groups was not significantly different. The pretest average score of the experimental and control groups are shown in Table 4.4 and Figure 4.1.

Table 4.4. Independent-Samples T Test: Pretests

	n	Mean Score	% df	Median	P-Value
Control Group	30	35. 76	25.1	37	P = 0.102
Experimental Group	30	34.9	28.8	35	

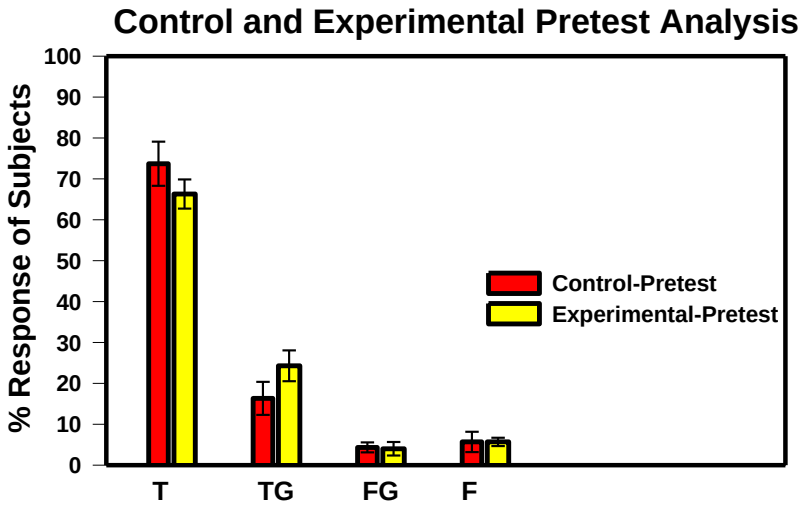

Figure 4.1. Control and Experimental Pretest Comparison

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.102).

Assumption 2: Experimental Posttest Score = Control Posttest Score

The second hypothesis sought to evaluate the difference between the posttest scores of those participants exposed to the behavior module as opposed to the participants not being exposed to the module. Therefore, the independent sample *t* test was conducted again to evaluate the difference between the posttest score of the two groups. The results indicated that individuals who participated in the treatment activity obtained higher responses than those without treatment activity.

The participants in the treatment group (N=30) were asked ten questions on the content knowledge of ASD in the pretest and posttest survey and a comparison of each question was analyzed in percentages as follows. In the treatment posttest questionnaire, 96.7% of the participants responded correctly to question one with only 6.7% who guessed correctly. In the control posttest questionnaire, all thirty (N=30) answered correctly (100%) with none responding incorrectly. For question two in the treatment posttest questionnaire, 100% of the participants responded correctly to question two devoid of any incorrect responses; in the control posttest, 86.7% responded correctly, including 3.3% who guessed correctly and 6.7% who answered incorrectly. For question three, 96.7% responded correctly and 3.3% guessed correctly with nine responding incorrectly (F). In the control posttest, 53.3% responded correctly to the same question and 33.3% guessed correctly, 6.7% (guessed incorrectly) and 6.7% responded incorrectly.

For question four, 100% of the participants of the treatment posttest responded correctly with no incorrect guessing. Some 70% of the control posttest participants answered correctly along with 16.7% guessing correctly, 13.3% responding incorrectly and 13.3% who guessed incorrectly. Question five had 96.7% of the participants of the

treatment posttest responding correctly and 3.3% responding incorrectly. For the control group, 83.3% answered correctly, 10% guessed correctly, and 3.3% incorrectly guessed (FG). One hundred percent (100%) of the participants of the treatment posttest responded correctly to question six, where as 96.7% answered correctly to the same question in the control posttest, with 3.3% responding incorrectly.

One hundred percent (100%) of the participants of the treatment posttest responded correctly to question seven, where as 76.7% answered correctly to the same question in the control posttest along, with 16.7% who guessed correctly and 6.7% answered incorrectly. Some 56.7% of the participants of the treatment posttest responded correctly to question eight along with 23.3% guessing correctly, 3.3% answering incorrectly, and16.7% guessing incorrectly. In the control posttest group, 56.7% answered correctly, 13.3% guessed correctly, 23.3% answered incorrectly, and 6.7% guessed incorrectly. For question nine, 100% of the participants of the treatment posttest responded correctly, where as 73.3% answered correctly to the same question in the control posttest, 6.7% guessed correctly, 10% guessed incorrectly, and 10% answered incorrectly. Finally, 93.3% of the participants of the treatment posttest responded correctly to question ten with 6.7% guessing correctly. Some 73.3% answered correctly to the same question in the posttest control group along with 23.3% who responded correctly by guessing (TG) and 3.3% who responded incorrectly.

When comparing the combined responses of these four categories (T, TG, FG, and F) of control and experimental posttest scores, no statistical significant difference was established. Comparison of Subjects' Responses of Experimental Posttest Score and Control are shown in Table 4.5.

Table 4.5. Experimental Posttest Score and Control Posttest Score: Comparison of Subjects' Responses

T	TG	FG	F		T	TG	FG	F
29(96.7%)		1(3.3%)			30 (100%)			
Treatment Posttest: Question 1					Control Posttest: Question 1			
T	TG	FG	F		T	TG	FG	F
30(100%)					26(86.7%)	1(3.3%)	1(3.3%)	2(6.7%)
Treatment Posttest: Question 2					Control Posttest: Question 2			
T	TG	FG	F		T	TG	FG	F
29(96.7%)	1(3.3%)				16(53.3%)	10(33.3%)	2(6.7%)	2(6.7%)
Treatment Posttest: Question 3					Control Posttest: Question 3			
T	TG	FG	F		T	TG	FG	F
30(100%)					21(70%)	5(16.7%)	4(13.3%)	
Treatment Posttest: Question 4					Control Posttest: Question 4			
T	TG	FG	F		T	TG	FG	F
29(96.7%)			1(3.3%)		25(83.3%)	3(10%)	1(3.3%)	1(3.3%)
Treatment Posttest: Question 5					Control Posttest: Question 5			
T	TG	FG	F		T	TG	FG	F
30(100%)					29(96.7%)	1(3.3%)		
Treatment Posttest: Question 6					Control Posttest: Question 6			
T	TG	FG	F		T	TG	FG	F
30(100%)					23(76.7%)	5(16.7%)		2(6.7%)
Treatment Posttest: Question 7					Control Posttest: Question 7			
T	TG	FG	F		T	TG	FG	F
17(56.7%)	7(23.3%)	1(3.3%)	5(16.7%)		17(56.7%)	4(13.3%)	2(6.7%)	7(23.3%)
Treatment Posttest: Question 8					Control Posttest: Question 8			
T	TG	FG	F		T	TG	FG	F
30(100%)					22(73.3%)	2(6.7%)	3(10%)	3(10%)
Treatment Posttest: Question 9					Control Posttest: Question 9			
T	TG	FG	F		T	TG	FG	F
28(93.3%)	2(6.7%)				22(73.3%)	7(23.3%)		1(3.3%)
Treatment Posttest: Question 10					Control Posttest: Question 10			

The comparison results of the posttests of the two groups exhibited that the experimental group performed better than the control group. Comparison results are shown in Figure 4.2.

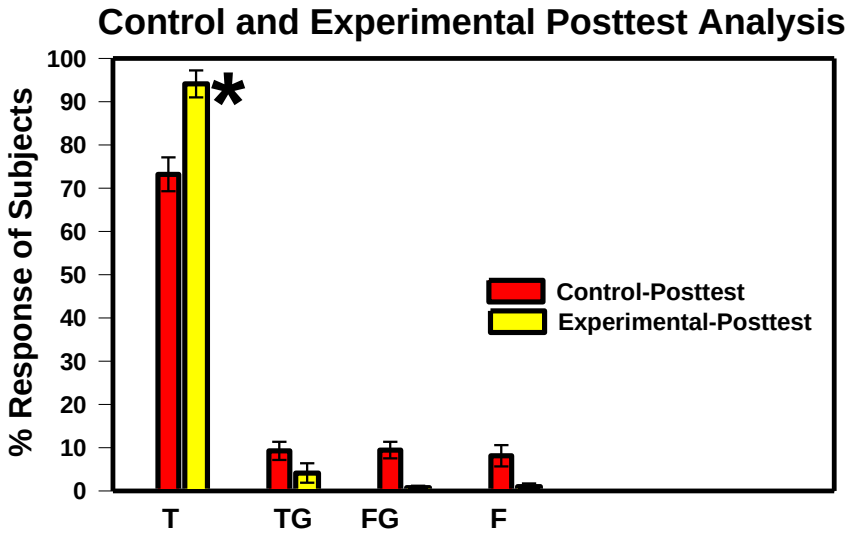

Figure 4.2. Experimental and Control Group: Posttest

The difference in the median values between the two groups is greater than would be expected by chance; there is a statistically significant difference (P = <0.001). Results of the analysis are shown in Table 4.6.

Table 4.6. Independent-Samples T Test: Posttests

	n	Median	Mean Score	% df	P-Value
Control Posttest	30	37	36.06	28.9	P = <0.001
Experimental Posttest	30	39.5	38.93	40	

Assumption 3: Experimental Posttest Score = Experimental Pretest Score

This assumption was to determine the effectiveness of the behavior module as a means to increase the participant's content knowledge of ASD. A paired *t* test analysis

was used to evaluate whether or not the experimental group would profit from treatment activity. The findings suggested that the mean score of the posttest was significantly higher than the mean score of the pretest. In other words, the participants in the experimental posttest group made a compelling growth in content knowledge test scores when compared with the experimental pretest group.

In the treatment pretest questionnaire, 86.7% of the participants responded correctly to question one, 3.3% responded correctly but guessed, 6.7% guessed incorrectly, and 3.3% answered incorrectly. In the treatment posttest questionnaire group, 96.7% answered correctly and only 3.3% responded incorrectly but guessed.

In the treatment pretest questionnaire, 73.3% participants responded correctly to question two and 20% responded correctly but guessed, 6.7% answered incorrectly. In the treatment posttest questionnaire, their posttest responses were 100% correct with no guessing or incorrect answers.

For the pretest treatment group for question 3, 60% responded correctly, 33.3% guessed true and 6.7% responded incorrectly (F), while 96.7% of participants in the posttest survey responded correctly to the same question, 3.3% guessed correctly and there were no incorrect answers.

For question four, 53.3% of the participants of the pretest responded correctly along with 40% who guessed correctly, 3.3% answered incorrectly 3.3% who answered incorrectly guessed. One hundred percent (100%) answered correctly without any incorrect responses after the treatment phase.

