Available Classroom Supports for Students with Autism Spectrum Disorders in Public Schools

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By

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DEDICATION

This is dedicated to my two daughters, Beth and Laura, who were patient as I pursued an advanced degree, and to my dad, who instilled in me a love of learning and encouraged me to follow my dreams.

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I would like to thank my friends and relatives, who tolerated my absences as I worked on this dissertation. I would also like to thank my committee members, who provided hope, encouragement, and guidance when I needed it. Special thanks to Margo Mastropieri, who was a relentlessly positive dissertation chair.

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ABSTRACT

AVAILABLE CLASSROOM SUPPORTS FOR STUDENTS WITH AUTISM SPECTRUM DISORDERS IN PUBLIC SCHOOLS

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A mixed-methods study was conducted to determine teacher attitudes concerning classroom supports for students with autism spectrum disorders available in public school. A national sample of randomly-selected educators serving preschool through age in public school settings responded to a web-based survey designed to determine the quantity and quality of research-validated supports that are available to students with autism spectrum disorders in a variety of public school settings nationwide. A representative subsample of respondents participated in follow-up interviews. The survey included personal and professional demographic items and four content-based subscales, which addressed autism classroom and instructional supports. Strong internal consistency was reported on all subscales. The autism classroom supports reported being used most frequently included structured learning environments, visual supports, access to general

education curriculum, behavior intervention plans, curriculum designed to address core deficits, educational paraprofessional support, and positive behavior supports. These supports were rated as very or somewhat important by a large majority of respondents. Special educators reported using significantly more supports than general educators. Respondents perceived that a greater number and variety of supports were available in special than in general education settings. Knowledge of, experience with, and training in autism yielded statistically significant effects on the number and types of supports the participants reported using. Individuals who reported training from university coursework and professional development training demonstrated no significant difference in total use of supports, but each were significantly greater than those without training in autism. Quantitative and qualitative results confirmed that practical, hands-on training with students with autism may increase teachers' confidence in implementing appropriate classroom and instructional supports. A majority of respondents expressed opinions that autism classroom and instructional supports should be based upon individual assessment of each student's strengths and needs and that these supports should be available regardless of the educational setting. Overall findings indicated that positive attitudes toward the use of autism supports were perhaps necessary, but not sufficient, to guarantee their regular use. Findings are discussed with respect to educational implications and future research.

1. Introduction

When it was originally identified in the early 1940s, autism was an obscure and misunderstood disorder which affected only a fractional percentage of individuals and families. Throughout nearly three decades following its first description, autism was classified as a type of childhood schizophrenia. In fact, it was not until 1980, with the publication of the third Diagnostic and Statistical Manual of Mental Disorder (DSM-III), that autism was considered a discrete diagnostic category, with separate and distinct criteria for diagnosis. Unfortunately, this manual identified only one profile of autism, which it labeled *infantile autism*. The manual's somewhat limited description of the disorder included only six characteristics and required that all six be present for a diagnosis of autism (Grinker, 2007). Furthermore, the DSM-III classification system placed autism in Axis II, identifying it as a relatively stable disorder, unlikely to improve with intervention (Edelson, 1995).With the 1987 revision of the text, the designation was changed to *autistic disorder*, in an effort to reduce confusion and controversy over the term, "infantile." In addition, the diagnostic criteria were expanded to include 16 characteristics, with 8 or more required to be present for an autism diagnosis (Grinker).

A revolution in the diagnosis of autism came in 1994, with the publication of the fourth edition of the Diagnostic and Statistical Manual (DSM-IV). Although this manual

streamlined the characteristics of autistic disorder from 16 to 12, and required only 6 for diagnosis, this was not its most significant contribution. The DSM-IV was the first diagnostic manual to allow for multiple autism-related disorders, including Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), thereby acknowledging that autism is a disorder expressed through myriad symptom combinations (Edelson, 1995; Grinker, 2007).

Recent statistics from the Centers for Disease Control (2007) indicate that autism spectrum disorders (ASDs) currently affect approximately 1 in 150 eight-year-old children in the United States. With the diagnosis of ASDs increasing at alarming rates, autism is now in the foreground of public attention. It is the subject of numerous research studies, as professional communities of practice attempt to answer ongoing medical and educational questions.

Relevance of the Study

Abundant survey research has addressed issues not directly related to the effectiveness of schools or educational programming. Many studies have inquired into the medical history (Beversdorf et al., 2005; Dosreis, Weiner, Johnson, & Newschaffer, 2006) and developmental symptomology (Goin-Kochel & Myers, 2004) or ongoing characteristics of children with autism spectrum disorders (Allik, Olav-Larsson, & Smedje, 2006; Schreck & Williams, 2006; Winter-Messiers, 2007), including risk factors for, and comorbidity of, other disorders and events (Semple, 2004; Williams, Sears, & Allard, 2004; Lee, Harrington, Chang, & Connors, 2008; Solomon, Ozonoff, Carter, &

Caplan, 2008). Surveys have helped to reveal the treatments most frequently sought for children with ASDs (Witwer & Lecavalier, 2005; Harrington, Rosen, Garnecho, & Patrick, 2006; Liptak, Stuart, & Auinger, 2006; Green, 2007; Preece & Jordon, 2007; Thomas, Ellis, McLaurin, Daniels, & Morrissey, 2007; Thomas, Morrissey, & McLaurin, 2007). Others have sought to illuminate parental and familial perceptions and adjustment to children with autism spectrum disorders (Caruz, 2006; Bayat, 2007; Hamlyn-Wright, Draghi-Lorenz, & Ellis, 2007; Mandell & Salzer, 2007; Twoy, Connolly, & Novak, 2007).

Education research has included, among other topics, the attitudes of professionals (Horrocks, White, & Roberts, 2008) and their effect on the services available, the occupational characteristics, training, and knowledge of special education teachers (Hendricks, 2007) and speech-language pathologists (Schwartz & Drager, 2008) who serve students with autism, assessment tools (Akshoomoff, Corsello, & Schmidt, 2006; Messmer-Wilson, 2006) and models (Walworth, 2007), schools' assistance in the employment transition process (Flagler, 2004; Marcos, 2007) and the post-secondary quality of life of individuals with ASDs (Hamm & Mirenda, 2006).

More than a decade ago, Mesibov and Shea (1996) suggested that traditionally-delivered educational services are ineffective with students with ASDs, as the techniques employed fail to account for the unique behavioral, sensory, social and cognitive characteristics of autism. Moreover, they proposed that "full inclusion, as a policy, explicitly and implicitly discourages the development of specialized approaches, while the unique characteristics of students with autism make specialization essential" (p. 345).

The evidence for specialized instructional strategies and supports has increased substantially since then (Ogletree & Oren, 2001; Taubman, et al., 2001; Iovannone, Dunlap, Huber, & Kincaid, 2003; Odom, et al., 2003; Ganz, 2007; Jennings, 2007; Callahan, Henson, & Cowan, 2008; Ganz & Flores, 2008).

The internet provides a natural avenue for far-reaching inquiry into the interventions commonly employed with children with autism spectrum disorders (Green, et al., 2006). Recent survey research dealing with intervention by school systems has elucidated early intervention services (Reffert, 2008), how individual characteristics and level of functioning relate to diagnosis (Mansell & Morris, 2004; Meagher, 2007) and access to school services (Montes & Halterman, 2006). However, there are few research studies which indicate the specific services and supports available to students with autism spectrum disorders in public school settings and the reasons they have been selected.

In 2006, Messmer-Wilson surveyed clinical specialists, including school psychologists, in Indiana about their knowledge and practices in diagnosing and treating children with autism spectrum disorders. Respondents indicated that professionals working with students in public school settings require better training in diagnostic measures, particularly for higher-functioning students with ASDs, and consultation strategies for assisting teachers with classroom interventions.

In a comparative study of service delivery models for students with ASDs in the United States and Ireland, Collins (2008) surveyed professionals whose backgrounds qualified them as "experts." She used the consensus of a panel consisting of school psychologists and child/adolescent psychiatrists to validate and extend existing American

and Irish models of service delivery. Respondents indicated that training opportunities within school systems should emphasize awareness of [research] literature and evidence-based practices, more hands-on inservices working directly with students with ASDs, increased training for and empowerment of general education teachers, and the use of proactive team approaches to instruction and behavior management.

Hess, Morrier, Heflin, & Ivey (2008) utilized the web-based Autism Treatment Survey to determine the strategies used with children with ASDs in Georgia public school systems. The researchers then categorized the interventions and strategies into five categories: interpersonal relationships, skill-based, cognitive, psychological/biological/neurological, and other. They found that ten percent of the strategies used in Georgia schools were evidence-based practices. Furthermore, they determined that strategy use varied by grade level and classroom type. Hess, et al. hypothesized that, in order to avoid litigation, school districts allowed student access to all treatments, rather than basing decisions upon empirical validation.

To date, no research studies have attempted to elucidate the range of supports available to students with ASDs in public school settings across the United States and the rationales, either empirical or otherwise, used to validate these supports.

Purpose and Research Questions

This proposed study is, therefore, designed to determine the supports that are available to students with autism spectrum disorders in a variety of public school settings nationwide. The following research questions were, therefore, proposed:

1. What supports are available to students with ASDs in the continuum of general

and special education settings in public schools nationwide?

2. In what ways do the educational background and ongoing training and development activities of teachers and administrators affect the quality, quantity, or types of supports available to these students?
3. In what ways do the personal and professional opinions and attitudes of teachers and administrators affect the quality, quantity or types of supports available to these students?

Definition of Terms

A number of terms have been used herein to pose questions or describe and explain the diagnosis and characterization of autism spectrum disorders and the educational interventions used to address them. For the purposes of this study, these terms have been defined below:

Administrator. An administrator is defined, for the purposes of this study, as educational professionals whose responsibilities include the overall supervision of a single school building or part of a building, managing students with and/or without disabilities, and supervising general education and/or special education teachers, support personnel, and maintenance staff. Sometimes referred to as a principal, the administrator makes decisions about the instructional programming and educational focus areas of the school.

Applied behavior analysis (ABA). Applied behavior analysis is the intentional modification of socially significant behavior through analysis and manipulation of environmental variables. Behavior is analyzed to determine the environmental variables

which reinforce and maintain it. These variables are then systematically altered to produce a change in behavior. ABA is a comprehensive, research-validated strategy that is often the basis for intervention for individuals with autism spectrum disorders.

Autism spectrum disorders. Identified in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* as the pervasive developmental disorders, these disorders are generally characterized by impaired social interaction, verbal and/or nonverbal communication and often reflect patterns of repetitive, restricted or stereotypical behaviors, activities, or interests. Diagnoses differ based upon the specific number, type, and severity of symptoms and the age of onset of symptoms.

Behavior intervention plan (BIP). This individualized, proactive plan to change problem behaviors usually results from the analysis and recommendations of a functional behavior assessment. Appropriate replacement behaviors and emergency procedures for aggressive behavior may be integral parts of a behavior intervention plan.

Clinicians. The term clinician refers here to personnel within or outside school systems whose primary responsibility is the diagnosis and characterization of a disorder. Clinicians may include school or private psychologists, psychiatrists or other trained mental health professionals. They may offer treatment of a diagnosed disorder or may refer intervention to another professional.

Cognitive flexibility. Cognitive flexibility is the ability to change one's thought processes and problem-solving based upon the changing demands of the environment. It requires one to successfully monitor situations and restructure or adapt one's reasoning accordingly. Cognitive flexibility is often impaired in individuals with developmental

disabilities, such as autism spectrum disorders.

Comorbidity. Comorbidity is the existence of concomitant disorders or illnesses. Generally one comorbid condition is considered to primary, with others adding to the complexity or severity of impairment.

Continuum (of services). This term refers to the manner in which special education services, as dictated by IDEA 2004, are delivered. The continuum offers services from the least intrusive/restrictive, which are consultative and collaborative services delivered within the general education setting, to the most restrictive, which are full-time residential special education services specifically contracted for the individual. Students with disabilities access services on the continuum based upon identified strengths and needs in their individualized education plans (IEPs).

Developmentally appropriate instruction. Instruction based upon assessment of the student's developmental skill level (strengths and weaknesses), rather than age or grade level.

Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). This reference book published by the American Psychiatric Association provides diagnostic criteria for 297 mental disorders. It is an industry standard for physicians, clinical psychologists and social workers, researchers, pharmaceutical and insurance companies, legislators, and policy makers. The fourth edition of the manual, which was published in 1994, was subject to a text revision in 2000 (DSM-IV-TR). The DSM-IV categorizes mental disorders and disabilities into levels, called axes, which describe the characteristics of disorders. Axis II addresses developmental disorders, and is, therefore,

the category which includes the autism spectrum disorders.

Differential reinforcement. Differential reinforcement refers to the process of providing varying levels and/or types of reinforcement for different types, quantity, or quality of behavior. This principle of applied behavior analysis is used to help individuals discriminate among their responses and to shape behavior toward a target level. For example, if a student does not attend and does not provide a correct response, then only corrective feedback (no reinforcement) may be given. If she attends, but answers incorrectly, or vice versa, she may receive a moderate level of reinforcement (e.g., praise and/or a less-preferred reinforcer) and corrective feedback for the missing element. If she attends to the task and responds correctly, she will receive a high level of reinforcement (e.g., praise, teacher excitement, and a tangible reinforcer).

Discrete trial training (DTT). This instructional technique, also known as discrete trial teaching, is based on the principles of applied behavior analysis. DTT involves the direct, programmed teaching of a variety of independence-building, social/interactional, and academic skills. It elicits specific target behaviors through prompting, feedback, and reinforcement. Discrete trials are comprised of four parts: the presentation of the task, the child's response, the consequence, and a short pause to indicate the completion of the trial. DTT tasks are generally presented with simple, concise instructions. The child's responses elicit either reinforcement for correct responses or corrective feedback for incorrect responses. Then, a pause prior the subsequent trial reorients attention to the task.

Discriminative cues. For the purposes of this study, discriminative cues are the

auditory and visual cues provided within discrete trial training for the purpose of securing attention and/or providing feedback on student performance. These cues may be delivered nonverbally, such as pointing to materials, or as comments, such as, "Look," or, "That's it!"

Executive function. Executive function refers to a set of mental processes that control and regulate other, more basic, abilities, such as attention, memory, and motor skills. Executive function subskills include planning future behavior, organizing, monitoring the environment and changing behavior, as necessary, initiating and ceasing behavior, and problem-solving/strategizing in novel situations. Executive function is sometimes referred to as cognitive control.

Functional behavior assessment (FBA). This type of behavior analysis (functional approach to behavior) determines the function, or overall purpose, of behavior and the environmental variables which sustain it. Information gathered through direct observation, interviews, checklists, data reviews is summarized in a report and recommendations for a behavior intervention plan are usually provided.

General education teacher. A general education teacher is defined, for the purposes of this study, as a teacher whose primary teaching responsibility is with students in kindergarten through 12th grade. The teacher may or may not have certification or endorsement in specific content areas.

Generalization. Generalization refers to the ability to apply knowledge and skills across settings, people, time, and/or behaviors.

Higher order cognitive skills. These skills, compared to lower-level skills such as

simple recall, involve more complex reasoning in the brain. They include logical problem-solving ability and fluid reasoning (i.e., the application of knowledge in novel situations). These skills are central to measured intelligence and are good predictors of academic success.