Some 56.7% of the participants of the pretest responded correctly to question five along with 36.7% who guessed correctly, 3.3% who responded incorrectly, and 3.3%

who guessed incorrectly. Over 96.7% answered correctly in the posttest along with 3.3% incorrectly answering (F).

For the treatment pretest group, 83.3% of the participants responded correctly to question six along with 16.7% guessing correctly, where as 100% answered correctly to the same question in the posttest with none responding incorrectly.

Some 66.3% of the participants of the pretest responded correctly to question seven along with 33.3% who guessed correctly, and 3.3% answering incorrectly, where as 100% answered correctly to the same question in the posttest with none responding incorrectly.

Sixty-three percent (63.3%) of the participants of the pretest responded correctly to question eight along with 10% who guessed correctly, 10% who answered incorrectly (F), and10.7% who guessed incorrectly. Some 56.7% answered correctly to the same question in the posttest along with 23.3% who guessed correctly, 16.7% answered incorrectly, and 3.3% who guessed incorrectly.

For question nine, 60% of the treatment participants of the pretest responded correctly along with 23.7% who guessed correctly, 10% who answered incorrectly, and 6.7% guessed incorrectly. One hundred percent (100%) answered correctly to the same question in the posttest with none responding incorrectly. Finally, 60% of the participants of the treatment pretest responded correctly to question nine with 26.7% guessing correctly, 6.7% answering incorrectly, and 6.7% guessing correctly. Some 93.3% answered correctly to the same question in the posttest with 6.7% responding correctly with guessing (TG). Comparison of Subjects' Responses of Content Knowledge of treatment Pretest and Posttest group are listed below in Table 4.7.

Table 4.7. Treatment Pretest and Posttest: Comparison of Subjects' Responses of content Knowledge.

T	TG	FG	F		T	TG	FG	F
26(86.7%)	1(3.3 %)	1(3.3%)	1(6.7%)		29(96.7%)		1(3.3%)	
Treatment Pretest: Question 1					Treatment Posttest: Question 1			
T	TG	FG	F		T	TG	FG	F
22(73.3%)	6(20%)		2(6.7%)		30(100%)			
Treatment Pretest: Question 2					Treatment Posttest: Question 2			
T	TG	FG	F		T	TG	FG	F
18(60%)	10(33.3%)		2(6.7%)		29(96.7%)	1(3.3%)		
Treatment Pretest: Question 3					Treatment Posttest: Question 3			
T	TG	FG	F		T	TG	FG	F
16(53.3%)	12(40%)	1(3.3%)	1(3.3%)		30(100%)			
Treatment Pretest: Question 4					Treatment Posttest: Question 4			
T	TG	FG	F		T	TG	FG	F
17(56.7%)	11(36.3%)	1(3.3%)	1(3.3%)		29(96.7%)			1(3.3%)
Treatment Pretest: Question 5					Treatment Posttest: Question 5			
T	TG	FG	F		T	TG	FG	F
25(83.3%)	5(16.7%)				30(100%)			
Treatment Pretest: Question 6					Treatment Posttest: Question 6			
T	TG	FG	F		T	TG	F	FG
19(66.3%)	10(33.3%)		1(3.3%)		30(100%)			
Treatment Pretest: Question 7					Treatment Posttest: Question 7			
T	TG	FG	F		T	TG	FG	F
19(63.3%)	3(10%)	5(10.7%)	3(10%)		17(56.7%)	7(23.3%)	1(3.3%)	5(16.7%)
Treatment Pretest: Question 8					Treatment Posttest: Question 8			
T	TG	FG	F		T	TG	FG	F
18(60%)	7(23.3%)	2(6.7%)	3(10%)		30(100%)			
Treatment Pretest: Question 9					Treatment Posttest: Question 9			
T	TG	FG	F		T	TG	FG	F
18(60%)	8(26.7%)	2(6.7%)	2(6.7%)		28(93.3%)	2(6.7%)		
Treatment Pretest: Question 10					Treatment Posttest: Question 10			

The results corroborated that the behavior module was an effective tool in facilitating learning. Comparison of experimental and control group posttest are shown in Figure 4.3.

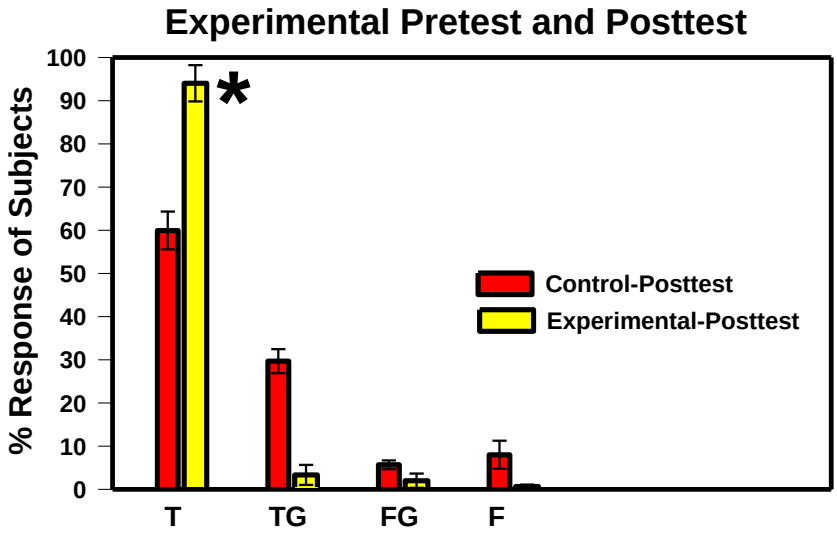

Figure 4.3. Experimental Group: Pretest and Posttest

The difference in the median values between the two groups is greater than would be expected by chance; there is a statistically significant difference (P = <0.001). Results of the analysis are shown in Table 4.8.

Table 4.8. Paired-Samples T Test: Experimental Group

	n	Median	Mean Score	% df	P -Value
Pretest	30	39	38.9	28.8	P = <0.001
Posttest	30	35	34.5	40	

Assumption 4: Control Posttest Score = Control Pretest Score

In order to authenticate whether the participants in the control group acquired a significant amount of content knowledge, the paired *t* test analysis was executed on both

assessments of the control group (e.g. pretest and posttest). As with the other analyses, all the participants (N=30) in the pretest control group were asked ten questions related to the content knowledge of ASD in the pretest and posttest survey. Their responses were categorized into four groups: correct responses (T), correct but guessed (TG), incorrect with guessing (FG), and incorrect responses (F).

In the control pretest questionnaire, 96.7% of the participants responded correctly to question one and 3.3% responded correctly but guessed, whereas participants in the control posttest questionnaire answered correctly 100% of the time. In the control pretest questionnaire, 86.7% of the participants responded correctly to question two and 6.7% responded correctly but guessed, 3.3% answered incorrectly, 3.3% responded incorrectly but guessed. For question two, the control posttest responses were 86.7% correct, 3.3% guessed true, 6.7% incorrect, and 3.3% responded incorrectly but guessed.

For question three, 46.7% of the control pretest group responded correctly, 40% guessed true, 6.7% responded incorrectly (F), and 6.7% guessed incorrectly (FG), while 53.3% of control participants in the posttest survey responded correctly to the same question along with 33.3% guessed correctly, 6.7% answered incorrectly, and 6.7% guessed incorrectly.

For question number four, 60% of the control group participants responded correctly on the pretest along with 30% guessing correctly, and 10% guessing incorrectly. Some 70% answered correctly in the control posttest along with 16.7% guessing correctly, and 13.3% guessing incorrectly.

On question five, 76.7% of the control group participants responded correctly with 16.7% guessing correctly, 3.3% answering incorrectly, and 3.3% guessing

incorrectly. Some 83.3% of the control group participants answered correctly along with 10% guessing correctly and 3.3% answering incorrectly. For question six, 96.7% of the control group participants responded correctly along with 3.3% guessing correctly. Some 96.7% answered correctly to the same question in the posttest along with 3.3% guessing correctly and none responding incorrectly.

Seventy-six percent (76.7%) of the control group participants responded correctly to pretest question seven along with 13.3% guessing correctly, 6.7% answering incorrectly, and 3.3% guessing incorrectly. For the control posttest participants, some 76.7% answered correctly to the same question along with 16.7% guessing correctly and 6.7% answering incorrectly. Some 53.3% of the participants of the pretest responded correctly to question eight along with 13.3% guessing correctly, 26.7% answering incorrectly, and 6.7% guessing incorrectly. For question eight on the posttest, the 56.7% of control group participants answered correctly along with 13.3% guessing correctly, 23.3% answering incorrectly, and 6.7% guessing incorrectly. For question nine on the pretest, 76.7% of the control group participants responded correctly along with 6.7% guessing correctly, 6.7% answering incorrectly, and 10% guessing incorrectly. Some 73.3% answered correctly to the same question in the posttest along with 6.7% guessing correctly, 10% answering incorrectly, and 10% guessing incorrectly. Finally, 66.7% of the participants of the pretest responded correctly to question ten with 30% guessing correctly, and 3.3% answering incorrectly. Some 73.3% answered correctly to the same question in the posttest with 23.3% guessing correctly and 3.3% responding incorrectly. Control Pretest and Posttest: Analysis of Subjects' Responses of each question was shown in Table 4.9.

Table 4.9. Control Pretest and Posttest: Comparison of Subjects' Responses of Content Knowledge.