Individualized education plan. An IEP, or individualized education plan, is the legal document which describes the strengths and needs of a child with an identified disability and the individualized goals, objectives, and services necessary to meet those needs. It is created by the child's IEP team, consisting of at least a parent or guardian, a general education teacher, a special education teacher, and an administrator or designee. The IEP is reviewed at least annually, but may be reviewed more often.

Individuals with Disabilities Education Act (IDEA 2004). IDEA 2004, also known as the Individuals with Disabilities Education Improvement Act, is federal legislation which summarizes the manner in which public school systems may improve and expand their delivery of special education services to individuals with disabilities through their 21st year of life and reauthorizes previous legislation relating to the identification of children with disabilities, disability categories, service delivery, accountability, and the manner in which disputes may be resolved.

Inhibitory control. This term generally refers to the ability to control one's own behavior, particularly through the restraint of automatic response. Inhibitory control is one of the subskills of executive function and is impaired in many developmental and other disorders.

Instructional milieu. The environment for instruction, including the social

elements and the culture of schools generally and classrooms specifically is the instructional milieu.

Maintenance. Maintenance refers to the durability of a learned behavior or skill over time; the demonstration of the behavior or skill after any supporting instruction, prompting, or artificial reinforcement is removed greatly affects long-term educational success.

No Child Left Behind Act of 2001 (NCLB). Public Law 107-110, also known as the No Child Left Behind Act, is federal legislation designed to improve academic outcomes for "disadvantaged" students. This standards-based reform has firm accountability measures and dramatic negative consequences for the failure of schools to demonstrate progress.

Noncompliance. In behavioral terms, noncompliance refers to failure to respond to and/or comply with the direction of another. It may be expressed passively, as in ignoring a direction, or actively, as in turning away, vocalizing negation, or actively behaving contrary to direction.

Reinforcement. This term refers to any consequence (event) which occurs after a behavior and increases the future likelihood of that behavior; it may be intentional or unintentional.

Reinforcer. A social interaction (praise, attention, tickling, high five, etc.) or tangible item presented directly after a desired behavior is exhibited which increases the future likelihood of that behavior.

Scientifically-based instruction. Scientifically-based, or research-based,

instruction refers to techniques and strategies that have been evaluated through systematic, empirical methods which demonstrate their effectiveness.

Sign language. For the purposes of this study, sign language refers to any form of manual communication, including finger spelling, American Sign Language, and/or signed English, used as an alternative or augmentative communication system for an individual with a disability.

Social skills. Social skills are those skills necessary to effectively communicate and interact with others as well as problem-solve, make decisions, and manage one's own behavior in social situations. These skills are learned behaviors and are mediated for most individuals through the reactions of other people.

Special education teacher. A special education teacher is defined, for the purposes of this study, as a teacher whose primary teaching responsibility is with students with disabilities in pre-kindergarten through 12th grade, regardless of setting. The teacher may or may not have certification or endorsement in general education or specific content areas.

Stereotypic behavior. Stereotypic behavior is that which is repetitive or invariable and fails to demonstrate a clear goal or function but may serve some self-reinforcing function for the individual. It is a common symptom in the autism spectrum disorders.

Supports. This term refers to the educational interventions used to address the specific instructional, behavioral, and social needs of diverse students. Supports may include assigned personnel, strategies, materials, including technology hardware and software, and task accommodations and modifications used to ameliorate the difficulties

experienced by students of varying ability levels, learning styles, strengths, and disabilities.

Visuospatial ability. Visuospatial ability is the ability to mentally manipulate two- and three-dimensional figures, including mental rotations, combinations, and movement sequences. Differences in visuospatial ability by age, sex, and disability/ability characteristics have been the subject of numerous research studies.

Vocalizations. Vocalizations are audible sounds made with utilization of the vocal folds and intended to convey meaning between individuals. They may include discrete sounds, syllables, words, and/or sentences.

Working memory. Sometimes referred to as short-term memory, working memory is actually a complex interaction of subskills which allow individuals to temporarily store and manipulate information. These subskills include attention to relevant information, suppression of irrelevant information, processing of bits, or chunks, of information, creation and manipulation of cognitive representations (i.e, a brain "picture"), review and rehearsal of information, and the construction of retrieval structures. Working memory is an aspect of executive function.

2. Background Literature and Conceptual Framework

Behavioral Characterization of Autism Spectrum Disorders

Since the middle of the twentieth century, autism spectrum disorders (ASD) have been characterized in terms of external behavioral output. The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition [DSM-IV] (American Psychiatric Association, 2000), indicates that individuals with autism or pervasive developmental disorder display significant impairments in each of three areas: communication, social interaction, and stereotypic or restricted patterns of behavior. While individuals with Asperger's disorder demonstrate some degree of stereotypic or restricted behaviors and impairment in social interaction, they are differentiated by age-appropriate cognitive, adaptive, and language skills. In a 1998 study, Mahoney et al. found the diagnostic criteria of the DSM-IV to be accurate and reliable in identifying all of the autism spectrum disorders except atypical autism, which is a sub-classification of pervasive developmental disorder, not otherwise specified (PDD-NOS).

Tools such as the Autism Diagnostic Interview (ADI) and the Autistic Diagnostic Observation Schedule – Generic (ADOS) are valid (Tadevosyan-Leyfer, et al., 2003), reliable measures (Lord, et al., 1997; Lord, et al., 2000) with good inter-instrument agreement (di Bildt et al., 2004) which are frequently used by clinicians, but generally not school-based personnel (Akshoomoff, Corsello, & Schmidt, 2006: Messmer-Wilson,

2006), to establish the behavioral characteristics necessary for the diagnosis of autism spectrum disorders (Mahoney, et al., 1998). Other, more recently developed measures, such as the Activities and Play Questionnaire – Revised (Honey, Leekam, Turner, & McConachie, 2007) and the Social Communication Assessment for Toddlers with Autism (Drew, Baird, Taylor, Milne, & Charman, 2007) may be used to provide additional information about the characteristic deficits in children with autism.

Despite the relative ease of diagnosis, however, there remains considerable overlap in the observable characteristics of similar disorders on the autism spectrum (Akshoomoff, Corsello, & Schmidt). It can, therefore, be difficult to discern one disorder from another. For example, Miller and Ozonoff (2000) found such comparable academic skill profiles for children with high-functioning autism and Asperger's disorder that they questioned the validity of discrete disorder characterizations. Furthermore, Gunter, Ghaziuddin, and Ellis (2002) found that the pattern of strengths and weaknesses in students with Asperger's disorder mirrored those of individuals with nonverbal learning disabilities.

Utility of Diagnoses

Although useful for determining eligibility to receive specialized services, diagnoses of autism spectrum disorders may not inform educational practice. Griswold, Barnhill, Miles, Hagiwara, & Simpson (2002) proposed that the extreme variability in the measurable skills of students with Asperger's disorder indicates that there is little correlation between the diagnosis and students' identifiable educational strengths and weaknesses. Therefore, assessments designed to evaluate specific skill areas are

necessary to create appropriate educational programs for these students.

Neuroscientific Characterization of Autism

Neurobehavioral and neuropsychological models of autism have emerged as a result of in-depth studies of the ways in which individuals with autism approach tasks and process information. These models have sought to explain the discrepancy between intact and impaired abilities in individuals with autism, and many have served to support earlier observational/behavioral data about autism spectrum disorders.

The Impact of Complexity

In 1998, Minshew and Goldstein found that individuals with autism demonstrated selective impairment on neuropsychological tests requiring higher-order cognitive abilities. That is, although they demonstrated a pattern of intact or superior function in domains of attention, sensory perception, simple memory, simple language, rule-learning, and visuospatial abilities, these subjects displayed significant deficits in skilled motor abilities, concept formation, complex memory, and complex language. The researchers proposed that the pattern of impairments seen in autism could be the result of disrupted interaction between the cognitive and neural systems in the brain. Because greater task complexity was associated with poorer task performance, the researchers characterized autism as a disorder that disproportionately affects complex information processing abilities, while leaving lower-level processing relatively intact.

Williams, Goldstein, and Minshew (2006) supported this model with a description, or profile, of memory function in autism. In their study, both children and adults with autism demonstrated impaired functioning on complex visual memory and

spatial working memory tasks but relatively unaffected performance on simpler associative memory tasks.

Executive Function and Attention

It is noteworthy, however, that neuropsychological studies have not always supported earlier beliefs and understanding about the characteristics of autism. For example, following their comparative study of executive functioning (EF) in students with attention deficit hyperactivity disorder (ADHD) and high-functioning autism (HFA), Guerts, Verté, Oosterlaan, Roeyers, and Sergeant (2004) proposed that EF measures were "of modest utility in case identification" (p. 848). The researchers found that, contrary to the hypothesized profiles of executive function in autism and ADHD, only two EF measures clearly discriminated between the disorders: planning and cognitive flexibility. This may be due to the identifying phenotype of autism itself or the high comorbidity of autism and other neurological disorders, including ADHD (Reiersen, Constantino & Todd, 2008).

Evidence of similar performance on tasks of executive function has not been exclusive to studies comparing only children with disabilities. Christ, Holt, White, and Green (2007) found that children with autism spectrum disorders performed comparably to typically-developing controls on some tasks of executive function but poorer on others. The researchers concluded that the three measures used assessed different aspects of inhibitory control, which, in turn, relate to different stages of cognitive processing. In addition, some measures of executive control required an ability to sustain attention, which was weaker in children with autism.

Solomon et al. (2008) recently found that executive function in children with ASDs is related to the characteristics of formal thought disorder. The researchers indicated that individuals who required increased time to apply executive control are statistically more likely to demonstrate loose associations and illogical thought. Further, they found that patterns of repetitive and impaired social behavior were statistically related to illogical thinking. Solomon et al. posited that cognitive deficits in linguistic skills and contextual processing, which are common in children with ASDs, may underlie the evident thought disorder characteristics.

In a study of attention orienting, Kylliäinen and Hietanen (2004) found that children with high-functioning autism could recognize the eye gaze of another person and shift visual attention based upon the gaze direction. This implies that, although attention in individuals with autism appears to be based more on general arousal than selective activation of specific perceptual systems (Belmonte & Yurgelum-Todd, 2003), involuntary/reflexive shifts of attention, such as those elicited by eye gaze, are intact in autism. The researchers cautioned, however, that seemingly typical behavioral observations may not be associated with typical strategies for processing visual information.

Visuospatial Ability in Autism

Autism is a disorder that has been characterized by an uneven pattern of cognitive abilities in which visuospatial abilities are intact or enhanced. However, studies of visuospatial performance in individuals with autism have produced inconsistent results. That is, not all studies have supported the existence of average to superior visuospatial

skills in individuals with autism.

In a comparative study of autism spectrum disorders, Miller and Ozonoff (2000) found that individuals with Asperger's disorder and high-functioning autism demonstrated similar profiles of ability, including average to above average visuospatial skills. Although the Asperger's group performed better than the autism group on visuospatial tasks, this difference did not remain when group differences in IQ were controlled. Ropar and Mitchell (2001), by contrast, found that subjects diagnosed with autism scored significantly better than other groups on block design and embedded figures tasks, whereas subjects with Asperger's disorder performed similarly to typically-developing peers. The authors suggested that perhaps the superior visuospatial skills sometimes seen in individuals with Asperger's disorder are not innate, but develop as a result of experience and maturity.

In 2005, Bertone, Mottron, Jelenic, and Faubert found that the intact or enhanced visuospatial performance of individuals with autism was not evident during all visual information-processing tasks. Whereas previous studies hypothesized that visuospatial performance was related to the static or dynamic nature of the stimuli, these researchers proposed that the pattern of visuospatial abilities evident in autism was, in fact, complexity-dependent. That is, individuals with autism demonstrated enhanced performance when processing less demanding tasks but impaired information processing at more complex levels.

Like Ropar and Mitchell, Kuschner, Bennetto, and Yost (2007) found that individuals with ASD showed relative strengths in visuospatial disembedding and detail-

focused perceptual processing. However, these subjects also displayed relative weaknesses in concept formation and abstraction. Because these visuospatial strengths and weaknesses were present in young children with ASD, the authors suggested that these characteristic abilities have primacy in individuals with autism.

Instructional Supports and Programs

In response to legislative requirements of scientifically-based instruction (Yell, Drasgow, & Lowrey, 2005, p. 135) and the burgeoning number of students with ASDs, educational programs attempting to address the particular needs of this group have proliferated. These programs vary widely in both their philosophy and approach, and often employ similar techniques and strategies (Ogeltree, Oren, & Fischer, 2007), making unbiased evaluation challenging. Additionally, there has been little research inquiring into the social validity of educational practices for students with ASDs (Callahan, Henson, & Cowan, 2008). For these reasons, well-designed guidelines for identifying (Simpson, McKee, Teeter, & Beytien, 2007) and validating (Callahan, Henson, & Cowan) effective programs and practices are essential to developing appropriate instruction.

The effectiveness of instructional programs may be determined in a consistent, unbiased manner through analysis of research-based best practices. In 2001, the National Research Council proposed seven recommendations for ensuring treatment efficacy with students with autism spectrum disorders. The Council gave priority to early intervention (i.e., prior to 3 years of age), active engagement in intensive instruction for 25 or more hours per week, systematic, developmentally-appropriate instruction, low student ratios,

family involvement in the educational process, ongoing formative program assessment, and instruction with typically-developing peers. Several years later, Iovannone, Dunlap, Huber and Kincaid (2003) found empirical support for six fundamental elements that they proposed "should be included in any sound, comprehensive instructional program for students with ASD" (p. 150). These features included family involvement in assessment and strategy implementation, practices, supports and services that are customized to meet the needs and characteristics of students and their families, learning environments that are clear, predictable and structured, a functional (i.e., applied behavior analysis) approach to problem behavior, using positive, proactive interventions, curriculum content designed to address the core deficits in autism (Hagiwara, 2002), and systematic, targeted, direct instruction (Johnson, McDonnell, Holzwarth, & Hunter, 2004; Collins, Evans, Creech-Galloway, Karl, & Miller, 2007; Flores & Ganz, 2007) in essential skills. Additionally, Browder, Trela, and Jimenez (2007) found that instruction based on task analysis of component skills was an effective strategy for increasing student response rate and accuracy.

Although the presentation of instructional tasks is important to all students, for those with autism spectrum disorders, it may largely determine educational outcomes. Research has indicated that discrete trial training (DTT) is an effective strategy for teaching young children (Ogeltree & Oren, 2001) with autism, both individually and in groups (Taubman, et al., 2001). This is due to a number of critical features of DTT, which include skillful securing and maintenance of joint attention (Murray, et al., 2008), a functional approach to behavior, a predictable and understandable learning

environment, systematic instruction (Iovannone, et al., 2003), adult-directed teaching, and differential reinforcement (Odom, et al., 2003).

Moreover, the use of discriminative cues can improve the accuracy and speed of response of young children with autism in discrete trial learning. (Grindle & Remington, 2002; Grindle & Remington, 2004). Cue value, which indicates response correctness and predicates the delivery of reinforcement, and response marking, which draws attention to responses, irrespective of accuracy, have both been shown to improve the performance of students with ASDs over no-cue conditions. These signals serve to alert students to the critical elements of the instructional milieu and may attenuate any loss of performance created by a delay in the delivery of reinforcement (Grindle & Remington, 2004; Grindle & Remington, 2005).

It is important to note, however, that DTT is only one of many techniques (Delprato, 2001; Ogeltree, Oren & Fischer, 2007) based in applied behavior analysis, and that it must be "correctly and skillfully" (Simpson, 2001, p.70) implemented in order to be effective.

Instructional technology. Technology facilitates task analysis of complex educational and social objectives, permits immediate feedback on student responses, and allows a permanent record of performance; therefore, it represents an excellent tool for rehearsal of a variety of desired behaviors. There is some indication that specialized instructional technology may be effective in addressing the academic weaknesses (Kinney, Vedora, & Stromer, 2003) of students with ASDs. Moreover, software capabilities may also allow educators to address some of the more elusive, but socially

important, neuropsychological characteristics of autism, such as deficits in Theory of Mind (Moore, Cheng, McGrath, & Powell, 2005).

Technology presents an engaging visual environment for instruction, making it a promising strategy for use with students with ASDs. In addition, the discreet, socially appropriate nature of portable technology ensures that instruction and support for a variety of academic and life skills is persistently available (Cihak, Kessler, & Alberto, 2007).

Accommodations and modifications. When the school curriculum remains unmodified, children with ASDs often have difficulty benefiting from instruction and mastering content (Simpson, de Boer-Ott, & Smith-Myles, 2003). Therefore, it is particularly important that appropriate accommodations and modifications (Browder, Trela, & Jimenez, 2007; Cihak, Kessler, & Alberto, 2007; Ganz, 2007) be included in their day-to-day instructional programs, and not just in their IEPs.

Social skills instruction. Deficits in social interaction are central to the diagnosis of autism spectrum disorders (American Psychiatric Association, 2000). Despite increasing opportunities in integrated educational settings for students with ASDs, social skills deficits continue to represent ongoing challenges for these children. Fortunately, these weaknesses may be ameliorated through systematic instruction in appropriate social skills.

Although no empirical evidence has designated which social skills programs may be most effective with particular autism spectrum disorders, sufficient research exists to propose aspects of these programs which are generally effective. In order to successfully

promote the development of social skills, programs should be based on assessment of current functioning and focus on individual goals and/or plans. In addition, there should be distinct goals for improving interaction with adults, peers, and the community. Skill development should occur, to the extent possible, in the child's natural environments. Both the generalization and maintenance of skills should be addressed, and supports for the student, typically-developing peers, and family should be included (Stichter, Randolph, Gage, & Schmidt, 2007).

Peer-mediated interventions (Stichter, et al., 2007) have been effective in assisting children with ASDs in developing and generalizing the social skills necessary for thematic (Ganz & Flores, 2008) and unstructured play. These strategies may increase bids for peer attention and initiation of social interaction as well as the overall level of appropriate interactions, such as turn-taking (Harper, Symon, & Frea, 2008), while decreasing dependence on adult prompts (Ganz & Flores, 2008). Anecdotal reports indicate that they may also expand the interests of children with ASDs to include more varied experiences (Harper, Symon, & Frea, 2008), including the use of social activities as reinforcers (Chung, et al., 2007).

Video (Nikopoulos & Keenan, 2007) and other forms of modeling (Kinney, et al., 2003; Stichter, et al., 2007), in conjunction with contingent reinforcement of desired behaviors, has been shown to be an effective instructional strategy for children with autism spectrum disorders. Nikopoulos and Keenan found that video modeling reduced response latency in social situations and facilitate imitation of social behavior, reciprocal interaction, and social initiations in children with ASDs. Even in children with limited

expressive vocabulary or extremely restricted behavior patterns and interests, brief social sequence video clips resulted in substantive changes in complex social behavior. The visual models provided via video also appeared to promote both generalization and maintenance of learned social skills.

In older and higher-functioning students with autism, social skills group training has demonstrated effectiveness in decreasing inappropriate social interactions and increasing engagement and appropriate communication. Strategies such as rehearsal, role-playing, video feedback and contingent reinforcement systems reportedly make group training engaging and enjoyable as well as educational for participants. However, this type of social skills training necessitates prerequisite skills in attending, listening, turn-taking and voice modulation, which may be inconsistent in students with ASDs (Chung, et al., 2007).

The inclusion of multiple, trained peers who are engaged in (Harper, et al., 2008), supported during (National Research Council, 2001), and reinforced for the process appears to contribute to the success of social skills interventions. Additionally, family involvement and consistent teacher training and application may be pivotal to positive student outcomes (Chung, et al., 2007; Stichter, et al., 2007).

Augmentative and Alternative Communication (AAC)

Communication is foundational to human life. It is essential to our ability to get our needs and wants met. It allows us to learn and progress intellectually and share our experiences, ideas, and beliefs with others. For students with ASDs, the ability to successfully communicate is critical to maximizing the effectiveness of educational

interventions. In fact, Ganz and Flores (2008) found that having a method for successfully interacting with others improves inclusionary educational experiences by increasing the ability of students with ASDs to actively and appropriately participate and increases acceptance by typically-developing peers of the unusual characteristics sometimes present with autism.

By definition, however, impairment in communication constitutes one of the core deficits in autism. That is, in order to receive a diagnosis of autism, there must exist a qualitative deficit in the understanding, expression, or social/pragmatic use of spoken language (American Psychiatric Association, 2000). For many children with autism, speech and language therapy and/or targeted interventions in verbal behavior ameliorate these deficits. Still, some individuals with ASDs, despite intervention, never develop functional speech. For these individuals, securing and learning to use a suitable alternative method of communication with facility is particularly challenging.

According to Mirenda (2001), the broad goal of augmentative and alternative communication (AAC) is to assist individuals in becoming competent to meet their own current and future communication needs (p. 142). This goal is most often met through standard or modified sign language, picture/icon communication, or assistive technology in the form of voice output devices. AAC may be used as either a replacement system for undeveloped verbal language or to augment or elicit limited verbal output. Although AAC interventions generally focus on expressive communication, they may be also used to improve receptive communication skills through input (i.e., visual) supports. It is important to note that competent training in and use of AAC has resulted in better post-

secondary outcomes for individuals with disabilities (Hamm & Mirenda, 2006).

Picture Exchange Communication System (PECS. The Picture Exchange Communication System, or PECS, is a hierarchical system of symbol exchanges designed to promote functional communication in children with ASDs. PECS uses behavioral techniques, such as shaping and prompting, to facilitate increasing communicative complexity (Ogeltree, Oren, & Fischer, 2007). The first three phases of PECS build upon the internal motivation of the user by rewarding exchange (picture) requests with immediate access to a desired item. Later phases focus on more interactive communication, including the formation and use of sentences, responses, and comments. Unlike other pictorial systems, PECS requires no pre-linguistic picture discrimination or matching skills, so it is developmentally appropriate for a wide range of users.

A meta-analysis of studies on the effectiveness of picture exchange communication indicated that nearly 98% of children with developmental disorders who were trained in PECS or an equivalent icon-based system experienced success in basic communication, such as requesting items (Lancioni et al., 2007). Furthermore, multiple studies inquiring specifically into the use of PECS with children with autism have shown that some students develop increased spoken language skills after instruction in the system (Mirenda, 2001; Carl & Felce, 2007), despite a lack of intentional instruction in vocal output. Notably, the recorded increase in the production of spoken words reflected not only responses to the prompts or interaction attempts of others, but also independently initiated communication (Carr & Felce). Improved staff and parental training in PECS also appears to produce modest increases in student communication,

including initiations, using the system (Howlin, Gordon, Pasco, Wade, & Charman, 2007).

Voice output devices. Voice output communication aids (VOCAs), which vary from single utterance devices to scalable, categorized language systems, offer the unique advantage of allowing communication with partners at greater distances from the user or who may not be attending visually to the individual (Lancioni et al., 2007). Other noteworthy benefits include their facility of use with unfamiliar people and in new environments and the possibility for more natural social interactions (Mirenda, 2001). Although VOCAs are most often used when students demonstrate extremely limited or unintelligible vocalizations, studies have indicated that the vocal model provided by the devices may, in fact, facilitate speech production.

In a recent meta-analysis of studies of the effectiveness of VOCAs, Lancioni et al. found that 92% of children trained in the use of the devices demonstrated successful basic communication. The authors noted that user preferences, as well as training, may impact the perceived effectiveness of voice output devices.

Sign language. While sign language, as the only unaided mode of alternative communication, has the benefit of requiring no external equipment, its use naturally delimits the community with which students with ASD may successfully communicate. Functional communication is only possible with partners familiar with both sign language and any idiosyncrasies created by the child's formation of particular signs. The use of sign language as a communication strategy may also be limited by the characteristics of autism spectrum disorders. Signing requires the presence of several pre-linguistic skills,

such as eye contact, non-verbal/motor imitation, and the motivation to label items in the environment, which are typically areas of weakness for children with ASDs. Moreover, the development of a manual sign vocabulary requires extensive training on the part of the child, family, and educational team in order to be successful. For these reasons, sign language, once the most frequently used communication strategy for students with ASDs, is no longer as popular as it once was (Lancioni et al.).

Environmental Supports

Visual supports. Individuals with ASDs often demonstrate relative strength in visuospatial processing (Minshew & Goldstein, 1998; Miller & Ozonoff, 2000; Ropar & Mitchell, 2001; Bertone, et. al, 2005; Kuschner, Bennetto, & Yost, 2007). Therefore, visual interventions and supports, which express concepts, schedules, and instructions in the form of pictures, may provide the additional environmental information that these students require in order to be successful in a variety of academic and social situations with fewer prompts (Ganz, Bourgeois, Flores, & Compos, 2008). Supports such as visual schedules, visual indication of physical classroom boundaries, and visually-organized work tasks, decrease students' dependence upon typical areas of weakness, including verbal communication, working memory, and auditory processing. They may also serve to lessen the difficulty and anxiety associated with change for students with ASDs (Ganz, 2007). In their 2008 study, Ganz and Flores found that visual strategies were effective in promoting both social [play] skills and contextual language in young children with autism spectrum disorders. Further, they found that children trained to use visual scripting began to self-prompt their own verbal behavior, allowing adult prompts to fade naturally.

Ogeltree, Oren, and Fischer (2007) caution, however, that, in isolation, visual supports and other discrete evidence-based intervention techniques "fail to constitute effective practices" (pp. 233-234). They recommend the use of visual supports within a comprehensive model of intervention based in the tenets of applied behavioral analysis (ABA).

Behavioral Supports

Some behavioral techniques that are effective with typically-developing children, such as the use of adult proximity to increase academic engagement, are also effective with children with autism spectrum disorders. However, other strategies are often necessary in order to consistently and effectively manage their more idiosyncratic, challenging behaviors (Conroy, Asmus, Ladwig, Sellers, & Valcante, 2004). For children with ASDs, a system of consistent, proactive behavioral supports is vital to success in a variety of academic and social settings.

Functional behavior assessments and behavioral intervention plans. Students with ASDs demonstrate a variety of problem behaviors, including task avoidance, noncompliance, inappropriate vocalizations or calling out, leaving a designated area/seat, and physical aggression, which interfere with their ability to benefit from instruction (Scott, et al., 2004). For this reason, many students with autism spectrum disorders require targeted behavioral interventions through functional behavior assessment and behavioral intervention plans. During a functional behavior assessment, a multi-disciplinary team systematically records a student's behavior, either through direct observation or structured interviews, valid and reliable checklists, such as the Functional

Assessment Checklist for Teachers and Staff (McIntosh, et al., 2008), rating scales, questionnaires and reports. The FBA team then hypothesizes the function, or purpose, of the student's behavior. A behavior intervention plan, which focuses on proactive strategies and direct instruction in a replacement behavior which meets the function of the problem behavior, is subsequently formulated to promote an increase in appropriate classroom behaviors.

Functional behavior assessments and behavior intervention plans are specifically required in the Individuals with Disabilities Education Act (IDEA 2004) for students with disabilities, identified or not, who evidence behaviors which interfere with their own learning or the learning of others or whose behavior presents a danger to self or others. Unfortunately, these behavioral supports are often not available to students in a variety of inclusive settings because they are considered time-inefficient or unrealistic in terms of professional expertise requirements (Scott, et al., p. 196). However, research has supported the increased effectiveness of inclusionary practices when interventions are based upon functional assessments (Blair, Umbreit, Dunlap, & Jung, 2007).

Positive behavior supports. Positive behavior support (PBS) is a function-based approach to behavioral training and management which demonstrates strong empirical validation. PBS may be enacted through a variety of methods from individual to school-wide supports. Schools employing hierarchical positive behavior support systems provide proactive, educative and non-punitive interventions at various levels, depending upon the identified needs of students (Hieneman, Dunlap, & Kincaid, 2005). The primary level of PBS, which meets the needs of approximately 80% of students, is designed to reduce the

occurrence of new behavior problems in the school-wide setting. At this level, school personnel present, directly teach, and reinforce a limited number of clearly understandable behavioral expectations to all students. The secondary level, which is intended to support approximately 15% of students who demonstrate high risk for engaging in more serious problem behaviors, is devised to reduce current behavior problems in classroom settings. This level provides targeted, small group interventions for students who do not respond to the primary level of support. The tertiary level, which is aimed at the 5% of students who require intensive, individualized behavior interventions, is designed to reduce the intensity, severity, and resultant complications of current problem behavior cases. This level involves multi-disciplinary teams in interventions intended to diminish problem behaviors and increase the adaptive behaviors of individual students. Tertiary interventions include functional behavior assessments (FBAs) and subsequent behavior intervention plans (BIPs); therefore, this third level of PBS aligns with the requirements set forth in the reauthorization of the Individuals with Disabilities Education Act (2004) regarding the resolution of significant disciplinary and behavioral issues (National Technical Assistance Center on Positive Behavioral Interventions and Supports, 2008).

For decades, the challenging behaviors sometimes exhibited by students with autism spectrum disorders have been addressed through individualized interventions based in applied behavior analysis. These same principles are now being applied in a variety of educational settings, allowing students with ASDs unprecedented access to meaningful inclusive instruction (Hieneman, et al., 2005). To this end, school-wide

systems of positive behavior supports "can contribute to the already established, research-validated behavioral technology by providing a template for creating systems and practices that encourage sustained implementation and use of positive behavior support intended to benefit all students in the school" (Freeman, et al., 2006, p. 6).

On an individual level, positive behavior supports, particularly as a part of collaborative efforts between professionals and family (Buschbacher, Fox, & Clarke, 2004), have demonstrated both effectiveness in reducing problem behaviors and durability of effect over time in students with ASDs (Lucyshyn, et al., 2007).

Survey Research in Autism

Comorbidity of genetic disorders with autism. In order to assess the comorbidity of genetic disorders and/or exposure to toxic or teratogenic environments and ASD diagnoses, Semple (2004) used an "ad hoc, original, and informal written survey" (p. 40). The 20-item survey was comprised of subscales related to diagnosis, environmental exposure, and family history. It included yes/no, forced response, and open-ended questions.

Semple reported using a correlational field design, in which the dependent variables are not manipulated, but observed. She proposed that this design did not require experimental control and would allow anonymous reporting and a large sample size. She acknowledged that, while this design has strong external validity, it has lower internal validity.

In order to ensure an adequate sample of children with and without ASDs, Semple used purposeful sampling based upon availability, location, and population. Potential

participants were identified through a local public school system and a private clinic offering autism intervention services. A total of 1,700 surveys were mailed to clinic clients and sent home with target public school children in packets which each included a cover letter, informed consent document, numbered survey, return envelope, and postcard to indicate that parents wanted to receive the study results. The researcher reported that 189 surveys were returned, yielding a return rate of approximately 10%.