T	TG	FG	F		T	TG	FG	F
29 (96.7%)	1 (3.3%)				30 (100%)			
Control Pretest: Question 1					Control Posttest: Question 1			
T	TG	FG	F		T	TG	FG	F
26 (86.7%)	2 (6.7%)	1(3.3%)	1(3.3%)		26(86.7%)	1(3.3%)	1 (3.3%)	2(6.7%)
Control Pretest: Question 2					Control Posttest: Question 2			
T	TG	FG	F		T	TG	FG	F
14(46.7%)	12(40%)	2(6.7%)	2(6.7%)		16(53.3%)	10(33.3%)	2(6.7%)	2(6.7%)
Control Pretest: Question 3					Control Posttest: Question 3			
T	TG	FG	F		T	TG	FG	F
18(60%)	9(30%)	3(10%)			21(70%)	5(16.7%)	4(13.3%)	
Control Pretest: Question 4					Control Posttest: Question 4			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	5(16.7%)	1(3.3%)	1(3.3%)		25(83.3%)	3(10%)	1(3.3%)	1(3.3%)
Control Pretest: Question 5					Control Posttest: Question 5			
T	TG	FG	F		T	TG	FG	F
29(96.7%)	1(3.3%)				29(96.7%)	1(3.3%)		
Control Pretest: Question 6					Control Posttest: Question 6			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	4(13.3%)	2(6.7%)	1(3.3%)		23(76.7%)	5(16.7%)		2(6.7%)
Treatment Pretest: Question 7					Control Posttest: Question 7			
T	TG	FG	F		T	TG	FG	F
16(53.3%)	4(13.3%)	8(26.7%)	2(6.7%)		17(56.7%)	4(13.3%)	2(6.7%)	7(23.3%)
Control Pretest: Question 8					Control Posttest: Question 8			
T	TG	FG	F		T	TG	FG	F
23(76.7%)	2(6.7%)	3(10%)	2(6.7%)		22(73.3%)	2(6.7%)	3(10%)	3(10%)
Control Pretest: Question 9					Control Posttest: Question 9			
T	TG	FG	F		T	TG	FG	F
20(66.7%)	9(30%)		1(3.3%)		22(73.3%)	7(23.3%)		1(3.3%)
Control Pretest: Question 10					Control Posttest: Question 10			

When comparing the combined responses of these four categories (T, TG, FG, and F) of pretest and posttest control scores, no statistical significant difference (P = 0.964) was established. The combined data is as follows: in the pretest control group: 73.7% participants responded correctly, 16.4% responded correctly with guessing, 4.4% incorrectly with guessing, and 5.7% responded incorrectly, whereas in the posttest group 72% participants responded correctly, 33.3% correctly with guessing, 4.4% incorrectly with guessing, and 6% answered incorrectly. The following comparison of pretest and posttest analysis is depicted in Figure 4.4.

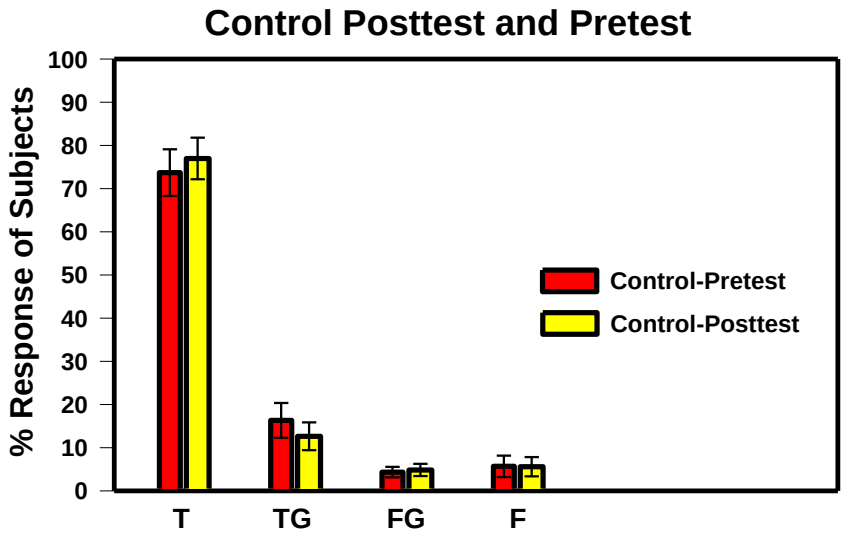

Figure 4.4. Control Posttest and Pretest Comparison

Comparisons indicate that the mean score of the control group pretest was 25.1%. For the control group posttest, the mean score was 28.9%. The results showed that there was no significant gain between the pretest and posttest scores. The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability and there is not a statistically

significant difference (P = 0.964). All in all, the findings suggested that treatment activity was a determinant in the enhancement of the content knowledge from pretest to posttest. Results of the analysis are shown in Table 4.10.

Table 4.10. Paired-Samples T Test: Control Group

	n	Mean Score	Median	% df	P-Value
Control Pretest	30	35.76	37	25.1	0.964
Control Posttest	30	36.06	37	28.9	

Knowledge Test Results

In summary, the results of the first research question: "Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?" supported the idea that the behavior module did enhance the content knowledge of the participating individuals in the study.

Research Question Two: Behavior Module Effectiveness

The behavior module was intended to provide information to parents, professionals and caregivers working with children with ASD. The experimental group, a total of 30 participants, reflected module effectiveness by completing an additional ten questions related to the perceptions of the module which sought to determine the effectiveness and accessibility of the module.

The experimental group used a Likert-type scale to indicate their perceptions about the module effectiveness. Scores of five signaled that the participants "strongly agreed" with the question; scores of four signaled "agreement", three indicated "neutral", two implied "disagree", and one indicated the participant "strongly disagreed" in relation

to their contentment. The research questions, with regard to perception of the module, aimed at both the accessibility of the module layout and the effectiveness of the module's content. As Table 4.10 showed, 93.3% of the participants responding to question one, understanding the module content, chose either "strongly agree" or "agree" and 6.7% responded "neutral" in the 5-point Likert scale. None of them responded "strongly disagree" or "disagree," indicating the content information is easily comprehensible. For the second question, comfort of navigating the module, 30% responded with "strongly agree" or "agree", 50% "neutral," and 20% chose "disagree." None of them responded "strongly disagree." On the third question, concerning a well-designed format, 26.7% of the participants chose "strongly disagree" or "disagree", 46.7% as "neutral", only 6.7% chose "disagree," and none gave any input for "strongly disagree." For the fourth question, on the aspect of technical glitches, 23.3% responded "agree," 46.6% chose "neutral," 20% chose "disagree," and none answered "strongly disagree." On the fifth question, response time needed, 36.7% responded with "strongly agree" or "agree," 43.3% chose "neutral," 20% responded with "disagree," and none of them chose "strongly disagree." Overall, the results from questions two to five represented the format of the module, demonstrating that the accessibility of the module was effective but was a challenge to some extent. Twelve percent (12%) of the participants found the module a little difficult to navigate, as the links on the navigation column were not easy to maneuver and did not reflect in the right column. However, the participants agreed that the module covered various aspects of ASD.

For the sixth question, useful strategies, 50% of the participants responded with "strongly agree" or "agree," where as 50% chose "neutral" and none of them chose

"disagree" or "strongly disagree" for the evaluation. This indicated that the module provided useful strategies to most of the population. Seventy-six percent (76%) of the participants responding to question seven, enjoyable online video, chose either "strongly agree" or "agree", 13.3% chose "neutral", 6.7% chose "disagree," and 3.3% chose "strongly disagree." For the eighth question, 86.6% of the participants considered the behavior module as a helpful tool for individuals beginning to learn about ASD. On the ninth question, 93.4% of the participants considered the module as an accessible means that provides information about research-based interventions in ASD, and would be used for future reference; only 6.7% chose neutral with none responding disagree or agree. Finally, over 86% of the participants responding to question ten, relevant information from the module, either chose strongly agree or agree and only 6.7% responded neutral. This was coupled with 3.3% who strongly disagree and disagree for the evaluation scale. The effectiveness of the module was highly supported by a majority of the participants. Table 4.11. represents module evaluation results.

Questions	n	%
1. Simplicity of the Content		
SA	10	33.3
A	18	60
N	2	6.7
D	0	0
SD	0	0
2. Easy Navigation		
SA	3	10
A	6	20
N	15	50
D	6	20
SD	0	0
3. Well Designed Layout		
SA	3	10
A	5	16.7
N	14	46.6

D	2	6.7
SD	0	0
4. Free of Technical Glitches		
SA	3	10
A	7	23.3
N	14	46.6
D	6	20
SD	0	0
5. Response Time Needed		
SA	3	10
A	8	26.7
N	13	43.3
D	6	20
SD	0	0
6. Helpful Approach		
SA	5	16.7
A	10	33.3
N	15	50
D	0	0
SD	0	0
7. Pleasant Online Video		
SA	10	33.3
A	13	43.3
N	4	13.3
D	2	6.7
SD	1	3.3
8. Helpful Tool		
SA	10	33.3
A	14	53.3
N	4	13.3
D	1	3.3
SD	1	3.3
9. Accessible Means		
SA	11	36.7
A	17	56.7
N	2	6.7
D	0	0
SD	0	0
10. Relevant Information		
SA	11	36.7
A	15	50
N	2	6.7
D	1	3.3
SD	1	3.3

Further analysis presented separate satisfaction percentages for the format and content sections. Six out of 10 questions labeled content satisfaction by aiming at the simplicity of the content, practicability of the strategies, enjoying online video, amount of time needed, as a helpful tool, productiveness of the content revealed. The other four questions examined the module's layout in relation to enhancement, lack of technical glitches, appealing look and feel, navigation, and exploring the module. Figure 4.5 and 4.6 detail the results.

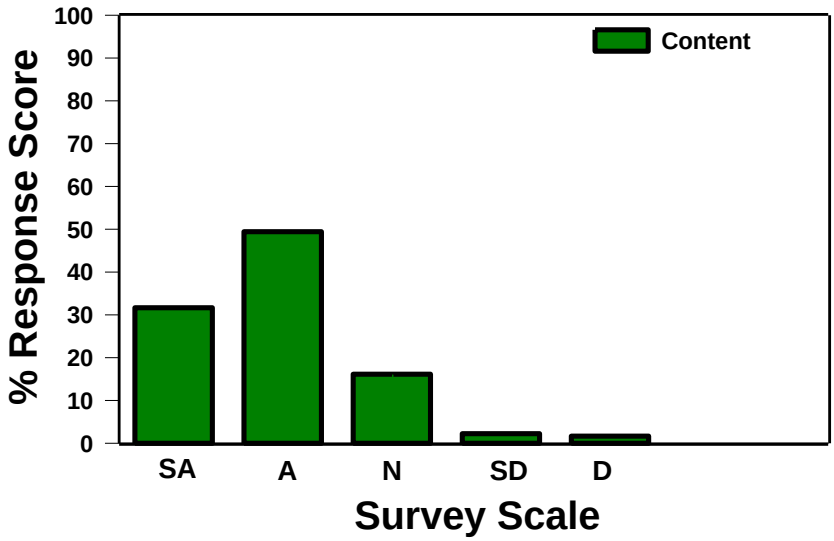

Figure 4.5. Perception of Module Content

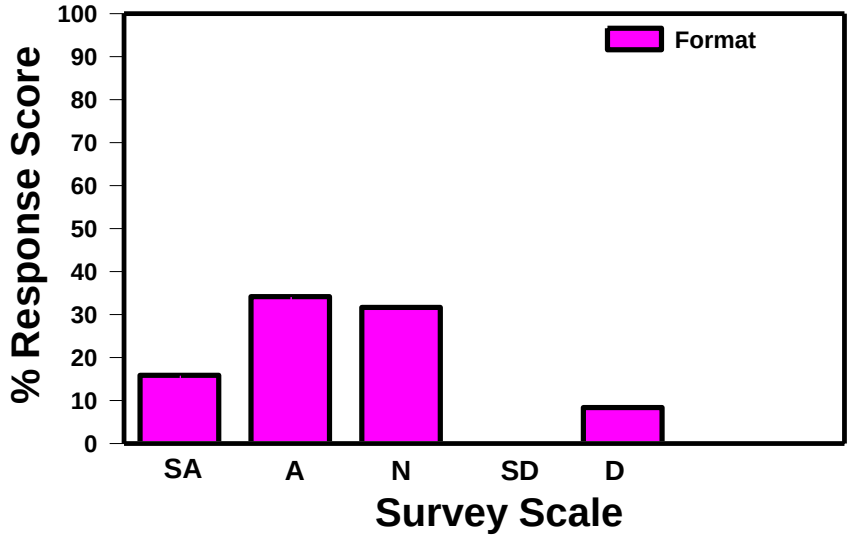

Figure 4.6. Perception of Module Format

Data analysis of the experimental group was used to calculate a mean score for each question. Content simplicity or clearness and helpful tool generated the highest mean (M=4.28 and 4.32). The questions demonstrating the minimal degree of satisfaction were in the accessibility class. Both appealing look and feel, amount of time needed, and lack of technical glitches obtained mean scores of only 3.12 - 3.32, signifying less satisfaction. Figure 4.7 details the mean score of perception questions.

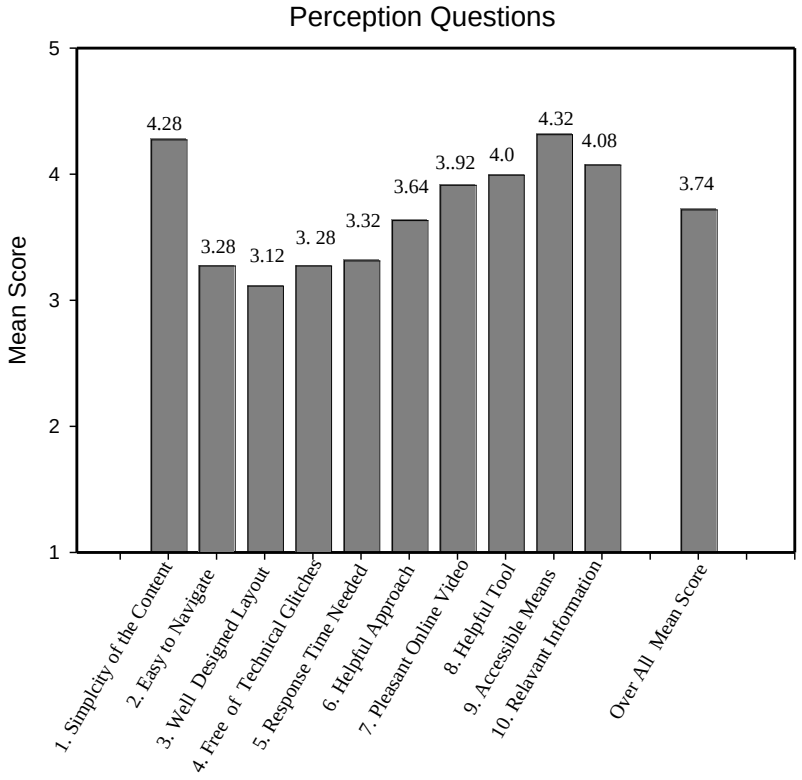

Figure 4.7. Mean Score for Perception Questions

The frequency of the participants' responses to each perception question is shown in Figure 4.8. Frequency data for the questions in relation to content simplicity or clearness, format navigation, enjoying the online videos, and using as helpful tool, signaled that the considerable number of participants strongly agreed (5) and agreed (4) with the module's satisfaction. Over all, the results indicated that the accessibility of behavior module was effective. The greater part of the participants' responses to all remaining questions indicated agreement with module satisfaction. Figure 4.8 details frequency of responses for perception questions.

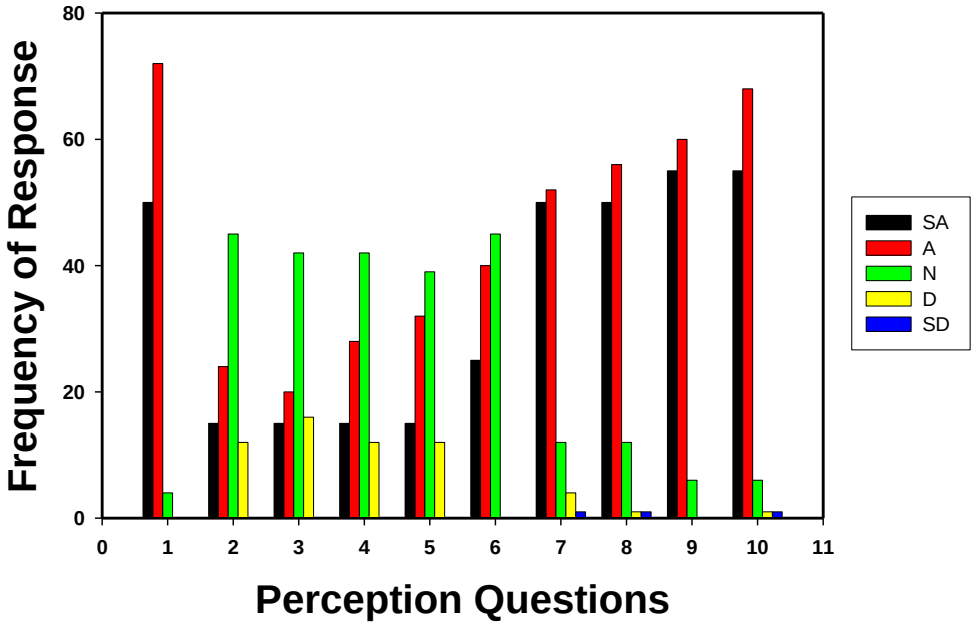

Figure 4.8 Frequencies of Responses for Perception Questions.

Research Question Three: Parents' Attitudes Toward Online Behavior Module

When participants were asked thirteen questions to report their attitude toward the web-based behavior module, the results were informative. Over 96% of the participants considered the online behavior module as an effective tool for learning about ASD while 83% responded using research-based behavioral interventions addressed in the behavior module. Only 16.6% reported neutral. Only 13.3% responded not learning through the behavior module and the research-based behavioral interventions addressed in the module. About 63.3% preferred to choose books as their learning resource. The participants who chose to adopt books as their learning resource pointed to books' practicality and computer illiteracy. Eighty-seven percent (87%) indicated using Applied Behavior Analysis to increase desired behaviors, decrease inappropriate behaviors, and teach new behaviors, and 13.3% reported neutral. When asked about discrete trial

teaching, visual cues, prompting and fading, 80% of the participants chose "strongly agree" and "agree". About 66.6% of the participants indicated that they were using PECS to communicate with a non-verbal child and 30% remained neutral; 76.7% selected Joint Attention Routine and social story interventions to improve interaction, emotional and behavioral issues, with only 23.3% neutral for JARs; 83.3% reported using Discrete Trial Training where as only 16.6% were neutral; 43.2% reported using Pivotal Response Training to motivate a child to learn new tasks, while 53.3% remained neutral.

Over 90% of the participants agreed that the online module was an effective learning resource in order to work with children with ASD. In general, when participants were asked the 13 questions, 90% of participants' responses scored more than 3.9 on a scale of 1-5, suggesting a generally positive attitude toward online behavior module. In addition, only 10% of subjects scored less than 1.7, suggesting they have a poor attitude towards online behavior module. In this study, the top score was 4.3 and the bottom was 1.7. Findings of the total subjects' cumulative response was presented below in Figure 4.9.

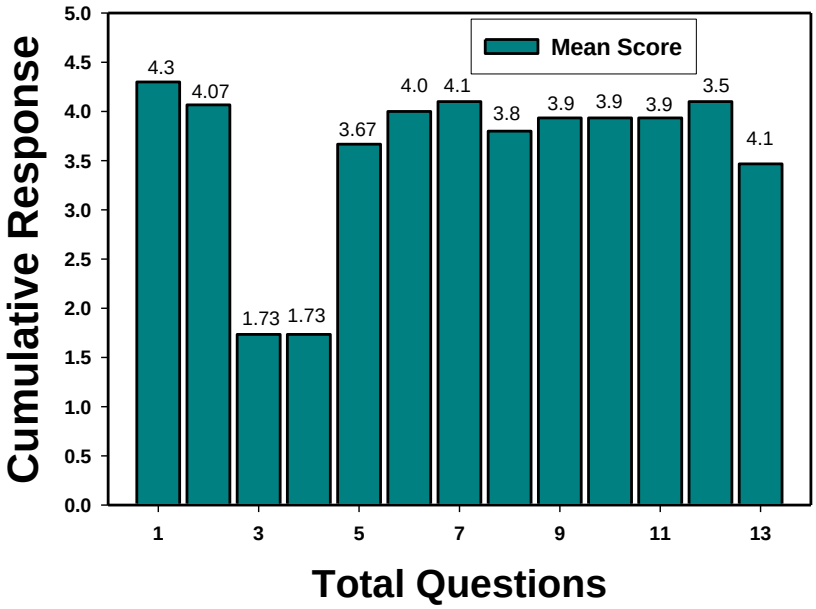

Figure 4.9. Attitude Cumulative Response

Summary

A total of 60 parents with children with ASD from Autism Solution Center located in Memphis, Tennessee participated in this study. Three research questions were used to evaluate the effectiveness of the behavior module. 1) "Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?" 2) "Was the Behavioral Module developed for parents learning about children with ASD such that it is appropriate and accessible?" and 3) "Do parents who have been trained through the Behavior Module select research-based behavioral interventions from a list of interventions more often than those who have not been trained?" The data was collected over a period of four months due to the unavailability of the parents.

A *t* test was used to determine if a significant difference exits between and within the scores of the two groups. Findings from independent-sample *t* tests showed that each group obtained a similar understanding of behavior issues in ASD. In order to obtain accurate results, the study utilized a paired-sample *t* test of the experimental group's pretest and posttest scores.