Semple reported descriptive statistics on the demographics of the children who were the subjects of the survey. She used Fisher's exact tests and a Chi-Square test to determine the significance of associations between group and selected genetic or environmental factors. She also used *t*-tests to compare the means of number of genetic factors and number of environmental factors reported by parents.

Semple's results indicated that the presence and number of genetic factors was significantly higher in children with ASDs than in those without ASDs. Moreover, she found that children with ASDs had significantly greater reported exposure to and number of environmental factors. The Chi-Square test indicated that the incidence of ASDs was higher in children who had both genetic and environmental factors. The author concluded that her results supported existing research which indicated that both environmental and genetic factors are "causes" (p, 59) of pervasive developmental disorders. This conclusion may be overstated based upon more current information available.

Access to information and use of services. In 2004, Mansell and Morris implemented a postal mail survey to study the reactions of parents to their children's diagnoses with autism spectrum disorders by a local diagnostic service. A review of the

service's records allowed the researchers to identify potential participants. They subsequently mailed recruitment letters and four-page questionnaires to the parents with return envelopes. The researchers sent reminder letters after four weeks to encourage return of the questionnaires.

Using scaled answer choices and open-ended questions, Mansell and Morris inquired into the process of adapting to a child's diagnosis with an ASD. Specifically, the researchers asked parents about the information they received and used regarding autism treatment and support, the quality and usefulness of that information, and the ways in which their [the parents'] attitudes toward the ASD diagnosis changed over time. The researchers also encouraged parents to make recommendations about ways to improve the service.

Mansell and Morris reported descriptive statistics (i.e, frequency, percentage, number of respondents) on parent ratings of the usefulness of information sources. They also used non-parametric tests to compare the ratings made by parents whose children were diagnosed prior to an alteration in the service which occurred in 1998, and those diagnosed from 1998 onward. Further, they reported qualitative analyses of parent comments and recommendations on the handling of the service's diagnosis of, and prognosis for, children with ASDs. The authors reported positive changes in parent ratings of the diagnostic service after the 1998 alteration, emphasizing the importance of consumer feedback in the ongoing refinement of autism services.

Parent reports of early symptoms. Goin-Kochel and Myers (2004) conducted an international web-based survey of parents and caregivers of children with ASDs in order

to determine the noticeable onset of 11 symptoms across the disorders. They targeted potential participants in the United States and seven other English-speaking countries.

The researchers derived the 11 ASD symptoms which constituted the main items of the survey from a review of the literature on the common reported characteristics of autism and the core deficit areas used in autism screening procedures. They used established survey methods and input from two mothers of children with ASDs to ensure that their survey was clear and concise, but allowed for an adequate range of responses.

Goin-Kochel and Myers advertised their study via the electronic and print media of various autism organizations, such as the National Autistic Society and the Autism Society of America. To determine an appropriate sample, the researchers first identified 378 children with ASDs. No indication of the process involved in this identification of children was included in the study report. Then, to increase the validity of the survey, they eliminated children who were older than 10 years. The secondary sample group identified parents and caregivers of children with ASDs 10 years and younger who had access to a computer and the internet. This parent/caregiver sample included a majority of mothers, some fathers, and one grandmother, from nearly all of the United States, as well as Australia, Canada, England, Ireland, and New Zealand. Most were Caucasian and reported being married at the time of the survey. A majority of these adults reported post-secondary educational levels and greater than (U.S.) mean income levels. Therefore, the authors acknowledged that their sample was not representative of families of children with autism.

Goin-Kochel and Myers analyzed the noted characteristics/symptoms of the

children using descriptive statistics [mean, SD, mode, median, range and percentage] and one-way ANOVAs to determine the effects of diagnostic groups and age of diagnosis and gender, and a Chi-Square test of characteristics by diagnosis. The researchers found that, although there was a time lag between the age at which caregivers reported noting symptoms and the age of diagnosis, it was not as great as previously reported in the literature. Still, they noted that the delay in intervention could significantly impact individual outcomes for children. Goin-Kochel and Myers also noted great variability in symptoms and the age at which they were noted both across and within the pervasive developmental disorders, strengthening the argument that there is no universal set of symptoms for the disorders.

Healthcare for children with autism. Liptak, Stuart, and Auinger (2006) used information from three national surveys to determine the health service utilization and expenditures of children with ASD. These researchers retrieved data from the Medical Expenditure Panel Survey (MEPS), the National Ambulatory Medical Care Survey (NAMCS), and the National Hospital Ambulatory Care Survey (NHAMCS). They obtained information on demographic characteristics, utilization and typical source of medical care, insurance coverage and health care expenditures. Using software designed to account for their sampling method, which over-represented African Americans and Latinos, they weighted the data to produce national estimates. Liptak et al. reported descriptive statistics for type and amount of expenditures for children with autism, children with cognitive impairments, children with depression, and children with no diagnosis.

Liptak et al. found that, although children with autism were no more likely than their typically-developing peers to be of a particular income level or race, they were more likely to utilize public insurance. Nearly all the children with autism required a special school program, but they missed an average of 25 days of school per year in the year prior to the survey due to their condition. They averaged more annual physician visits, outpatient visits, and number of medications prescribed than their typical peers. Furthermore, parents of children with autism reported spending significantly more on physician visits, prescription medications, outpatient care, and total health care than those of typical children and more on outpatient care and physician visits than those of children with cognitive impairments. Additional home health expenditures for children with autism averaged $2,239. The amount of total out-of-pocket health care expenditures for children with autism ($6,132) was of substantive concern to the researchers. Because autism appears to be associated with poorer physical health, they suggested that their results and the results of similar studies be used to plan financial resources and optimal health coverage for children with autism.

Treatments used by parents. In order to measure the number and types of treatments that parents sought for their children with pervasive developmental disorders, Green et al. (2006) used an internationally-publicized internet survey. Although a large majority of respondents reported residence in the United States of America, others responded from 15 other countries, including Canada, the United Kingdom, Australia, New Zealand, Iceland, the Philippines, Denmark, Afghanistan, Albania, Egypt, Algeria, Israel, India, Malaysia, and South Africa.

The researchers drafted the items in the survey using their own professional knowledge and a comprehensive search in medical and educational databases. The 111 identified treatments were categorized into seven major areas: medications, vitamin supplements, special diets, medical procedures, educational and therapy approaches, alternative medicine/therapy, and combined programs. The draft survey was pilot tested with five parents of children with autism. Minor revisions were made as a result of feedback from the parents. The final version of the survey was tested by university staff to ensure electronic access and data collection.

Green et al. sent out emails to autism associations, including the Autism Society of America and the Autism Organizations Worldwide, detailing the survey and asking for assistance in identifying families willing to participate. The initial group of potential participants was contacted via 87 emails. Recommendations from early participants led to additional emails detailing the survey and inviting response. The survey was available to potential respondents for three months.

The survey website included an introductory page detailing the study and its IRB approval, an informed consent statement, and contact information for the principle researchers. The survey itself was comprised of 115 items in three subscales: demographics, characteristics of the child with an ASD, and treatments used. Out of 764 returned surveys, 552 were considered by the researchers to be usable.

Green et al. reported descriptive statistics (number of respondents, percent, and means) for the demographic characteristics of the respondents. They completed an age by disability comparison of the children with ASDs. In addition to descriptive statistics

about the treatments used by parents overall and by disability or age, Green et al. completed two way ANOVAs by type and severity of disability and on overall treatment use. They used Chi-Square tests to identify significant associations of treatment to the type and severity of disability.

The researchers found that the average number of treatments utilized by parents was seven, and that these treatments came from an average of four different treatment categories. Further, they found that the type and severity of the disability was related to treatment use for a large majority of treatment categories and that the number of treatments used was directly related to the severity of the disability. Green et al. noted that parents employed a variety of treatments with and without empirical support for effectiveness. They recommended that parents have "ready access to objective and data-based – yet consumer-friendly – information on a range of specific treatments; depending on the age and type/severity of the child's disability" (p. 83).

Use of alternative and complementary medicine in ASD treatment in New York and New Jersey. Harrington, Rosen, Garnecho, and Patrick (2006) employed a cross-sectional postal mail survey design to illuminate parents' perceptions of the causes of their children's pervasive developmental disorders and whether or not they had sought treatment through complementary medicine practices. Their survey first inquired into specifics of the ASD diagnosis, including the DSM-IV classification, the age of diagnosis, the title of the diagnostician, and whether or not the diagnosis was, in the parents' opinion, made in a timely fashion. Later survey items delved into parental impressions of causes of the disorder, symptoms of the disorder, treatments sought by the

parents, and the titles of those who recommended particular treatments.

Potential participants were identified through a review of medical charts in two large private pediatric practices in the New York City metropolitan area. Parents of children with DSM-IV classifications of 299.0 or 299.8 (i.e., all of the pervasive developmental disorders except for childhood disintegrative disorder) which were verified by an external professional assessment were contacted and asked to participate in the study. Survey packets were sent to 89 families in New York and 61 families in New Jersey who met the diagnostic criteria.

Harrington et al. analyzed the survey responses using a variety of statistical measures. They reported descriptive statistics on the demographics of both the parent respondents and the children with ASDs. They compared the demographic characteristics of the parents from each practice using Chi-Square tests. The researchers used the Kruskal-Wallis test, a non-parametric measure of variance, to determine whether the ASD diagnosis was related to delay in the diagnosis and the symptoms evidenced by the children. Further, they used Chi-Square tests to evaluate the association between the symptoms of children with ASDs and the treatments used by their parents.

Harrington et al. found that primary care physicians were rarely involved in the diagnosis of their patients with ASDs, as parents reported seeking diagnosis from professionals trained in the diagnosis of pervasive developmental disorders. Parents perceived a substantive delay between the age at which symptoms were apparent and the age at which diagnosis was made. Of particular concern to the researchers were parents' expressed belief that immunizations were the cause of autism symptoms in their children

and their prolific use of alternative and complementary medicine treatments. Harrington et al. encouraged primary care physicians to proactively guide parents of children with ASDs in both general health maintenance and the ongoing treatment of the disorders.

Professionals' beliefs, diagnostic practices, and treatment approaches in Indiana. In 2006, Messmer-Wilson used a postal survey to elucidate the knowledge, beliefs, diagnostic practices, and intervention recommendations of educational and mental health professionals in Indiana. She selected a representative sample of school psychologists, clinical and counseling psychologists, and child psychiatrists from corresponding state-level mental health professional organizations to participate in the study.

Messmer-Wilson created her survey by adapting an existing survey used to study Attention Deficit Hyperactivity Disorder (ADHD). The 99 survey items related to professional preparation and training, knowledge and beliefs about symptoms of autism and the rate of comorbidity with other disorders, the tools, methods, and team members used to formulate ASD diagnoses, the relative ease or difficulty of distinguishing among the pervasive developmental disorders, and recommendations for intervention. The survey included yes/no, scaled response, and open-ended questions.

The researcher piloted the survey with eight professionals in the Indianapolis area to determine the estimated completion time for the survey and to identify items needing clarification. After revisions, she mailed the survey to five other professionals for review. The recommendations of this group resulted in further revisions. The final version of the survey was coded and mailed to potential participants with an accompanying cover letter and a stamped return envelope. Coding ensured that the researcher would be able to

identify which participants had completed the survey. Messmer-Wilson sent postcard reminders to potential participants who had not responded one week later. Three and one-half weeks after the initial survey, she sent replacement survey packets, including cover letters, surveys, and return envelopes, to all professionals who had not yet responded. Perhaps due to an offer to enter all respondents in a random cash drawing, this researcher had a 46.9% survey return rate. However, some returned surveys were unusable for data analysis, as they were incomplete.

Messmer-Wilson conducted both qualitative and quantitative analyses using the survey data. She summarized professionals' knowledge about ASDs using descriptive statistics and compared responses to the DSM-IV criteria for autism diagnosis. She categorized open responses related to training and diagnostic practices into [etic] themes for analysis. Further, she analyzed the reported training/professional preparation in autism and the year of completion of the highest degree earned by the professionals to determine if a relationship between them existed. Finally, she reported descriptive statistics for diagnostic tools, methods, and team members, as well as recommended interventions.

The results of Messmer-Wilson's study showed that professionals' self-reported competence in autism assessment and intervention related directly to the type of training they received. However, all the groups reported feeling more comfortable performing assessments and less comfortable providing interventions for autism. Statistical analyses showed that professionals who had earned their highest degrees earlier were less likely to have received formal coursework or experience in autism as part of their academic

programs or internships. Moreover, the responding professionals consistently recommended increased coursework, hands-on training, and workshops in ASD diagnosis/assessment and evidence-based interventions, such as applied behavior analysis. Other suggested training modifications included increased awareness of community resources, improved parent education and support, and collaborative team approaches to intervention which include both general and special education teachers. The author concluded that there was a "gap between supply and demand in the number of professionals available and prepared to serve individuals with autism" (p. 142).

Characteristics of school-age children with autism. Although the symptoms of autism spectrum disorders have been well-documented, the impact of the disorders on school functioning have not. Montes and Halterman (2006) utilized data from a previously-published random national telephone survey, the 2001 National Household Education Survey of Before and After School Programs and Activities (ASPA-NHES), to determine the characteristics of children with autism. The ASPA-NHES had a 59.7% response rate. The results were adjusted to account for households without phones and weighted to reflect an estimate of the actual population. The Pearson design effect *F*-statistic was used to determine whether responses varied by subpopulation.

Montes and Halterman reported descriptive statistics on the comprehensive family demographics of respondents, the areas of disability and services received for them, educational placement, behavioral and academic performance, and the children's before and after school care and activities. They used inferential statistics to compare the characteristics of children with autism and those with no autism diagnosis. The

researchers found that children with autism were more likely to have fathers who worked part-time rather than full-time. Furthermore, children with autism were less likely to receive As and Bs in school and had more teacher contacts for behavior problems. Also, children with autism were less likely to participate in after-school activities than both children without disabilities and children with disabilities other than autism. Perhaps most importantly, the parents of children with autism reported that their child's autism affected his or her learning. These children were at significantly increased risk for, and frequently had, multiple disability designations and/or comorbid disorders, such as ADHD, learning disabilities, speech impairments, serious emotional disabilities, and mental retardation. They also evidenced increased health problems, according to parent reports.

Montes and Halterman found that approximately three-fourths of children with autism received services through their school system. Interestingly, these children were more likely to have services designated through an individualized education program (IEP) than students with other disabilities. They were also statistically more likely to receive services through local or state health and social services agencies. The authors noted that, although children with autism appeared to receive relevant services, they continued to demonstrate significant academic and social difficulties.

Parent resilience to diagnosis of autism. In 2007, Bayat combined several rating scales, including the Childhood Autism Rating Scales (CARS), and a series of open-ended questions to measure the emotional resilience of 167 parents and other primary caregivers of children 2-18 years old with ASDs. The researcher recruited potential

participants through the Autism Society of Illinois, the Chicago Public Schools autism programs, and a therapeutic private school serving students with autism from families with low socio-economic status. He acknowledged that the study's sample over-represented white, upper-middle class families.

Bayat mailed out a total of 2,100 survey packets. Those dispersed through the Chicago public school system (1,200) were written in both English and Spanish in an effort to increase the response rate.