A significant difference was established. But, no significant difference was found between the pretest and posttest scores in the control group.

A greater number of participants indicated their positive attitude towards the behavior module and found the module effective as well as considered it a helpful tool for knowledge enhancement. It was also indicated that the behavior module was well designed in terms of basics to provide information in the area of autism education for parents with children with ASD.

CHAPTER V

SUMMARY AND IMPLICATIONS

Introduction

This chapter seeks to provide a discussion of the meaning of the results of the study. The chapter is organized into five sections. The first section summarizes the dissertation by chapters. The second section discusses the results of the research hypothesis, and the third section provides practical implications. The fourth section discussed the limitations of the study. The final section sketches out the implications for future research and conclusion.

Summary by Chapters

This study was intended to determine the overall effectiveness of the behavior module and to examine the extent to which an online behavior module would increase the awareness of research–based interventions for parents working with children with ASD. In order to deal with the growing rates of children with ASD and face the challenges of problem behaviors characteristic of ASD, an online behavior module with several research–based interventions for parents and caregivers was developed. This study sought to determine the effectiveness of the behavior module by analyzing changes in the participants' content knowledge and their perceptions and attitudes toward the module's accessibility and appropriateness. Chapter one provided the introduction of the study and rationale. Chapter two introduced a widespread literature review to provide a cornerstone for the study. A review of that literature is presented below.

In order to understand what the participants would be learning, the literature review provided an extensive description of the behavior-based issues facing children with ASD and provided insight into some of the research-based interventions parents may be interested in working with their children. The definitions of all five primary disorders which fall under the umbrella of PDD were discussed (American Psychiatric Association [APA], 2000). The typical behaviors of individuals with ASD are present in the diagnostic criteria for ASD, substantiated by the American Psychiatric Association (APA).

Furthermore, the Individuals with Disabilities Education Act in 1990 (P.L. 101-476) defines ASD as a federal disability category. The recent increase in the number of children being diagnosed with ASD has become a major special education category leading to an increased demand for information by professionals, parents and educators. Autism has been, and continues to be, the focus of intensive study (Zager, 2005). Current statistics indicate that the number of children diagnosed with ASD has grown to approximately one in 91 children in the United States (Kogen et al., 2009). The Centers for Disease Control and Prevention (CDC) estimates that an average of one in 110 children in the U.S is on the Spectrum. With ASD being diagnosed at such an alarming rate, parents may have trouble acquiring information to successfully manage their children's problem behaviors. Therefore, parents need to have easy access to interventions to deal with problem behaviors. If parents lay a solid knowledge-based foundation by having available and organized resources, they will have a better chance to help their children. In order to disperse the information to a broad group, the behavior

module uses an online format module. All in all, this study was aimed at collecting factual data to evaluate the effectiveness of this online format module.

Chapter III explored and clarified the research methodology used in this study. The chapter provided a rationale for the research questions proposed by the study, the research design, information on the data sources executed, data collection, data analysis procedures, a data management plan, and the validity of the study. The research instrument for this study consisted of an online survey that asked questions pertaining to behavioral issues in children with ASD and questions about the module format itself in order to collect data to answer the specific research questions.

The study used a pretest-posttest control group design using a multiple-choice format. Each group took the same pretest. The experimental group was provided a treatment activity and a posttest was administered to both groups. In addition, the survey used a Likert-type scale to measure the perceptions and attitudes toward web-based learning.

An accessible population of parents with children with ASD was selected within the Memphis area. There were 60 subjects that participated in this study, split into two equal groups of 30 people. All participants were parents of children with ASD with a variety of severity, ages and grade level. There was no limit to their child's age or grade level but the child must have ASD. For this study, all participants were required to complete a set of pretests and posttests; in addition, the experimental (pretest) group was required to complete the treatment activity by exposing them to the behavior module. The pretest and posttest questionnaires included three sections which included: background information, content knowledge, and perceptions and attitudes toward the

behavior module. Treatment groups were provided supplementary questions regarding the perceptions and attitudes.

Chapter IV discussed the descriptive statistics created to determine the participants' demographic information. In addition, data analyses were administered and described to address each of the research questions. Independent- and paired-sample *t* tests were used to determine whether significant differences existed between the control and the treatment groups, as well as within each group. The study also used percentages and frequencies. The results were interpreted in text, table, and chart format. Chapter V will provide further discussion of the results.

Discussion of Results

The aim of this study was to evaluate the general effectiveness of the behavior module by examining the usefulness and accessibility of its implementation, surveying the range of knowledge acquired by viewing the module, and analyzing the intensity of individual's knowledge affecting their perceptions of the module's content. Thus, the study used three research questions and discussed both descriptive and inferential statistics to ascertain the efficacy of the behavior module as a means for dissipating information regarding research-based strategies for parents with children with ASD. Results for each of the research questions are discussed in detail throughout the following sections.

Research Question One

Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

The first research question used *t* test analysis of variance and comparison of individual responses of the content knowledge to determine any significant difference between the pre- and posttest scores. The experimental group was exposed to the behavior module before taking the posttest while the control group received no additional information on ASD between the test administrations. The responses of the participants were compared from the pretest and posttest administration. Results were analyzed. A *t* test analysis of variance of the content knowledge indicated that there was significant difference (P = <0.001) between pre and posttest of the treatment group.

Secondly, however, the findings indicated that there was not a statistically significant difference (P = 0.964) from the pretest to posttest scores of the control group, there by reinforcing the findings. Due to the treatment activity, the participants in the treatment group achieved higher scores than the control group. Participants in the treatment group, exposed to the behavior module, showed enhanced understanding of the content presented within the instrument and posttest scores indicating an acceptable amount of reliability. The mean posttest scores of the experimental group were 38.933 while the mean posttest scores of the control group were 36.06 of the instrument.

In conclusion, the results established that the treatment had, in fact, resulted in a higher content knowledge for those individuals who obtained the treatment and were exposed to the behavior module. In other words, the behavior module was certainly helpful to promote participants' content knowledge in ASD.

Research Question Two

Was the Behavioral Module developed for parents learning about children with ASD such that it is appropriate and accessible?

The study used a Likert-type scale to determine the individuals' degree of satisfaction with the module's general effectiveness. Only participants who were exposed to the behavior module were asked to finish the posttest survey in the 5-point Likert-type scale. Scores of five signaled that the participants "strongly agreed" with the question, scores of four signaled "agreement", three indicated "neutral", two implied "disagree", and one indicated the participant "strongly disagreed" in relation to their contentment. According to the results from the perception section, participants indicated that the behavior module was a helpful tool in learning about ASD. They acknowledged the practicability of the strategies provided and the easy to understand text. A few suggestions were made to improve the module, such as maneuverability. In order to particularly address the appropriateness and accessibility of the behavior module, the perception questions were divided into two subcategories: module content and module format.

Appropriateness as Established by the Module Content

Over all, nearly 80.3% of the participants expressed moderate to high levels of satisfaction with the module's content. Results revealed that the majority of participants indicated strong agreement with the simplicity and understanding of the content (N=28), enjoyment of the video information (N=23), accessible means (N=29), relevant information (N=26), and usefulness as a reference tool (N=25). Overall, these results established the module as a valuable information resource. Participants demonstrated positive gains in content knowledge related to ASD.

Accessibility as Established by the Module Format

Over 33% of the participants demonstrated moderate satisfaction with the module's format. Results revealed that the design layout of the format was the only section in which the majority of participants indicated strong disagreement. The module's look and feel, freedom from technological glitches, and response time needed produced a mean score between 3.12 to 3.32, with only a fundamental level of confirmation. The findings established the behavior module as an accessible resource tool.

All in all, the behavior module was an effective learning tool that provided useful resources to assist parents who are working with children with ASD.

Research Question Three

Do parents who have been trained through the Behavior Module select research-based methods for behavioral intervention from a list of interventions more often than those who have not been trained?

The study again used a Likert-type scale to determine individual attitudes toward the online behavior module in the 5-point Likert-type scale. Scores of five signaled that the participants "strongly agreed" with the question, scores of four signaled "agreement", three indicated "neutral", two implied "disagree", and one indicated the participant "strongly disagreed" in relation to their attitude towards online behavior module. The majority of the participants demonstrated highly supportive attitudes toward online behavior module. Over 96% of the participants considered the online behavior module as an effective tool for learning about ASD while 83% responded that using the research-based behavioral interventions addressed in the behavior module was productive. About 63.3% preferred to choose books as their learning resources due to their practicality and

computer illiteracy. Overall, 90% of participants selected 4.0 or more on a scale of 1-5, suggesting a positive attitude toward online behavior module. In addition, only 10% of subjects scored less than 1.7, suggesting they had poor attitude towards online behavior module. Furthermore, results from the overall samples revealed the compelling finding that the contribution of the online behavior module resource to promote parents learning were positive.

Implications for Practice

The study findings suggest some implications for practice in using an online product as a parent information tool and provided convincing evidence that an online format helps parents to gain content knowledge after viewing an online behavior module. Thus, findings discussed in this study suggest that parents need a well-designed online module to be able to gain content knowledge. Additionally, participants' perceptions regarding the format section of the module staggered to some extent from their perceptions of the content. Based on findings of the study, some possible recommendations are discussed in the following section.

Embodiment of Meaningful Summary

The designers of the behavior module intended to provide clear, brief and relevant information regarding research-based interventions and behavior issues in children with ASD. To a greater extent, it is difficult for parents to clarify the meaning and simplify the information without having an intensive background in the field. If we present too many things to users at one time, it presents an information overload. Website users tend to get turned off by this. Therefore, information should be provided with detailed and

organized descriptions in the form of summaries that may clarify the meaning and simplify the information rather than presenting perplexed detailed descriptions which may alleviate reader's curiosity. Thus, each task will steer readers to in-depth inquiry about ASD education.

Restructuring Technology

The research participants demonstrated poor satisfaction with regard to the attractiveness of the module, easy navigation, and freedom from technological glitches. Participants suggested that hyperlinks in the navigation column should correspond in the right column for easy maneuvering throughout the site. In today's fast paced life, it is imperative to have a website that not only looks great, but leads your user from page to page easily. The primary goal of the online behavior module is to embellish an individual's extensive content knowledge without sustaining any obstruction. Thus, the website should be professionally designed, user-friendly, and cause minor technological difficulties so that any individuals can access the site without experiencing difficulty or needing assistance. In addition, the designers should examine any areas that might render problems to users who have limited experience with computers, as suggested by the researcher. For example, online video is a good source to enhance learning through live presentation but the specific software applications may not be installed on an individual's computer. Thus, an appropriate link should be provided to download the software while providing step-by-step instruction to use the necessary technology, thereby promoting learning about ASD and guiding the user along to where we want them to be.