The three open-ended questions inquired into the effects of autism on their families, the effects on themselves personally, and the way in which the respondents described the child with autism. Bayat reported descriptive statistics on the type and severity of ASD diagnosis, the number, type and settings of services received by children. He completed emic and etic categorization and analysis of the responses to open-ended questions. Although he did not complete quantitative analysis on the relationship of participants' demographic characteristics and their responses to the open-ended questions, Bayat reported that "within the content analysis the data were repeatedly checked for the relationship between the orientation of statements (positive or negative) and socio-economic and ethnic background of the participants" (p. 708).

Bayat's results indicated that, for many families, emotional resilience after a child's diagnosis with an ASD took approximately 2 years to achieve. Key processes in developing emotional resilience in families included making positive meaning out of adversity, affirming strength and increasing compassion, and gaining a greater faith/spiritual conviction. The results confirmed previous research indicating that

disability can lead to positive outcomes within families.

Parental coping strategies in California. Twoy, Connelly, and Novak (2007) also addressed parental emotional well-being in their survey study of parents' coping skills. They used a 15-item demographic questionnaire and the 30-item scaled response Family Crisis Oriented Personal Evaluation Scales (F-COPES) to measure adaptation in families who had children aged 12 years or younger with autism. The researchers noted the high Cronbach's alpha and test-retest reliability of the F-COPES.

Twoy et al. used convenience sampling of 94 families who employed autism treatments or related services and/or who participated in a California Bay Area parent support group. They provided each of the families with two copies of the survey as a means of encouraging both mothers and fathers to participate. Surveys were dispersed by hand through the treatment agencies and support group personnel. Potential participants had two weeks to return the survey. The return rate for this survey was 29%.

The researchers reported descriptive statistics on the demographic characteristics of families and their responses to the five subscales of the F-COPES. In addition, they used *t*-tests to analyze for ethnic/racial and language group differences in mean.

Like Bayat (2007), Twoy et al. found that, despite experiencing "considerable and chronic" (p. 257) stress, parents of children with ASDs reported emotional resilience through a variety of coping strategies. Parents reported seeking emotional support through close friends, extended family, and spiritual connections. The vast majority also sought additional information and advice from professionals and from others experiencing similar difficulties. However, the researchers found that many parents used

passive behaviors, such as watching television, and passive appraisals of their impact on their children's outcomes to cope with stress.

Twoy et al. recommended that pediatric practitioners not wait for formal ASD diagnosis before providing information and assistance to families. Furthermore, they urged professionals to acknowledge that the earliest symptoms of ASDs may be present prior to 18 months of age that they refer parents to early intervention services and support groups as early as a parent or developmental screening indicates a possible delay. Finally, the researchers emphasized the role that practitioners play in helping parents to cope effectively with the stresses associated with a child's diagnosis with an ASD, either directly or by serving as a liaison between families and support services.

Participation in autism support groups in Pennsylvania. The stress associated with caring for a child with a disability and the need for positive coping strategies (Bayat, 2007; Twoy, et al., 2007) is well-documented in the literature. In an attempt to improve outcomes for families as well as for individuals with ASDs, many agencies have sought to improve the intervention and support services available. Mandell and Salzer (2007) implemented a state-sponsored survey provided in both electronic and postal mail formats to assess the extent to which parents and other caregivers of children with autism participate in support groups. To access the information about support groups, they utilized parts of a larger 92-item survey which measured the quality of autism-related services. The survey was pilot tested with 10 parents of children with ASDs, and subsequent changes were made to content and wording.

The researchers used a snowball sampling method to recruit parents and

caregivers of children with autism. Respondents in previous studies were contacted via mail and asked to complete the survey and then share information with other caregivers. Also professionals from the Pennsylvania Department of Public Welfare and county offices of Mental Health and Mental Retardation were asked to mail out information about the survey to families they had encountered in service delivery. Mandell and Salzer provided chances for 40 random cash drawings as an incentive for caregivers to complete the survey.

Most of the 1005 respondents submitted their surveys via the internet. The respondents ranged from 23 – 70 years of age and were primarily mothers. Comparison of the survey sample to the population served by public school autism programs and those who received Medicaid reimbursements indicated that the sample was representative of the population of caregivers for autism in Pennsylvania.

Mandell and Salzer reported descriptive statistics for demographic characteristics of the caregivers and the individuals with autism for whom they provided primary care. They also used Chi-Square analyses, *t*-tests, and logistical regressions to analyze the survey responses with regard to support group membership.

The researchers found that two-thirds of families who care for children with autism have participated in support groups for autism and that a majority of the families continue to participate. Most of these parents found the groups on their own, without professional referral. Further, they found that there were cultural characteristics common to support group membership. Specifically, autism support group participants were likely to be suburban, middle income, and well-educated and less likely to be African-

American, urban, or rural. Additionally, the caregivers participating in support groups were more likely to have children who demonstrated sleep problems, severe language deficits, and self-injurious behavior. Furthermore, the parents of young children and girls with autism were unlikely to join autism support groups.

Mandell and Salzer proposed that the high level of participation in autism support groups validates their perceived necessity. However, they argued that the underutilization of support groups by specific cultural and minority groups indicated a need to increase availability of these groups in specific communities. Moreover, the authors indicated that clinicians can serve an important role in referring parents to local or regional support resources.

Use of autism related services by families in North Carolina. Thomas, Morrissey, and McLaurin (2007) utilized a written survey with subsequent follow-up interviews to inquire into the public and private services employed by families in North Carolina as interventions for their children with ASDs. Their six-month study was conducted in two segments: a 20-minute self-administered written survey and a 40-minute computer-assisted telephone interview.

The researchers reported using a "self-selected sample" (p. 820) of 301 families who were identified through a research subject registry and direct recruitment through local autism associations. Families who expressed an interest in participating were mailed consent documents and survey questionnaires. Approximately two weeks after the written surveys were returned, the telephone interviews were conducted. The researchers reported that occasionally the telephone interviews had to be conducted over a series of

separate telephone calls.

Thomas et al. used the format of other surveys, such as the Medical Expenditure Panel Survey utilized by Liptak, et al., (2006), to structure their instrument. Their survey collected demographic information, access to and utilization of services, and parent satisfaction with services. They developed a comprehensive list of services available through schools or privately, including routine autism related services, such as speech/language therapy, and approach names and acronyms with which parents of children with autism were likely to be familiar, such as ABA, Floor Time, and TEACCH. Three parent focus groups reviewed the instrument and provided feedback.

The results of the Thomas et al. study were reported in descriptive statistics related to characteristics of the respondents and their children with ASDs, approach to care, utilization of services, providers, family out-of-pocket expenditures, and satisfaction. Chi-Square tests were used to measure differences in service utilization by type of service and approach to care.

The researchers found that families availed themselves of a wide variety of services both within and outside of school, and they are using multiple services concurrently. A large majority of families reported being satisfied with the services they used. Thomas et al. noted that school services were the most frequently utilized and were rated by families as the best services. Families who followed a particular approach to autism care were more likely to utilize services. Furthermore, there was an association between a family's approach to care and the pattern of services used. The researchers recommended future study of the "sequencing of events and decision-making that leads

to the association between approach and service use patterns and changes in the use of services over time" (p. 827).

Autism programs in Virginia. In order to elucidate the design of, rationales for, and effectiveness of, autism programs in Virginia, Jennings (2007) used a postal survey of special education directors of the state's 139 school districts. The researcher utilized a cross-sectional census survey of 15 yes/no, scaled response, and open-ended items, categorized into three sections: district programming for students with autism, the perceived effectiveness of those programs, and the demographics of the respondent and the school district. To improve the validity of the instrument, Jennings conducted an item analysis and deleted duplicate items; he then submitted the draft survey to two consecutive focus groups of educational personnel with expertise in autism education and supervision. Finally, he submitted the draft to an expert reviewer from the Virginia Department of Education. After making modifications to the format, wording, and content of items, Jennings created the final version of the survey. He conducted reliability testing of the survey's scaled response items using Cronbach's alpha, calculated the mean and standard deviation of responses for these items, and reported inter-item correlations. Jennings received responses from 93 of the 139 school districts in Virginia, which corresponded to a 66.9% return rate.

Jennings reported descriptive statistics, including frequency and percent, for all items. In addition, he reported correlations between demographics and the services available in autism programs. He also reported the results of one-way analyses of variance (ANOVA) between the programs being utilized in Virginia school districts and

the perceived program effectiveness and between the demographics of the school districts and the perceived program effectiveness. Further, he used post hoc testing to determine which findings were more significant.

Jennings found that approximately half of the responding school districts in Virginia employed programs specifically designed for autism, while slightly less than half offered traditional special education services for students with autism. A majority of the school systems using programs specifically designed for autism education employed a combination of programs. However, for school systems using a single primary program, applied behavior analysis was the most commonly-employed model.

Although Jennings found that student needs were the most common reported rationale for the programming decisions of school systems, nearly as many respondents reported that faculty and staff training determined the program choices. Disturbingly, less than 13% of the respondents listed research as the primary determinant of program decisions for students with autism. A vast majority of the respondents reported that their school districts effectively served students with autism and that staff were adequately trained for working with students with autism. However, a large majority also reported that an autism endorsement is needed in Virginia, and that this would improve the services provided.

Jennings found that the perceived effectiveness of programs specially designed for autism education was significantly different from the perceived effectiveness of school systems using only traditional special education services. Moreover, the geographic locations of the school districts significantly influenced the programming

provided. Specifically, rural areas appeared to employ more traditional special education services than urban or suburban, and suburban areas appeared to use a greater variety of programming than either rural or urban areas. Post hoc testing showed that the means for the perceived effectiveness of urban and suburban areas were significantly different.

Teacher knowledge, practices, and training needs in southeastern Virginia. Hendricks (2007) used a web-based self-report survey to assess the skills and needs of teachers of autism in southeastern Virginia. The researcher created her survey, which included 32 items from the six proficiency areas of the *Virginia Skill Competencies for Professionals and Paraprofessionals Supporting Individuals with Autism across the Lifespan,* using Survey Monkey online survey software. Virginia and national experts in autism education reviewed these preliminary survey items, and Hendricks made substantive revisions based on their recommendations. She then piloted the survey with ten special education teachers in order to ensure ease of use and adequate range of responses.

Hendricks arranged her research through the Directors of Special Education in twelve school divisions. After she received permission to complete the research, she sent pre-notice emails to teachers, indicating that the survey would soon be implemented. One week later, emails were disbursed requesting their participation in the study and providing a hyperlink to the survey. Potential participants were given three weeks to respond to the survey, with reminder emails sent, as necessary, at one week and three days prior to the end of the data collection period. A random drawing for several cash rewards was used as an incentive for completion.

Hendricks analyzed the response data using descriptive statistics to illustrate teachers' levels of knowledge, implementation of established practice, and training needs. She also utilized inferential statistics, including *t*-tests and one way analyses of variance (ANOVA), to determine if relationships existed between teachers' demographic/occupational characteristics and their level of knowledge and practice.

Respondents indicated that they felt most knowledgeable about general autism and less so about specific characteristics which may accompany a diagnosis of autism. They reported implementing individualized support strategies most often and expressed a low need for training in this area. Conversely, they reported implementing social skills instruction least often and identified this as an area of significant need for training. Hendricks found that the occupational characteristics of educational level, areas of endorsement, and type of student with autism all related to the level of knowledge and implementation reported by teachers. However, she found no relationship between teachers' occupational characteristics and their training needs.

Social validity of interventions in the southwestern United States. In their 2008 mail survey, Callahan, Henson and Cohen tackled a topic largely unaddressed in autism research: the social validity of interventions. The researchers sent questionnaires consisting of 99 open response and forced choice items to parents, teachers, and administrators in the Southwestern United States. When answering the 84 content-based questions in this six-page survey, participants were asked to consider the importance of various components of autism programs under ideal circumstances, regardless of cost or other limitations and constraints. A seven-point rating scale was used to represent the

importance of each component, with a rating of one indicating that "the component is totally irrelevant and/or unrelated to a high-quality autism program," and a rating of seven indicating that "the component is an indispensable part of a high-quality autism program" (p. 686). The researchers identified program components for possible inclusion in the survey based upon a review of recent journal articles and/or books. They then categorized the interventions based upon an acronym, IDEAL: Individualized programming, Data collection, Empirically-demonstrated strategies, Active collaboration, and a focus on Long-term outcomes. In order to ensure a clear understanding of each component, the researchers included in the wording of each question some elaboration about the use, definitions, and examples of each intervention. They deliberately avoided using specific program titles or descriptors, such as TEACCH or ABA, in order to avoid respondent bias.

Callahan et al. encouraged return of the surveys by sending out reminder postcards to potential participants who had not responded after one month. After the initials surveys were returned, they mailed a second set of surveys out to 90 randomly-selected respondents so that they could determine the test-retest reliability of the instrument. The results of this inquiry indicated that "the major consumers of autism programming (parents, teachers, and administrators) demonstrated a surprisingly high and consistent level of agreement on ratings of the importance of the specific interventions" (p. 689). Finally, they conducted a second round of recruitment and mailed subsequent surveys approximately five months after the initial surveys were sent.

The overall results of the Callahan et al. study indicated that a majority of the

interventions were considered to be important or essential to effective autism programming in public schools. Ratings differed by subgroup, with parents generally rating components as more important and administrators overall rating them as less so. Statistically significant differences in ratings were noted in all categories except Data collection, which received the highest importance rating overall. The individual components receiving the highest importance ratings were equally spread across categories. The researchers noted that demographic factors had relatively little impact on the social validity ratings, with self-reported levels of knowledge and training in autism being the exception.

Overall the findings of this study demonstrated strong social validity for many basic intervention components of autism programs. However, the researchers found lower social validity ratings for several evidence-based practices in autism programming. Furthermore, they cautioned that narrative responses on the survey indicated that typical public school autism classrooms do not provide "ideal" programming. They encouraged research to determine the minimal level of socially-valid, evidence-based intervention that would be "required to obtain educationally and socially significant outcomes for students with autism" (p. 690).

Diagnosis and treatment. Meagher (2007) used a postal mail survey to study the factors which school psychologists considered when making diagnoses of, and treatment recommendations for, ASDs. This research acknowledged the essential role that school psychologists have in the initial diagnosis of, and treatment recommendations, including educational interventions, for many pervasive developmental disorders.

Meagher devised a questionnaire of 46 scaled response, true/false, and open-ended questions based upon a variety of information sources: autism assessment instruments and techniques recommended by the New York Department of Health and the New York City Board of Education, his own professional experience, consultation with other professionals, and a review of the literature. The preliminary survey items inquired into the training and experience of respondents with autism. Later scaled response items asked about their familiarity with, frequency of use of, and effectiveness ranking for, seven autism assessment instruments and 15 treatment techniques. The final 10 items, which were presented as true/false statements of general knowledge about autism, were used by the researcher "as a control variable" (p. 29) to evaluate the understanding and knowledge level of respondents.

In order to draw a representative sample of school psychologists nationwide, Meagher contacted the National Association of School Psychologists (NASP) for a list of active members. He sent his survey, with accompanying cover letter and stamped return envelope, to 1,000 randomly selected NASP members.

Meagher's preliminary analysis was reported in the form of descriptive statistics about the respondents. He reported frequencies and distributions by geographic area and professional background and percentages, medians, means, and standard deviations for the respondents' experience and confidence in working with autism. He then used the Wilcoxon signed rank test, a non-parametric test for use when equal interval measurement cannot be assumed, to compare the frequency of use of, and familiarity with, pairs of autism assessment instruments. Because the number of raters on the

effectiveness of each instrument varied, Meagher was unable to report inferential statistics for these items. Instead, he reported descriptive statistics on the number of raters and the rankings (means, SDs) they provided using a seven-point scale. He reported pairwise comparisons of treatment recommendations and descriptive statistics of their relative ranked effectiveness. Meagher's analysis of correlations between the number of raters and the effectiveness ratings was statistically significant for treatments but not for assessments.

Meagher found that school psychologists tend to choose from a limited number of familiar diagnostic/assessment instruments for autism, most often the Childhood Autism Rating Scale (CARS) and the newer Gilliam Autism Rating Scale (GARS) being most commonly used. Further, he determined that school psychologists appear to be familiar with evidence-based strategies, such as applied behavior analysis, and rank them as highly effective; however, these professionals may continue to recommend or perceive as effective treatment techniques with no empirical data supporting them, such as cranial-sacral therapy and other alternative or complementary medicine treatments.

Autism service delivery in the United States and Ireland. Collins (2008) used a pair of nearly identical electronic surveys to inquire into the delivery of services to students with autism in public schools in the United States and Ireland. This study compared autism education practices in the U. S., which has had specific legislation governing the education of students with disabilities since the mid-1970s, and Ireland, which first enacted legislation of this type in 1998. The researcher created survey items about best practices in autism education using the California Department of

Developmental Services Guidelines, which were published in 2002. She then utilized the input of an Autism Expert Review Panel, consisting of 12 professionals specializing in autism diagnosis, education and/or advocacy in the United States and Ireland, to create comprehensive autism service delivery models for both countries and subsequent questions about service delivery.

Using forced-choice and open-ended items, Collins asked the members of the Autism Expert Review Panel to delineate the types of services provided, evaluate the autism service delivery models for each country, articulate areas of need for public education in autism, and express knowledge and attitudes about best practices in autism screening and assessment for children in two groups: from birth to 5 years old and 6 years old and older. She pilot tested the survey with ten school psychologists and made revisions to both form and content before sending it out to six respondents from each country via a cover letter with an embedded hyperlink.

Collins collected data for three months through the online survey software, Survey Monkey. At the end of that period, she analyzed the data using both qualitative and quantitative methods. Specifically, she reported emic and etic themes in service delivery and best practices and the total number of participants answering each item as well as the number of participants submitting each particular response. Collins synthesized her results into a number of recommendations, which focused on improving training for collaborative, interdisciplinary teams in research-based best practices in autism education/intervention.

Autism education and early intervention in Michigan and Ohio. Reffert (2008)

inquired into early intervention practices using an online survey in two forms: a 16-item form for school district professionals and a 22-item form for parents of children with autism. She created the survey, incorporating yes/no, multiple choice, and open-ended questions, by adapting from similar surveys. She piloted the survey with three educators and three parents of children ages 3- 6 years old (not yet in kindergarten) with diagnoses of autism. Based upon their comments and suggestions, Reffert devised final forms of the survey, which were distributed to potential participants in rural, suburban, and urban areas of two mid-Western states.

School districts were identified for potential participation through the Michigan state Department of Education website and the Ohio Department of Taxation identification list of school districts. Potential parent participants were identified through a variety of disability websites, including the Autism Society of Northwest Ohio, Lucas County (Ohio) Board of Mental Retardation and Developmental Disabilities. Recruitment emails were sent to school districts with posted websites. Participants were directed to an online survey designed using the Survey Monkey online survey software. The survey was sent three times, at two-week intervals, to school systems. The low response rate (22.8%) Reffert encountered may have been due to the survey's initiation at the beginning of the school year.

Reffert's survey items related to district and school demographics, autism-specific questions, early intervention program specifications, and the types of supplemental services sought and received. She used these items not only to describe the current services, but to compare school district performance with the National Research

Council's (2001) recommendations for *Educating Children with Autism*.

Reffert found that a vast majority of school systems did not provide the recommended number of hours per week, days per week, and weeks per year of intervention services. Moreover, most school districts did not employ evidence-based intervention programs, such as those built on the principles of applied behavior analysis. The researcher noted that parent reports of the level of services provided to children with autism did not correspond with the district reports of those same services. She reported that parents have responded to this apparent gap in service by procuring private therapies and treatments for their children.

Principals' attitudes toward inclusion of children with autism in Pennsylvania. In 2008, Horrocks, White, and Roberts used a survey research design to illuminate the attitudes of public school principals in Pennsylvania toward the inclusion of students with autism in general education settings. They used the four-part Principals' Perspective Questionnaire, which was previously created by one of the authors. Part one of the survey inquired into the personal and professional characteristics of the respondents. Part two assessed the placement decisions related to the inclusion of students with autism. Part 3 measured 17 specific attitudes about inclusion, and Part 4 measured general attitudes toward inclusion and special education.

Horrocks et al. used a sample that was stratified by school level and community type/geographic location. The researchers used the Lawsche-Baker tests of proportional similarity to determine if their sample represented the overall population of principals in Pennsylvania. Although urban schools were slightly underrepresented, the sample they

selected was fairly representative for their state. The researchers used Cronbach's alpha to assess internal consistency and Pearson's correlation coefficients to measure the stability of responses to Parts 3 and 4.

Horrocks et al. reported that most principals expressed positive attitudes toward the inclusion of students with autism and that these attitudes were related to previous professional experience with children with autism and previous successful inclusion placements. Formal training also was related to greater inclusionary placement recommendations. The researchers noted that principals' personal experiences with children with autism did not relate to either more positive attitudes toward inclusion or greater inclusionary placement recommendations for these children. Interestingly, principals with more experience in their current school district were less likely to have positive attitudes toward inclusion of students with disabilities.

Principals appeared to strongly consider students' level of social engagement and academic performance when making decisions to place students with autism in inclusionary settings. Formal training increased the likelihood of inclusionary placements for students described as socially detached, making it a key focus area for these researchers.

Horrocks et al. emphasized the importance of principals' attitudes in creating positive educational climates in which inclusionary placements are encourages. They recommended that administrators receive more formal training in autism, particularly in "the unique social skill deficits of this population" (p. 1472), as a means of improving educational outcomes for students with autism spectrum disorders.

Treatments and strategies used in public schools in Georgia. Also in 2008, Hess, Morrier, Heflin and Ivey utilized a web-based survey to inquire into the interventions frequently used with students with ASDs in Georgia public schools. Based upon the Green et al. (2006) study, the recommendations of the National Research Council (2001) and other studies, these researchers developed a comprehensive list of interventions frequently used by teachers of children with ASDs. They created a survey consisting of 43 items in six subscales, the first of which dealt with the demographics of the respondent teachers, and the other five of which dealt with types of common autism interventions. Their survey draft was reviewed by four experts in autism and research and then pilot tested with a group of teachers and graduate students at Georgia State University. The final version of the Autism Treatment Survey was primarily comprised of forced-choice items, presented in drop-down menus.

Participants were required to be Georgia public school teachers in classrooms including students with ASDs. Hess et al. recruited participants through the 159 public school systems. They sent initial contact emails to special education directors and autism specialists, explaining the study and asking for help dispersing the survey link to teachers meeting the inclusion criteria. One week later, the researchers sent emails with the survey link embedded. One week after the survey opened, reminder emails were sent. After three weeks, a final email reminder and thank you was sent.

A total of 234 surveys were returned, approximately 80% of which were usable by the researchers. Nearly all of the survey respondents were females, and a large majority were employed as special education teachers. *T*-tests indicated that the sample

was representative of Georgia teachers.

Hess et al. reported descriptive statistics on individual interventions and categories of strategies. In addition, they analyzed the use of strategies by classroom type and grade level. The researchers also coded the interventions according to best practice levels (i.e., effective, promising, limited supporting information, and not recommended) and reported descriptive statistics according to these levels.

Disturbingly, Hess et al. found that, in the Georgia public schools, fewer than 10% of the interventions being used with students with ASDs were scientifically-based practices. However, they noted that approximately 40% of the interventions were newer practices, not yet evaluated by research studies. The researchers found that interventions varied by classroom type and grade level. Furthermore, their results indicated that some teachers were employing strategies that may be inappropriate for students with ASDs. Based upon their analyses, Hess et al. concluded that selection of educational interventions for students with ASDs in Georgia public schools was not based upon best practice guidelines; they conjectured that unfamiliarity with literature on best practices and attempts to avoid litigation may influence the interventions available to students with ASDs.

Summary

Although a number of survey research studies have addressed the general topic of autism, many have focused on the characteristics, symptoms or medical aspects of the spectrum disorders or on the actions and functioning of families who care for children with ASDs. Furthermore, a majority of the available research on autism services and

treatments concentrates on state-specific programs and interventions. There are few studies on public school autism programs, and none deal specifically with the types of, and influences on, classroom and instructional supports that are available to students with ASDs in various settings.

Much remains to be learned about the effectiveness and social validity of various methods for educating diverse students with autism spectrum disorders. However, unbiased assessment of current educational treatments is the necessary first step in devising a plan for long-term systemic educational change for these students. Implementing evidence-based, socially valid practices in public schools will not only improve instruction for individuals with autism, but will allow them greater confidence, independence, and quality of life throughout the lifespan.

3. Methods

Design

This study employed a mixed-mode survey research design, including multiple data collection modes and multiple means of communication, to inquire into the supports available to students with ASDs in public schools nationwide. This mixed-mode approach allowed lower overall cost and higher response rates (de Leeuw, Hox, & Dillman, 2008). Further, this research method allowed for adequate generalization from the sample to the population. According to Nardi (2003), self-administered surveys, or questionnaires, "are more efficient tools for surveying large samples of respondents in short periods of time than interviews or other research methods, and with less expense than interviews or telephone surveys" (p. 59). After consideration of the research aims and the advantages and disadvantages of various data collection modes, including sampling, usability, and response rate, a cost-effective, versatile internet survey format was chosen for the initial and primary data collection. Follow-up telephone and email interviews were selected for additional data collection.

Couper et al. (1998) emphasized that merely typing a paper survey into an electronic instrument does not create an adequate electronic survey. These authors posited that the process of creating an electronic survey requires careful evaluation of the wording and order of questions, as well as the layout, and format. A three-stage approach

to testing the instrument was utilized. To begin, subject matter and formatting background (de Leeuw et al.) were sought through a comprehensive literature review. Then, as recommended by Nardi, the survey was refined through multiple drafts and pre-testing. Feedback was used to eliminate redundancy (de Leeuw et al.) and improve the comprehensibility, wording and formatting of items (Nardi, 2003; de Leeuw et al., 2008). The final instrument was presented in an electronic, web-based format, which was tested under authentic participation conditions (de Leeuw et al.).

Although computer-based surveys can create a limitation in terms of computer access for some demographic subgroups (Nardi), the impact of this characteristic was minimized by the contact of all potential participants by email, implying that they had existing access to computers. Furthermore, the typical coverage error which limits many web-based surveys is, according to de Leeuw et al., "less critical for web surveys aimed at…special populations where all or most of the members have internet access" (p.269).

A cross-sectional, electronic web-based survey was delivered one time to educational professionals employed in public schools in the United States. Explanations of the goals and content of the survey and the manner in which questions were to be answered, or meta-information, were conveyed through the survey's formatting, layout, and wording. Multiple visual aspects, including response categories, spatial arrangements and color contrasts, were designed to assist participants in navigating the survey and focusing on relevant information (de Leeuw et al.).

The survey instrument was self-administered, which reduced researcher effects on the respondents. It took approximately 15 minutes for pilot participants to complete,

which, although long for an internet survey, is within acceptable limits for "special groups ... and/or when a salient topic is surveyed" (de Leeuw et al., p. 121). The 117 item survey was comprised of a combination of open-ended and closed-ended questions, with the majority of items being closed-ended. Although they allowed for fewer variations in responses than open-ended questions, the one-and two-directional intensity (Nardi) and frequency (de Leeuw et al.) scales of the closed-ended questions allowed participants to answer more rapidly and with greater ease. Furthermore, these types of items allowed efficient coding of responses and data analysis.

It was recognized that the types of items comprising the survey raised issues specific to self-reported behavior and attitudes. These issues are addressed here. de Leeuw et al. indicated that frequency scales may force participants to rely on estimation strategies based upon the importance and/or rate of a behavior in their memories; however, they proposed that this effect is minimized when the behavior occurs frequently, as one might assume teaching behaviors do. Also, self-reported frequency behaviors may be affected by the participant's age, culture, and/or desire to provide a socially desirable response. Relationships between demographic data, including age and ethnicity, and types of responses were reported in the Results section and reviewed for significance.

In addition, de Leeuw et al. explained the ways in which attitudes expressed in surveys are subject to context effects, especially the order of questions in the instrument and the response choices provided. In this particular study, question order effects were considered to be of some benefit by promoting assimilation of the autism classroom

supports and the standards by which they were to be evaluated (i.e., their use in classrooms). Additionally, response order effects, including primacy, were considered to be controlled, to some extent, in this study by respondents' familiarity with their work environment and the social desirability of their responses. For example, few teachers were considered likely to respond that they "never" used a strategy or support if that were not true, if, in fact, they used it at all.

Demographic questions were designed to be mutually exclusive and exhaustive. Filtering techniques were used at the beginning of the survey to assess the level of knowledge of, training about, and experience with autism spectrum disorders. For those respondents with a minimal or greater level of knowledge and experience about ASDs, subsequent contingency questions (Nardi) were then used to determine what supports are available to students with autism spectrum disorders in a variety of general and special education settings and to elucidate the rationales for those supports. The choice of vocabulary and wording of questions were carefully considered and reviewed by external sources with expertise in research and/or autism. Using feedback from reviewers, text clarifications and information which might be necessary in order for participants to answer questions (e.g., population estimates for geographical location and school district size) were added to the survey instrument. An offer to receive a copy of the study was included at the end of the survey. de Leeuw et al. proposed that this can be used as an incentive for participation.

Couper et al. noted that online survey software packages vary greatly in their capabilities to automatically document responses, provide output file formats and interact

with external data analysis software. This makes the selection of appropriate survey software critical to the outcomes of the research. The software used to convey this survey allowed for automatic coding of data into response categories for analysis, which eliminated the potential source of error encountered when researchers enter response data by hand.

Potential browser compatibility issues (de Leeuw et al.) were considered. As a result, success in opening and answering the survey in four different browsers was evaluated before the survey was available to participants. The survey opened correctly and was accessible in Internet Explorer, Mozilla Firefox, Netscape Navigator and Opera.

Follow-up interviews via phone or email were conducted with participants who volunteered their contact information. Due to low cost and reduced time when compared to face-to-face interviews, phone interviews are the most popular means of conducting survey research. Phone interviews allowed me to probe for additional details on the topic of classroom supports, while limiting researcher effects. The interviews were brief, as Nardi indicated that respondents are likely to tolerate only short phone interviews, lasting a maximum of 20 minutes. These interviews were designed to illuminate the attitudes toward supports available to students with autism spectrum disorders in diverse general and special education settings in public schools in the United States.