Suggestion for Advanced Learning:

In order for a website to be productive, adaptable, and useful, the developers should look at the basic fundamentals and the objectives to design their website, there are certain consideration that should be included, such as recommended links to other websites. This will assist individuals to elevate their own learning and apply their awareness to their commitment. A website's success depends on the willingness to add new updates, delete old broken links, find helpful resources for the visitors, and provide a useful and informative contribution to the World Wide Web.

Limitations of the Study

There were several limitations to this research study. Addressing the limitations of this study would help future inquiry in the field of web-based learning for parents working with or living with individuals with ASD. The primary limitation is the sample size itself because the study could not be conducted over a larger part of the population, manifesting random sampling of the whole population impractical. Hence, the study centered around the parents of children with ASD from Autism Solution Center located in Memphis, Tennessee. A second limitation was that the pre-test and post-test survey format developed by the researcher allowed for a lapse of time between each pre-test and post-test format. During this time, participants could memorize specific facts about ASD instead of collecting a proper understanding from the module. Again, during pretest and posttest, participants may have accidentally learned information about ASD that may have affected their test scores. Third, participants exploring the module may not have been able to concentrate the required time to complete the module and learn what was

expected of them on the posttest. Fourth, the capability of the responder to confirm and collect precise information is a further limitation. Finally, the instrument used in the study was particularly designed to meet the needs of this study. The reliability and validity of the instrument itself may have affected supplementary concerns. Although the method in use is derived from several former studies in which reliability and validity had been identified, no pilot study was executed to support the reliability and validity of this particular instrument with parents.

Implications for Future Research

The study provided relevant information regarding research-based interventions and behavior issues of ASD for parents, caregivers and professionals who work with children with ASD. While the primary goal of the study has been reached, additional investigation should address some concerns to promote behavior module. First, in order to increase the applicability of results, a future study could involve individuals in a more metropolitan domain. The study reflected on needs of the parents, caregivers and professionals working with children with disabilities. Therefore, in order to provide a valuable guide for the future growth or development of the study, supplementary research on the individuals' needs, specific to ASD, would be great.

In addition, future research could include more detailed information from parents to understand their perceptions and experience of the implementation of the web-based learning. This would provide meaningful information in designing realistic and viable content to enhance their positive experiences.

Summary

This research study met its purpose, which sought to determine the effectiveness of an online behavior module aimed to increase the content knowledge of parents of children with ASD. The module presents several research-based interventions to provide a strong foundation in autism education. Parents will have ample chances of meeting and helping their children if they are provided with a substantial knowledge based with easily accessible and organized resources of information. The main findings of the research established the behavior module as an effective learning tool in benefitting children with ASD. Subjects who were exposed to behavior module demonstrated extensive improvement in their content knowledge and described enormous satisfaction with the module.

In addition, the study suggests that using an online format as a useful tool or resource provides relevant information for parents working with children with ASD. Providing parents with the tools necessary to deal with all the challenges that confront them will help meet the needs of the children and result in tremendous benefits to both the children and their families.

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APPENDIX A

CONSENT FORM

CONSENT FORM

What is this project about? You are invited to be a participant in my research project which looks at whether an online module developed by the Burkhart Center for Autism Education and Research at Texas Tech University will increase your understanding of research-based interventions for the behavior problems of children with ASD.

What will you ask me to do?

When you sign this consent form, you will be asked to complete an online pretest questionnaire. This pretest should take about 30 minutes. Next, you may be asked to view the online module. I will send you an email to let you know the URL. If you don't have a computer, I will give you paper copies of the pre and post tests as well as the module. Some people will not view the online module, but everyone will take a posttest. People who viewed the module will have a few extra questions about how they liked it. It will take between 30 and 45 minutes to complete the posttest questionnaire.

Will the questions make me uncomfortable? Dr. Lock, Mrs. Pani, and a special Board have reviewed the questions. They think you can answer them comfortably. However, you can stop answering the questions any time.

How much time do you need? We are asking for a total of 1 to 2 hours of your time.

Who is running this study? Dr. Robin H. Lock and Mrs. Jayasri Pani of the College of Education at Texas Tech University. robin.lock@ttu.edu or jayasri.pani@ttu.edu

If I have questions, who can I ask? You can ask:

- Mrs. Pani or Dr. Lock will answer any questions you have about the study. You can ask them directly at 806-742-1997 #288 or (901) 372-0555.
- TTU also has a Board that protects the rights of people who participate in research. You can also ask them questions about your rights at 806-742-3884. You can also mail them at Institutional Review Board for the Protection of Human Subjects, Office of Research Services, Texas Tech University, Lubbock, Texas 79409.

Are you going to protect my privacy? Of course! The surveys will not have your name or any personal information to protect your privacy.

Can I quit during the study? Yes, you can quit at any time. You will not lose anything if you stop. Participation is your choice

What will I receive? You will not directly receive anything for participating. If you are willing to participate in this project, please sign in the space below.

_____ Date _____

Signature

_____ _____ I need paper copies.

Printed name This consent form expires 7/31/2011

APPENDIX B

RECRUIMENT LETTER

RECRUITMENT LETTER

Dear Parents,

I am writing to invite you to participate in a study designed to enhance parental understanding regarding the research-based behavior interventions to improve their children's behavior. If you choose to participate you will be asked to

- complete a pretest survey about research-based behavior interventions related to ASD (about 30 minutes long)
- complete an online module about research-based behavior interventions (45 minutes long) or simply
- complete a posttest survey (30 minutes long). Some people will be asked to reflect on their perceptions or attitudes about the behavior module (30-45 minutes long) in order to determine the effectiveness of the behavior module.

If you do not have a computer, I will give you paper copies of everything you will need. Be sure to check on your consent form that you need paper copies.

Confidentiality is really important in this study so a code number will be used for all of the information you provide. Your full name will not be used. No identifying information will be viewed by anyone other than the researchers. The director will directly contact the parents' and

ask for volunteers to participate in the study. The director will not provide any private information to the researcher.

If you decide not to participate in the study, nothing will happen other than you will be thanked for your time and participation. Participation is entirely voluntary. Unfortunately, there are no monetary benefits available for participants. There are no known risks associated in participating in this study.

Let me know if you have questions. You can call me at (901) 831-5208 or email me at jayasri.pani@ttu.edu or my chair, Dr. Robin Lock at robin.lock@ttu.edu. Dr. Lock can also be reached at 806-742-1997 x288.

Thanks,

Jayasri Pani and Robin Lock

APPENDIX C

PRETEST INSTRUCTIONS AND QUESTIONNAIRE

GROUP A FORM

Directions for Pretest Procedure

Group A

****Please read the following directions before proceeding****

You are invited to be a participant in my research project which looks at whether an online module developed by the Burkhart Center for Autism Education and Research housed at Texas Tech University will increase your understanding of research-based interventions for the behavior problems of children with ASD. This pretest should take about 30 minutes.

Thank you again for your voluntary participation in this research study. Your responses are very helpful to our efforts to provide effective resources in the field of autism education. The purpose of this survey is to evaluate the effectiveness of the behavior module. The goal of the behavior module is to provide parents with information concerning research-based intervention practices in an easily accessible and systematized format improves the parents chances of meeting their children's needs

Directions for completing demographic information and survey questions

http://www.surveymonkey.com/s/ZVMLXPM

I have provided you a Survey Monkey address according to the group for which you were randomly assigned. This address will allow you access to the pretest section of this study. It is very important that you complete the demographic portion at the beginning of the survey. Confidentiality is really important in this study so a code number will be used for all of the information you provide. Your full name will not be used. We would like for you to develop a username by combining your pet's name and the last four digits of your phone number in the appropriate blanks. This will be for comparison purposes between your pre- and post- surveys only. Therefore, your full names need not be used. No identifying information will be viewed by anyone other than the researcher.

Upon completing the demographic portion of the survey, please continue on to the actual survey questions. Please respond each question that you feel is most appropriate. We understand that each of you have varied experiences, and you may have no prior experience with ASD. Please answer each question to the best of your ability. In order to have a valid picture of the pre- and post-test results, please check off the "G" box below your answer if you had to guess it.

Directions for Completing the Module

After you have completed the questionnaire using Survey Monkey and paper-based survey, you will continue on to the next phase of the study.

1. Log on to http://www.educ.ttu.edu/edsp/burkhartproject/ModuleThree/Behavior_In_ASD/Behavior_ASD_Home.htm

2. One at a time click on the topics listed at the left hand side of the screen.

3. Click on each topic to view the corresponding terms that come up on the left side bar and click on each topic of these terms to read additional information

4. Parents without computer access will be provided with paper copies of the appropriate materials at the initial meeting.

5. You will complete the post test two weeks after the pretest and will receive an email prompt to remind them to complete the posttest. DO NOT go back to the same address I gave you initially (that was the pretest address only).

6. In order to gather the most accurate information with regards to this study, please do not seek out any additional information on ASD until your participation has come to an end.

GROUP A FORM
PRETEST SURVEY

Section I. Background Information:

What is your Last Name: _____

Last four digits of your phone number: _____

Age: _____ Gender: M / F Ethnicity:_____

Level of Education: _____

Current Profession: _____

Section II**.** Content Knowledge

Research Question1: Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Please complete the following multiple choice and matching questions. In order to have a valid picture of the pre- and post-test results, **please remember to check off "G" if you felt that your answer was a guess.**

1) *Behavior* refers to specific observable behaviors exhibited by students (appropriate and inappropriate). ◯ a. True ◯ b. False ◯ G. Guessed
2) What are the three common behavior deficits of Autism Spectrum Disorders: _____, _____, and _____. ◯ a. ability to relate, mood, intelligent ◯ b. inability to relate, lack of functional language, sensory processing deficits ◯ c. dislike, loves to read, interactive play ◯ G. Guessed
3) Behaviors happen too often (self-stimulation, resistance to change, and bizarre and challenging behavior) are called_____. ◯ a. common behavior excess ◯ b. learning excess ◯ c. attention excess ◯ G. Guessed

4) Event that occurs before a behavior is exhibited is called a (an) _____.
- ◯ a. behavior
- ◯ b. antecedent
- ◯ c. consequence
- ◯ G. Guessed

5) A defining characteristic of Autism Spectrum Disorders in the form of repetitive, invariant motor responses include hand flapping, body rocking, like to spin objects, and head shaking is known as _____.
- ◯ a. self-injurious
- ◯ b. stereotypic / repetitive behavior
- ◯ c. echolalia
- ◯ G. Guessed

6) Early intervention by a teacher or parent can reduce the risk of anxiety or frustration. First, determine the function of behavior and then apply the appropriate intervention.
- ◯ a. True
- ◯ b. False
- ◯ G. Guessed

7) People with ASD tend to have difficulty with social and relational difficulties interact with one another. They use communication clues (body posture, personal space, gestures, & eye contact) that do not include the spoken word are known as **_____.**
- ◯ a. verbal cues
- ◯ b. non-verbal cues
- ◯ c. attention
- ◯ G. Guessed

8) One should develop an intervention plan when,
- ◯ a. the IEP committee identifies behavior problems
- ◯ b. unacceptable behavior either in the school or home
- ◯ c. unacceptable behavior results in repeated removals from class which interferes learning
- ◯ d. All of the above
- ◯ G. Guessed

9) Type of physical acting out in which individuals direct determined physical acts toward themselves (head banging, hitting self, biting self, pulling out own hair, pinching or scratching self, pulling out own hair, pinching or scratching self, picking at skin or nails, eye gouging) is called_____.
- ◯ a. self-injurious behavior
- ◯ b. self- stimulatory behavior
- ◯ c. self-instruction
- ◯ G. Guessed

10) _____ is a behaviorist approach, has been widely used to study human and animal behaviors. It attempts to understand, explain, describe and predict behavior. Using _____ as the main techniques to treat children with ASD was firmly established by Dr. Ivar Lovaas and his research groups as the most widely adopted approach in various ASD treatment programs.

Section II. Parents' Attitude

Research Question3: Do parents who have been trained through the Behavior Module select research-based behavioral interventions from a list of interventions more often than who have not been trained?

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

I have learned through the Behavior Module.	5 4 3 2 1
I have been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I have not learned through the Behavior Module.	5 4 3 2 1
I have not been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I prefer to use research-based behavioral interventions addressed in the module from online module resources than from book.	5 4 3 2 1
I used Applied Behavior Analysis to increase desired behaviors, decrease inappropriate behaviors, and teach new behaviors.	5 4 3 2 1
I used various approaches including but not limited to applied behavioral analysis, discrete trial teaching, use of visual cues, prompting and fading, etc.	5 4 3 2 1
I used PECS, visual aids such as visual schedules and pictures to communicate to work with my non-verbal child.	5 4 3 2 1
I used *Joint Attention Routine* to improve interaction, emotional and behavioral issues.	5 4 3 2 1
I used social story intervention to improve frustration.	5 4 3 2 1
I used Discrete Trial Teaching to promote the development of social, emotional, physical, and cognitive skills in children with ASD.	5 4 3 2 1
I used Positive Behavior Support to work with challenging behavior.	5 4 3 2 1
I used Pivotal Response Training to motivate my child learn new tasks.	5 4 3 2 1

APPENDIX D

PRETEST INSTRUCTIONS AND QUESTIONNAIRE

GROUP B FORM

GROUP B FORM
PRETEST SURVEY

Section I. Background Information:

What is your Last Name: _____

Last four digits of your phone number: _____

Age: _____ Gender: M / F Ethnicity:_____

Level of Education: _____

Current Profession: _____

Section II**.** Content Knowledge

Research Question1: Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Please complete the following multiple choice and matching questions. In order to have a valid picture of the pre- and post-test results**, please remember to check off "G" if you felt that your answer was a guess.**

1) *Behavior* refers to specific observable behaviors exhibited by students (appropriate and inappropriate). ◯ a. True ◯ b. False ◯ G. Guessed
2) What are the three common behavior deficits of Autism Spectrum Disorders: _____, _____, and _____. ◯ d. ability to relate, mood, intelligent ◯ e. inability to relate, lack of functional language, sensory processing deficits ◯ f. dislike, loves to read, interactive play ◯ H. Guessed
3) Behaviors happen too often (self-stimulation, resistance to change, and bizarre and challenging behavior) are called_____. ◯ a. common behavior excess ◯ b. learning excess ◯ c. attention excess ◯ G. Guessed
4) Event that occurs before a behavior is exhibited is called a (an) _____. ◯ a. behavior ◯ b. antecedent ◯ c. consequence ◯ G. Guessed

5) A defining characteristic of Autism Spectrum Disorders in the form of repetitive, invariant motor responses include hand flapping, body rocking, like to spin objects, and head shaking is known as _____.

◯ a. self-injurious
◯ b. stereotypic / repetitive behavior
◯ c. echolalia
◯ G. Guessed

6) Early intervention by a teacher or parent can reduce the risk of anxiety or frustration. First, determine the function of behavior and then apply the appropriate intervention.

◯ c. True
◯ d. False
◯ H. Guessed

7) People with ASD tend to have difficulty with social and relational difficulties interact with one another. They use communication clues (body posture, personal space, gestures, & eye contact) that do not include the spoken word are known as **_____.**

◯ a. verbal cues
◯ b. non-verbal cues
◯ c. attention
◯ G. Guessed

8) One should develop an intervention plan when,

◯ e. the IEP committee identifies behavior problems
◯ f. unacceptable behavior either in the school or home
◯ g. unacceptable behavior results in repeated removals from class which interferes learning
◯ h. All of the above
◯ G. Guessed

9) Type of physical acting out in which individuals direct determined physical acts toward themselves (head banging, hitting self, biting self, pulling out own hair, pinching or scratching self, pulling out own hair, pinching or scratching self, picking at skin or nails, eye gouging) is called_____.

◯ a. self-injurious behavior
◯ b. self- stimulatory behavior
◯ c. self-instruction
◯ G. Guessed

10) _____ is a behaviorist approach, has been widely used to study human and animal behaviors. It attempts to understand, explain, describe and predict behavior. Using _____ as the main techniques to treat children with ASD was firmly established by Dr. Ivar Lovaas and his research groups as the most widely adopted approach in various ASD treatment programs.

Section II. Parents' Attitude

Research Question3: Do parents who have been trained through the Behavior Module select research-based behavioral interventions from a list of interventions more often than who have not been trained?

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

I have learned through the Behavior Module.	5 4 3 2 1
I have been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I have not learned through the Behavior Module.	5 4 3 2 1
I have not been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I prefer to use research-based behavioral interventions addressed in the module from online module resources than from book.	5 4 3 2 1
I used Applied Behavior Analysis to increase desired behaviors, decrease inappropriate behaviors, and teach new behaviors.	5 4 3 2 1
I used various approaches including but not limited to applied behavioral analysis, discrete trial teaching, use of visual cues, prompting and fading, etc.	5 4 3 2 1
I used PECS, visual aids such as visual schedules and pictures to communicate to work with my non-verbal child.	5 4 3 2 1
I used *Joint Attention Routine* to improve interaction, emotional and behavioral issues.	5 4 3 2 1
I used social story intervention to improve frustration.	5 4 3 2 1
I used Discrete Trial Teaching to promote the development of social, emotional, physical, and cognitive skills in children with ASD.	5 4 3 2 1
I used Positive Behavior Support to work with challenging behavior.	5 4 3 2 1
I used Pivotal Response Training to motivate my child learn new tasks.	5 4 3 2 1

APPENDIX E

POSTTEST INSTRUCTIONS AND QUESTIONNAIRE

GROUP A FORM

Directions for Posttest Procedure

Group A

****Please read the following directions before proceeding****

You are invited to be a participant in my research project which looks at whether an online module developed by the Burkhart Center for Autism Education and Research housed at Texas Tech University will increase your understanding of research-based interventions for the behavior problems of children with ASD. This pretest should take about 30 minutes.

Thank you again for your voluntary participation in this research study. Your responses are very helpful to our efforts to provide effective resources in the field of autism education. The purpose of this survey is to evaluate the effectiveness of the behavior module. The goal of the behavior module is to provide parents with information concerning research-based intervention practices in an easily accessible and systematized format improves the parents chances of meeting their children's needs

I would like for you to complete survey questions with regard to your knowledge of research-based interventions associated with Autism Spectrum Disorders (ASD). Confidentiality is really important in this study so a code number will be used for all of the information you provide. Your full name will not be used. We would like for you to develop a username by combining your pet's name and the last four digits of your phone number in the appropriate blanks. This will be for comparison purposes between your pre- and post- surveys only. Therefore, your full names need not be used. No identifying information will be viewed by anyone other than the researchers.

Directions for Completing the Module Perception

http://www.surveymonkey.com/s/BLBJ52C

An additional section has been added to the survey questions that measures your satisfaction with the behavior module.

Upon completing the module perceptions of the survey, please continue on to the actual survey questions. Please respond each question that you feel is most appropriate. We understand that each of you have varied experiences, and you may have no prior experience with ASD. Please answer each question to the best of your ability. In order to have a valid picture of the pre- and post-test results, please check off the "G" box below your answer if you had to guess it.

Procedure:

1. Log on to http://www.educ.ttu.edu/edsp/burkhartproject/ModuleThree/Behavior_In_ASD/Behavior_ASD_Home.htm

2. One at a time click on the topics listed at the left hand side of the screen.

3. Click on each topic to view the corresponding terms that come up on the left side bar and click on each topic of these terms to read additional information

4. You will take a maximum of one and half hour to read the module and 30-45 minutes to complete the posttest questionnaires. You must read the module the first and answer the posttest questionnaires without the module in sight.
5. You will receive an email prompt to remind you to complete the posttest.

6. Parents without computer access will be provided with paper copies of the appropriate materials at the initial meeting.

POSTTEST SURVEY for TREATMENT

GROUP A

What is your Last Name: _____

Last four digits of your phone number: _____

_____ Yes, I have viewed the online behavior module.

Section I. Module Perceptions

Research Question 2: Was the Behavioral Module developed for parents learning about children with ASD such that it is appropriate and accessible?