S*ample*

Access to the national population of educators was limited for the individual researcher. However, “sampling does not have to be a major issue in internet surveys, provided the population can be defined and a good sampling frame is available” (de

Leeuw et al., p. 251). The target population of this study was accessed by employing the services of Market Data Retrieval (MDR), a public national school database which allows direct marketing to educators nationwide through email campaigns and postal mail lists. de Leeuw, et al. proposed that matching sample units to known data bases assists researchers in reducing non-response to their surveys.

In order to increase precision and decrease sampling error, a large sample was required (de Leeuw, et al.). This study involved the recruitment of a random sample of 3,000 adults who served as educators or administrators in public schools in the United States. Potential participants were randomly selected by MDR using the following criteria: 600 preschool/elementary general education teachers who instructed students with disabilities, 750 preschool/elementary special education teachers, including those who taught students with autism, 600 secondary general education teachers who instructed students with disabilities, 750 secondary special education teachers, including those who taught students with autism, and 300 administrators who supervised general and/or special education teachers, including those who taught students with autism.

The study sample was stratified by grade level and employed disproportionate allocation (de Leeuw et al., p. 110) to increase the representation of the rare population (i.e., teachers who taught students with autism). This list-based sample was solicited through individual invitations (de Leeuw et al., p. 267).

Inclusion and exclusion criteria. No demographic restrictions other than the occupational requirements listed above were placed on the sample.

Instrumentation

All participants were asked to complete an anonymous electronic survey (Appendix C) of the supports of which they are aware and/or which they use with students with autism spectrum disorders in general education and special education settings in United States public schools. The question and answer texts were concise "because internet users seldom read the text carefully, but rather scan it" (de Leeuw et al., p. 276). Grid questions were utilized to make the survey instrument appear shorter, thereby reducing the perceived burden on participants, and to eliminate redundancy in questions and response categories. The grid format also helped place relevant survey information in a comparative framework, encouraging respondents to consider related items as a cohesive unit. Open-ended questions, which allowed for richer, more personal responses, were also included in the instrument (de Leeuw et al.). Respondents' progress through the instrument was indicated by a completion graph on each page of the survey. Although carefully designed, the web-based format of this instrument may have contributed to "break-off," (de Leeuw, et al., p. 41) a situation in which potential participants electronically enter the survey but do not complete it.

Participant volunteers were asked to answer follow-up interview questions (Appendix D) via their preference of email or phone contact.

Procedures

As required to ensure the ethical treatment of human subjects in social research, informed consent and confidentiality protection (de Leeuw, et al.) were addressed prior to the implementation of this study. On January 9, 2009, an application to conduct research was submitted to the George Mason University Human Subjects Review Board (HSRB).

Approval was granted on the initial draft of the survey and procedures on January 30, 2009. After revisions to the instrument, an addendum to the original application was submitted on February 13, 2009. Approval for the amended survey and procedures was granted on February 23, 2009.

The survey, which was originally created using Survey Monkey online software, was reformatted in single-column format using SNAP Survey. This newer version was tested online to ensure accurate data collection and retrieval, and the formatting of some questions was modified. Once a workable version was completed, George Mason HSRB was contacted to determine whether or not formatting changes required another amendment. The new format was accepted without further amendment to the HSRB protocol on March 11, 2009.

A representative from Market Data Retrieval was contacted to set up an account and provide cost estimates for sending invitations and reminders to the 3,000 randomly sampled individuals. For this survey, a DM Opt package, including 2 email campaigns and a list of addresses, was selected. On March 13, 2009, the initial invitation was drafted. This invitation was formatted in hypertext markup language, or html, using Page Breeze editor, and in text format using an online text editor available from MDR. During the test launch of the email, it was noted that critical information was omitted and that there was difficulty accessing the survey through the hyperlink provided. These errors were submitted to MDR for correction, and the subsequent test launch was successful. The initial email invitation was deployed to potential participants on March 18, 2009. Due to system limitations within MDR, the initial email was deployed to only 2,577

individuals, rather than the negotiated 3,000.

On March 21, 2009, the email reminder was drafted. This email was also formatted in html, using Page Breeze editor, and in text format using an online text editor available from MDR. The test email was successful, and the reminder email was launched to the sample list on March 25, 2009. Due again to system limitations within MDR, the reminder email was deployed to only 2,563 individuals, rather than the negotiated 3,000.

On March 23, 2009, the address list obtained through MDR was used to create mailing labels for reminder postcards. Using a mail merge procedure between a label template in Microsoft Word and a formatted address list in Microsoft Excel, 3,000 labels were printed on Avery 5160 mailing labels. These labels were affixed to postcards designed by the researcher and printed by Postcards.com.

Individual consent to participate in the research was required and obtained electronically prior to completion of the survey (Appendix B). The consent document included contact information for the researcher, enabling participants to send questions, comments, and/or problems with the survey. It also included an explicit explanation of procedures to ensure confidentiality, which may have positively influenced both the respondents' decisions to participate and the quality of their answers. No tangible incentives were offered for completion of the survey, as this would have increased the research costs considerably and may have biased participation (de Leeuw et al.).

Invitation to participate. deLeeuw, et al. posited that email invitations are preferable in terms of cost, ease of use, and speed of response. A purportedly accurate

and up-to-date email list was generated and invitations were sent out through Market Data Retrieval (MDR). This helped to control one of the most common reasons for non-response to web surveys: inaccurate or out-of-date emails. However, consideration was also given to the fact that solicitation by email may be perceived as an invasion of privacy or as "junk mail."

Individual email invitations were sent to potential participants on the sample list, asking them to complete the online survey. Personalized invitations of this sort are considered "far more effective than general invitations" (deLeeuw, et al., p. 270). The emails (Appendix A) detailed the nature of the research and the approximate time required to complete the survey. They also included a URL for the survey, which allowed a single click-through to the instrument. This decreased the burden on the respondents, as fewer actions were required to access the survey (de Leeuw, et al.).

It has been noted that, because respondents react quickly to emails, compressed time intervals between reminders are possible (de Leeuw et al.). Therefore, one week after the initial invitation, another email was sent to potential participants, indicating that the electronic survey was still available. This email included a note to previous respondents, thanking them for completing the survey. Follow-up and reminder postcards were sent two weeks later using coordinating postal mail addresses obtained through MDR for all email recipients. de Leeuw et al. noted that personalization and timed reminders "have a positive influence on response in … web surveys" (p. 129). The postcards also may have helped to reduce non-response caused by MDR's lack of email contact information and by recipients' email servers or the recipients themselves judging

the email invitation to be spam.

Survey. An electronic survey (Appendix C) was created using the Survey Monkey web-based software program. However, due to issues relating to potential difficulties downloading data into SPSS for analysis, the survey was reformatted using SNAP Survey software and uploaded via the George Mason University secure server. This newer version was tested online to ensure accurate data collection and retrieval. Potential participants were contacted via email with messages which had a clear and concise subject line (de Leeuw et al., p. 47), indicating the survey recruitment purpose of the email.

The emails provided participants with a web link (URL) to access the web-based survey. The Informed Consent document preceded the actual survey items (Appendix B). Participants were notified that their continued participation after the first page in the survey designated their informed consent. They were encouraged to print a copy of the Informed Consent page for their records. They were also informed that they could request a paper Informed Consent document from the researcher, which they could subsequently sign and return. However, de Leeuw et al. indicated that the requirement to sign a document of informed consent actually reduced the likelihood of participation in a given study (p. 89).

The survey originally had been scheduled to remain available online for a period of four weeks. However, due to a low response rate after three weeks, it was deemed necessary to let the survey remain available for an additional 10 days in order to maximize the opportunity for response after the postcard reminders had been delivered.

Follow-up. At the end of the electronic survey, participants had the opportunity to volunteer their contact information for follow-up interviews. To ameliorate the adverse effects of the low response rate to the electronic survey, all participants who indicated their willingness to be interviewed were contacted. Follow-up interviews (Appendix D) were conducted via phone or email, based upon the contact information provided.

Validity

The survey items designed to inquire into the supports available to students with autism spectrum disorders (i.e, non-demographic items) were based upon documented, research-based effective practices and programs for instructing students with ASDs (see Table 1). These items were first reviewed by a group of three professionals who provide full-time consultative autism services for a public school system. No changes were suggested or made as a result of this review. Subsequently, the draft survey was reviewed by three faculty members with expertise in special education. Based upon the feedback from these experts, the survey was shortened considerably, and the format and wording were modified. One week later, the modified version was reviewed by a general education teacher and an administrator at the elementary level who supervised both general and special education programs. Several graduate research assistants, a doctoral candidate, and a member of the faculty of a mid-Western university with expertise in autism education subsequently reviewed the draft survey. Based upon all feedback, a final version of the survey was created. Due to the number of reviewers, their levels of expertise, professional fields, and years of experience, the content of this survey is posited to be clear, concise, and valid for assessing the classroom supports for students

with ASDs.

Table 1

Effective Instructional Practices for Use with Students with Autism Spectrum Disorders

Educational Practice	Information Source
Early intervention (prior to age 3)	National Research Council (2001)
Active engagement	
Intensive instruction for 25 hours or more/week	
Systematic, developmentally-appropriate instruction	
Low student ratios	
Family involvement in the educational process	
Ongoing, formative assessment	
Instruction with typically-developing peers	
Family involvement in assessment and strategy implementation	Iovannone, Dunlap, Huber & Kincaid (2003)
Customized supports, services, and practices	
Clear, predictable, structured learning environments	
Functional approach to problem behaviors	
Curriculum designed to address core deficits	Hagiwara (2002)
Instruction based upon task analysis	Flores & Ganz (2007)
Systematic, targeted direct instruction	Johnson, McDonnell, Holzwarth, & Hunter (2004); Collins, Evans, Creech-Galloway, Karl, & Miller (2007); Flores & Ganz (2007)

Data Analyses

Upon completion of the survey, statistical analyses of response data were completed using the Statistical Package for the Social Sciences (SPSS 17.0) software. An alpha level of .05 was used for all statistical tests. Analyses included descriptive statistics summarizing frequencies,

measures of central tendency, and dispersion. Comparisons among geographic, service delivery setting, occupational, professional, and personal variables were made. When the assumptions for parametric tests were not met, similar non-parametric tests were completed. Correlations between personal and professional variables were explored.

Qualitative analysis of applicable survey and follow-up interview items were conducted for conceptual themes and categories using NVivo 8 software. Qualitative data sources, including text entries and comments made on electronic survey submissions and follow-up interview documents, were input directly or imported into NVivo 8 by participant numbers. The participant files were read, reviewed, and coded, first for etic, and then for emic themes. Free nodes were created for relevant etic themes related to demographic characteristics (e.g., details related to certification and licensure, route to licensure, primary work setting, training in autism, and descriptions of non-categorized employment positions) and participant actions. As coding continued, recurring emic themes related to participants' attitudes, opinions, concerns, and comments emerged from the data. When coding was complete, queries were conducted to determine common and divergent positions among participants.

4. Results

This chapter presents the findings from the autism supports survey and follow-up interview, organized by research question and type of analysis. Information on the survey instrument, response rate, and characteristics of the sample are provided first. Quantitative analyses are then presented sequentially by research question. Afterward, analyses of qualitative data are presented in a person-centered manner, connecting characteristics to actions, attitudes, and opinions. Triangulation of data collected through quantitative and qualitative means concludes this section.

Survey Instrument

The survey instrument was primarily composed of forced-choice items, interspersed with free text and commentary items (see Appendix C). It was comprised of personal and professional demographic items and four content-based subscales. Each subscale consisted of 21 four-point Likert scale items which addressed aspects of the same set of autism classroom and instructional supports. The subscales asked educators to rate their use of supports, the importance of those supports, and how often the supports were perceived to be utilized in general and special education classrooms besides their own.

Reliability

Analyses of internal consistency were completed for the four subscales and the

total survey measure (see Table 2). The Cronbach's alpha for the Use of Support subscale was .958. For the Importance of Supports subscale, the Cronbach's alpha was .976. The internal consistency of the Perceived Use of Supports in General Education Settings was .971, and the internal consistency was .976. The total measure yielded an internal consistency score of .986.

Table 2

Reliability Statistics for Survey Subscales and Total Measure

		Summary Item Statistics		Scale Statistics		
Scale/Subscale	*a*	*M*	*n items*	*M*	*SD*	*n items*
Use of Supports	.958	2.63	21	55.12	18.37	21
Importance of Supports	.976	3.00	21	63.03	20.88	21
Perceived Use of Supports in Gen. Ed.	.971	2.30	21	48.35	19.93	21
Perceived Use of Supports in Spec. Ed.	.976	2.76	21	58.04	22.48	21
Total Measure	.986	2.68	84	224.69	69.43	84

Response Rate

A majority of individuals were contacted three separate times regarding completion of the autism supports survey: twice by email and once by postcard. Some individuals in the sample of 3,000 were contacted only through the postcard due to system limitations within MDR, which delimited the initial email deployment to 2,577 individuals, and the reminder email deployment to 2,563 individuals.

During the five and one-half weeks in which it was available, the electronic

survey was completed by 124 respondents, which represented a response rate of 4.1% of the total sample of 3,000. However, this response rate does not account for the number of emails returned due to full mailboxes, blocked or returned by anti-spam software, or disregarded as a result of participant opt-out requests (see Table 3). Additionally, it fails to compare the number of completed surveys to the number of actual opened emails (see Table 4). For example, the total of 79 completed surveys from 368 opened emails from the initial email campaign represents an adjusted response rate of 21.5%.

Table 3

MDR Email Campaign Unreceived Emails

	Email Campaign 1	*n* = 2,577	Email Campaign 2	*n* = 2,563
Full Mailbox	56 (2.22%)		56 (2.24%)	
Blocked	3 (0.12%)		10 (0.39%)	
Opt-outs	7 (0.28%)		5 (0.20%)	

Table 4

MDR Email Campaign Email and URL Information

	Email Campaign 1	*n* = 2,577	Email Campaign 2	*n* = 2,563
Total Emails Opened	368 (14.61%)		250 (10.01%)	
Total Unique Emails Opened	274 (10.88%)		181 (7.25%)	
Total Clicked URLs	89 (3.53%)		0 (0%)	
Total Unique Clicked URLs	79 (3.14%)		0 (0%)	

Nearly three-fourths of the participants reported that they completed the survey after an email contact (73.4%). Slightly less than one-third of the participants (31.5%)

reported completing survey following a postcard contact. The discrepancy in percentages required further analysis, which indicated that 10 participants (8.1%) had selected both contact methods. One participant (0.8%) did not share the method of contact to which she responded.

Characteristics of the Sample

Although the response rate for this survey was quite low, the characteristics of this sample were similar to those of other recent research in education with more typical response rates. In their National Center for Education Statistics Pilot Teacher Compensation survey research, Johnson and Cornman (2008) reported median teacher ages of 43 to 45 in participating states, with an age range of 25 to 66 years old; they also reported a median number of 8 to 15 years of experience. Johnson and Cornman found that 36.8% of teachers had earned master's degrees. In each of the states they surveyed, respondents were predominantly female (range 72.9% - 81.7%), and Caucasian/non-Hispanic individuals comprised the vast majority of teachers (range 74.2% - 98.1%). Mehrenberg (2008) also reported demographic characteristics comparable to those of this sample in terms of age range (22-64 years), gender (81% female), race (85% Caucasian; 8% African-American; 5% Hispanic; 1% Asian), and total state representation (30 of the 50 states). Furthermore, when the sample from this survey was compared to McCann's (2008) sample using an *F*-test, there were no statistically significant differences for gender ($p = .99$), race ($p = .89$), special education or general education employment designation ($p = .94$), teaching level ($p = .15$), or highest degree earned ($p = .29$).