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

I found the module addressed comprehensible information about the research-based interventions, which were considered to be useful to parents in helping children with Autism Spectrum Disorders related to behavioral issues.	5 4 3 2 1
I found the module format was easy to navigate and user-friendly	5 4 3 2 1
The module format was well designed and appealing to the surveyor.	5 4 3 2 1
The module was free of technical glitches/errors.	5 4 3 2 1
The amount of time taken to complete the module was relative to the amount of information covered by the module.	5 4 3 2 1
When working with students with ASD on an individual basis, I believe the information addressed in the module would be beneficial in understanding which strategies I might want to research for use with that particular individual.	5 4 3 2 1
I enjoyed the online videos of parents and professionals.	5 4 3 2 1
I found this module would be a helpful tool for individuals beginning to learn about ASD.	5 4 3 2 1
I found the module is an accessible means that provides information about research-based interventions in ASD, and will be used for future reference.	5 4 3 2 1
I found helpful information from the module that will be of use in my professional practices.	5 4 3 2 1

Section II. Content Knowledge

Research Question1: Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Please complete the following multiple choice and matching questions. In order to have a valid picture of the pre- and post-test results **please remember to check off "G" if you felt that your answer was a guess.**

1) *Behavior* refers to specific observable behaviors exhibited by students (appropriate and inappropriate).

◯ a. True
◯ b. False
◯ G. Guessed

2) What are the three common behavior deficits of Autism Spectrum Disorders: _____, _____, and _____.

◯ g. ability to relate, mood, intelligent
◯ h. inability to relate, lack of functional language, sensory processing deficits
◯ i. dislike, loves to read, interactive play
◯ I. Guessed

3) Behaviors happen too often (self-stimulation, resistance to change, and bizarre and challenging behavior) are called_____.

◯ a. common behavior excess
◯ b. learning excess
◯ c. attention excess
◯ G. Guessed

4) Event that occurs before a behavior is exhibited is called a (an) _____.

◯ a. behavior
◯ b. antecedent
◯ c. consequence
◯ G. Guessed

5) A defining characteristic of Autism Spectrum Disorders in the form of repetitive, invariant motor responses include hand flapping, body rocking, like to spin objects, and head shaking is known as _____.

◯ a. self-injurious
◯ b. stereotypic / repetitive behavior
◯ c. echolalia
◯ G. Guessed

6) Early intervention by a teacher or parent can reduce the risk of anxiety or frustration. First, determine the function of behavior and then apply the appropriate intervention.

◯ e. True
◯ f. False
◯ I. Guessed

7) People with ASD tend to have difficulty with social and relational difficulties interact with one another. They use communication clues (body posture, personal space, gestures, & eye contact) that do not include the spoken word are known as **_____.** ◯ a. verbal cues ◯ b. non-verbal cues ◯ c. attention ◯ G. Guessed
8) One should develop an intervention plan when, ◯ i. the IEP committee identifies behavior problems ◯ j. unacceptable behavior either in the school or home ◯ k. unacceptable behavior results in repeated removals from class which interferes learning ◯ l. All of the above ◯ G. Guessed
9) Type of physical acting out in which individuals direct determined physical acts toward themselves (head banging, hitting self, biting self, pulling out own hair, pinching or scratching self, pulling out own hair, pinching or scratching self, picking at skin or nails, eye gouging) is called_____. ◯ a. self-injurious behavior ◯ b. self- stimulatory behavior ◯ c. self-instruction ◯ G. Guessed
10) _____ is a behaviorist approach, has been widely used to study human and animal behaviors. It attempts to understand, explain, describe and predict behavior. Using _____ as the main techniques to treat children with ASD was firmly established by Dr. Ivar Lovaas and his research groups as the most widely adopted approach in various ASD treatment programs.

Section III Parents' Attitude

Research Question3: Do parents who have been trained through the Behavior Module select research-based behavioral interventions from a list of interventions more often than who have not been trained?

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

I have learned through the Behavior Module.	5 4 3 2 1
I have been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I have not learned through the Behavior Module.	5 4 3 2 1
I have not been using research-based behavioral interventions addressed in the module.	5 4 3 2 1

I prefer to use research-based behavioral interventions addressed in the module from online module resources than from book.	5 4 3 2 1
I used Applied Behavior Analysis to increase desired behaviors, decrease inappropriate behaviors, and teach new behaviors.	5 4 3 2 1
I used various approaches including but not limited to applied behavioral analysis, discrete trial teaching, use of visual cues, prompting and fading, etc.	5 4 3 2 1
I used PECS, visual aids such as visual schedules and pictures to communicate to work with my non-verbal child.	5 4 3 2 1
I used *Joint Attention Routine* to improve interaction, emotional and behavioral issues.	5 4 3 2 1
I used social story intervention to improve frustration.	5 4 3 2 1
I used Discrete Trial Teaching to promote the development of social, emotional, physical, and cognitive skills in children with ASD.	5 4 3 2 1
I used Positive Behavior Support to work with challenging behavior.	5 4 3 2 1
I used Pivotal Response Training to motivate my child learn new tasks.	5 4 3 2 1

APPENDIX F

POSTTEST INSTRUCTIONS AND QUESTIONNAIRE

GROUP B FORM

Directions for Posttest Procedure

Group B

****Please read the following directions before proceeding****

You are invited to be a participant in my research project which looks at whether an online module developed by the Burkhart Center for Autism Education and Research housed at Texas Tech University will increase your understanding of research-based interventions for the behavior problems of children with ASD. This post-test should take about 30 - 40minutes.

Thank you again for your voluntary participation in this research study. Your responses are very helpful to our efforts to provide effective resources in the field of autism education. The purpose of this survey is to evaluate the effectiveness of the behavior module. The goal of the behavior module is to provide parents with information concerning research-based intervention practices in an easily accessible and systematized format improves the parents chances of meeting their children's needs

I would like for you to complete survey questions with regard to your knowledge of research-based interventions associated with Autism Spectrum Disorders (ASD). Confidentiality is really important in this study so a code number will be used for all of the information you provide. Your full name will not be used. We would like for you to develop a username by combining your pet's name and the last four digits of your phone number. This will be for comparison purposes between your pre- and post- surveys only. Therefore, your full names need not be used. No identifying information will be viewed by anyone other than the researchers.

Directions for Completing the Module Perception

http://www.surveymonkey.com/s/B7ZZKHD

****Note**

Now that this research study has reached its completion, the website can be accessed at http://www.educ.ttu.edu/edsp/burkhartproject/ModuleThree/Behavior_In_ASD/Behavior_ASD_Home.htm **Feel free to view the module on your own time.**

POST-TEST FOR CONTROL GROUP

GROUP B

What is your Last Name: _____

Last four digits of your phone number: _____

Section I. Content Knowledge

Research Question1: Do parents who complete the Behavior Module demonstrate increased knowledge concerning the research-based behavioral intervention needs of children with ASD?

Please complete the following multiple choice and matching questions. In order to have a valid picture of the pre- and post-test results, **please remember to check off "G" if you felt that your answer was a guess.**

1) *Behavior* refers to specific observable behaviors exhibited by students (appropriate and inappropriate). ◯ a. True ◯ b. False ◯ G. Guessed
2) What are the three common behavior deficits of Autism Spectrum Disorders: _____, _____, and _____. ◯ j. ability to relate, mood, intelligent ◯ k. inability to relate, lack of functional language, sensory processing deficits ◯ l. dislike, loves to read, interactive play ◯ J. Guessed
3) Behaviors happen too often (self-stimulation, resistance to change, and bizarre and challenging behavior) are called_____. ◯ a. common behavior excess ◯ b. learning excess ◯ c. attention excess ◯ G. Guessed
4) Event that occurs before a behavior is exhibited is called a (an) _____. ◯ a. behavior ◯ b. antecedent ◯ c. consequence ◯ G. Guessed
5) A defining characteristic of Autism Spectrum Disorders in the form of repetitive, invariant motor responses include hand flapping, body rocking, like to spin objects,

and head shaking is known as _____.

◯ a. self-injurious
◯ b. stereotypic / repetitive behavior
◯ c. echolalia
◯ G. Guessed

6) Early intervention by a teacher or parent can reduce the risk of anxiety or frustration. First, determine the function of behavior and then apply the appropriate intervention.

◯ g. True
◯ h. False
◯ J. Guessed

7) People with ASD tend to have difficulty with social and relational difficulties interact with one another. They use communication clues (body posture, personal space, gestures, & eye contact) that do not include the spoken word are known as **_____.**

◯ a. verbal cues
◯ b. non-verbal cues
◯ c. attention
◯ G. Guessed

8) One should develop an intervention plan when,

◯ a. the IEP committee identifies behavior problems
◯ b. unacceptable behavior either in the school or home
◯ c. unacceptable behavior results in repeated removals from class which interferes learning
◯ d. All of the above

◯ G. Guessed

e. Type of physical acting out in which individuals direct determined physical acts toward themselves (head banging, hitting self, biting self, pulling out own hair, pinching or scratching self, pulling out own hair, pinching or scratching self, picking at skin or nails, eye gouging) is called_____.

◯ a. self-injurious behavior
◯ b. self- stimulatory behavior
◯ c. self-instruction
◯ G. Guessed

10) _____ is a behaviorist approach, has been widely used to study human and animal behaviors. It attempts to understand, explain, describe and predict behavior. Using _____ as the main techniques to treat children with ASD was firmly established by Dr. Ivar Lovaas and his research groups as the most widely adopted approach in various ASD treatment programs.

Section II. Parents' Attitude

Research Question3: Do parents who have been trained through the Behavior Module select research-based behavioral interventions from a list of interventions more often than who have not been trained?

5 = strongly agree 4 = agree 3 = neutral 2 = disagree 1 = strongly disagree

I have learned through the Behavior Module.	5 4 3 2 1
I have been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I have not learned through the Behavior Module.	5 4 3 2 1
I have not been using research-based behavioral interventions addressed in the module.	5 4 3 2 1
I prefer to use research-based behavioral interventions addressed in the module from online module resources than from book.	5 4 3 2 1
I used Applied Behavior Analysis to increase desired behaviors, decrease inappropriate behaviors, and teach new behaviors.	5 4 3 2 1
I used various approaches including but not limited to applied behavioral analysis, discrete trial teaching, use of visual cues, prompting and fading, etc.	5 4 3 2 1
I used PECS, visual aids such as visual schedules and pictures to communicate to work with my non-verbal child.	5 4 3 2 1
I used *Joint Attention Routine* to improve interaction, emotional and behavioral issues.	5 4 3 2 1
I used social story intervention to improve frustration.	5 4 3 2 1
I used Discrete Trial Teaching to promote the development of social, emotional, physical, and cognitive skills in children with ASD.	5 4 3 2 1
I used Positive Behavior Support to work with challenging behavior.	5 4 3 2 1
I used Pivotal Response Training to motivate my child learn new tasks.	5 4 3 2 1