Quantitative Analyses

Descriptive statistics were calculated for each quantitative survey item. Frequency of response in number and/or percentage was reported for Likert-scaled and other forced choice items. Means and standard deviations were reported for appropriate variables, including continuous variables, such as age and years of experience. Parametric and non-parametric tests were used to make comparisons among groups.

Statistical tests were selected for their probative value in answering each research question, giving careful consideration to the value of each statistical test when compared with the pre-determined alpha level of .05. That is, 64 statistical tests with $\alpha = .05$ would be expected to result in 3 "statistically significant" results on a random set of numbers. Therefore, an accounting of the rationale for, and the statistical significance of, each test was maintained during data analysis (see Appendix E). The table of tests shows that nearly 72% of the tests yielded statistically significant results; consequently, it is unlikely that the outcomes occurred by chance.

Research Question 1

Research question one inquired into the supports that are available to students with ASDs in the continuum of general and special education settings in public schools nationwide. In order to answer this question, survey items relating to actual or perceived use of supports were analyzed. Descriptive statistics were reported for the use of each individual classroom support, for total use of supports, and for perceived use of supports in general and special education classrooms other than those of the respondents.

General and special education teachers and educational paraprofessionals were asked to complete the survey section on Autism Classroom Instruction and Supports in

their own classrooms. Administrators were instructed to skip this section of the survey and continue with the section on perceptions of the use of autism classroom supports in other classrooms.

Frequency of support use. The reported frequency of use of autism classroom supports in respondents' classrooms is detailed in Table 5. The autism classroom supports that the respondents reported using most frequently were structured learning environments (55.6%), visual supports (51.6%), access to general education curriculum (48.4%), behavior intervention plans (45.2%), curriculum designed to address core deficits (44.4%), educational paraprofessional support (44.4%) and positive behavior supports (43.5%). These same supports were also rated as very or somewhat important by nearly all respondents.

Table 5

Frequency of Use of Individual Autism Classroom Supports

	Percentage of Reported Use				
Type of Instruction or Support	Most of the Time	Some of the Time	Very Little Time	Never	no response
Low student-teacher ratio	43.7	34.7	8.9	3.2	9.7
Formative assessment	25.8	42.7	16.9	3.2	11.3
Instruction with typical peers	37.1	40.3	9.7	3.2	9.7
Visual supports	51.6	29.0	8.1	0.8	10.5
Augmentative/alternative communication	16.9	33.1	21.8	20.2	8.1
Structured learning environments	55.6	27.4	6.5	1.6	8.9
Functional behavior assessments	32.3	40.3	16.9	2.4	8.1
Behavior intervention plans	45.2	34.7	8.9	4.0	7.3
Positive behavior supports	43.5	40.3	5.6	2.4	8.1
Curriculum designed to address core deficits	44.4	29.0	16.9	2.4	7.3
Access to general education curriculum	48.4	37.1	4.0	3.2	7.3
Targeted, direct instruction	34.7	38.7	14.5	3.2	8.9
Applied behavior analysis	13.7	32.2	27.4	18.5	8.1
Educational paraprofessional	44.4	26.6	11.3	8.9	8.9
Discrete trial teaching	12.1	22.6	28.2	28.2	8.9
Reinforcement systems	33.9	33.9	14.5	8.9	8.9
Social skills training	29.8	38.7	18.5	4.0	8.9
Video or computer modeling	12.1	21.0	24.2	33.9	8.9
Picture Exchange Communication System (PECS)	20.2	16.9	19.4	35.5	8.1
Voice output devices	6.5	14.5	21.8	47.6	9.7
Sign language	4.8	16.1	21.8	49.2	8.1

Use of individual supports. Descriptive statistics were calculated for use of each of the 21 supports by the total sample. These statistics are reported in Table 6. As can be seen in Table 6, the means for the use of the individual supports varied, on a four-point scale, from 1.60 to 3.19, with standard deviations from 1.01 to 1.31. The support with the highest mean for use was structured learning environments (M = 3.19; SD = 1.21). The supports with the lowest means for use were voice output devices (M = 1.60; SD = 1.06) and sign language (M = 1.60; SD = 1.01).

Table 6

Descriptive Statistics for Use of Individual Supports by All Respondents *N* = 124

Type of Instruction or Support	*M*	*SD*	*Minimum*	*Maximum*
Low student-teacher ratio	2.99	1.24	0.00	4.00
Formative assessment	2.69	1.22	0.00	4.00
Instruction with typical peers	2.29	1.21	0.00	4.00
Visual supports	3.10	1.26	0.00	4.00
Augmentative/alternative communication	2.31	1.20	0.00	4.00
Structured learning environments	3.19	1.21	0.00	4.00
Functional behavior assessments	2.86	1.14	0.00	4.00
Behavior intervention plans	3.06	1.17	0.00	4.00
Positive behavior supports	3.09	1.15	0.00	4.00
Curriculum designed to address core deficits	3.01	1.17	0.00	4.00
Access to general education curriculum	3.16	1.14	0.00	4.00
Targeted, direct instruction	2.87	1.19	0.00	4.00
Applied behavior analysis	2.25	1.15	0.00	4.00
Educational paraprofessional	2.89	1.31	0.00	4.00
Discrete trial teaching	2.01	1.17	0.00	4.00
Reinforcement systems	2.75	1.26	0.00	4.00
Social skills training	2.77	1.18	0.00	4.00
Video or computer modeling	1.94	1.18	0.00	4.00
Picture Exchange Communication System (PECS)	2.06	1.29	0.00	4.00
Voice output devices	1.60	1.06	0.00	4.00
Sign language	1.60	1.01	0.00	4.00

Support use by teaching position. Teachers were the intended focus of survey items on use of supports, as they were most likely to provide direct daily support for students with ASDs. Descriptive statistics for use of individual supports were calculated for general and special education teachers (see Table 7). General education teachers had means ranging from 1.38 to 3.12 on a four-point scale, with standard deviations of .90 to 1.41. Special education teachers had means ranging from 1.61 to 3.33 on a four-point scale, with standard deviations of .99 to 1.30. As is evident in the table, the mean use of each support by special education teachers is higher than the mean use by general education teachers.

Table 7

Descriptive Statistics for Use of Individual Supports by Teaching Position

Type of Support	General Education Teachers (n = 26)		Special Education Teachers (n = 80)	
	M	*SD*	*M*	*SD*
Low student-teacher ratio	2.54	1.36	3.18	1.11
Formative assessment	2.73	1.28	2.64	1.16
Instruction with typical peers	2.69	1.41	2.99	1.10
Visual supports	2.81	1.30	3.26	1.12
Augmentative/alternative communication	2.08	1.13	2.40	1.21
Structured learning environments	2.96	1.31	3.33	1.07
Functional behavior assessments	2.54	1.30	3.04	1.01
Behavior intervention plans	3.00	1.33	3.16	1.04
Positive behavior supports	2.92	1.29	3.23	.99
Curriculum designed to address core deficits	2.63	1.30	3.21	1.00
Access to general education curriculum	3.12	1.28	3.25	1.03
Targeted, direct instruction	2.54	1.14	3.06	1.06
Applied behavior analysis	2.00	1.20	2.34	1.09
Educational paraprofessional	2.42	1.27	3.05	1.25
Discrete trial teaching	1.73	1.25	2.12	1.10
Reinforcement systems	2.23	1.21	2.96	1.20
Social skills training	2.23	1.14	2.94	1.10
Video or computer modeling	1.58	1.10	2.09	1.19
Picture Exchange Communication System (PECS)	1.54	1.07	2.20	1.30
Voice output devices	1.54	1.07	1.61	1.05
Sign language	1.38	.90	1.72	1.04

Calculation of total use subscale. Statistical software (SPSS 17.0) was used to aggregate the respondents' usage ratings of individual supports into a total use subscale. The total use for each participant was computed by adding the usage ratings for all 21 individual supports. The calculations for the total use subscale were then analyzed for mean, standard deviation, minimum and maximum for the entire sample.

The data were disaggregated by employment position and analyzed again on the total use subscale. Descriptive statistics for the total use subscale by employment position are summarized in Table 8. As evident in Table 8, the means for total supports differed by position. Special education teachers (n = 80) and administrators (n = 7) had group means for total use of supports that were higher than that of the entire sample (Total M = 55.12; SD = 18.37). The group comprised of 7 administrators produced the highest mean (59.00); however, this group also had the largest standard deviation (26.59). The group of other education professionals (n = 11) had the lowest mean total use (25.97).

Table 8

Descriptive Statistics and Statistical Analysis for the Total Use Subscale by Position

		Descriptive Statistics			Mann- Whitney Test Result			
Position	*n*	*M*	*SD*	*Median*	*Mean Rank*	*U*	*z*	*p*
Gen Ed Teacher	26	49.19	20.65	52.50	42.04	742.00	-2.19	.03*
Sp Ed Teacher	80	57.78	14.92	59.50	57.23			
Administrator	7	59.00	26.59	66.00				
Other	11	25.97	20.65	53.00				
Total	124	55.12	18.37	59.00				

* significant at $p \leq .05$

The numbers of participants in the two teacher groups were unbalanced (80 special education; 26 general education). Therefore, the medians for the total use subscale by teacher groups were subjected to the Mann-Whitney, a non-parametric comparison test, to determine if statistically significant differences existed between them. General education teachers had a mean rank of 42.04, with a sum of ranks of 1093.00. Special education teachers had a mean rank of 57.23, with a sum of ranks of 4578.00. The results of this test showed a significant difference between general education teachers and special education teachers on total use of supports, U = 742.00, p = .03. These findings revealed that special education teachers used significantly more supports overall than their general education counterparts.

Participants were asked to indicate their perceptions of the frequency of use of autism classroom supports in classrooms other than their own. Specifically, teachers rated how often they observed or extrapolated the use of each support in other general education and special education classrooms, usually within their own buildings. The perceived frequency of use of supports in classrooms other than those of the respondents is detailed in Table 9. As can be seen in Table 9, a vast majority (19 out of 21) of the supports were perceived as being used more frequently in special education classrooms than in general education classrooms.

Table 9

Perceived Use of Autism Classroom Supports

Type of Instruction or Support	Perceived Use General Education/Special Education (%)				
	Most of the Time	Some of the Time	Very Little Time	Never	no response
Low student-teacher ratio	22.6/63.7	29.8/19.4	27.4/4.0	9.7/1.6	10.5/11.3
Formative assessment	26.6/46.8	36.3/32.3	19.4/2.4	3.2/4.8	14.5/12.9*
Instruction with typical peers	34.7/29.8	40.3/36.3	11.3/13.7	3.2/8.1	10.5/12.1
Visual supports	28.2/59.7	35.5/21.8	17.7/2.4	7.3/4.0	11.3/12.1
Augmentative/alternative communication	11.3/25.8	21.0/29.0	27.4/17.7	29.0/15.3	11.3/12.1
Structured learning environments	28.2/61.3	42.7/22.6	13.7/4.0	5.6/1.6	9.7/10.5
Functional behavior assessments	21.0/44.4	29.8/33.1	27.4/7.3	12.1/5.6	9.7/9.7
Behavior intervention plans	25.0/52.4	37.1/29.0	19.4/4.8	8.9/4.0	9.7/9.7
Positive behavior supports	28.2/52.4	39.5/30.6	16.1/4.8	6.5/2.4	9.7/9.7
Curriculum designed to address core deficits	21.8/61.3	29.0/19.4	28.2/7.3	10.5/2.4	10.5/9.7
Access to general education curriculum	50.8/47.6	29.8/25.0	6.5/11.3	3.2/5.6	9.7/10.5
Targeted, direct instruction	20.2/54.0	33.1/25.8	28.2/6.5	8.1/3.2	10.5/10.5
Applied behavior analysis	12.1/26.6	17.7/29.0	32.3/20.2	28.2/13.7	9.7/10.5
Educational paraprofessional	33.9/54.0	25.8/21.8	21.8/8.1	8.1/5.6	10.5/10.5
Discrete trial teaching	5.6/18.5	15.3/34.7	34.7/16.9	33.1/16.9	11.3/12.9
Reinforcement systems	16.1/41.1	35.5/33.1	26.6/10.5	11.3/4.8	10.5/10.5
Social skills training	26.6/44.4	18.5/30.6	32.3/12.1	10.5/3.2	12.1/9.7
Video or computer modeling	5.6/19.4	14.5/18.5	32.3/26.6	35.5/25.0	12.1/10.5
Picture Exchange Communication System (PECS)	8.1/25.0	16.4/17.7	23.4/21.0	41.9/25.0	10.5/11.3
Voice output devices	5.6/16.1	13.7/18.5	26.6/25.0	42.7/29.0	11.3/11.3
Sign language	4.0/16.1	14.5/21.0	26.6/20.2	45.2/30.6	9.7/12.1

*missing n = 1 (0.8%)

Most frequently used supports: Perceptions of general education. The supports that respondents perceived as most frequently used in general education (see Figures 1 and 2) were access to the general education curriculum (50.8%), educational paraprofessionals (33.9%), instruction with typically-developing peers (34.7%), visual supports (28.2%), structured learning environments (28.2%), positive behavior supports (28.2%), ongoing formative assessment (26.6%), and social skills training (26.6%).

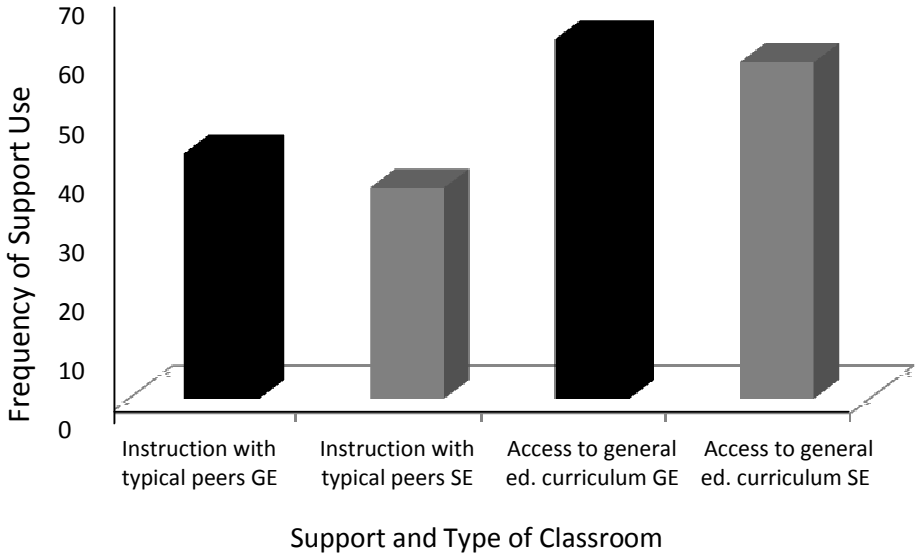

Figure 1. Comparison of the use of two of the autism classroom supports that were perceived as most frequently used in general education classrooms. The comparison indicates that supports which identify the main instructional group as typically-functioning or the setting as general education were perceived as being used only slightly more often by general education teachers than by special education teachers when supporting students with ASDs.

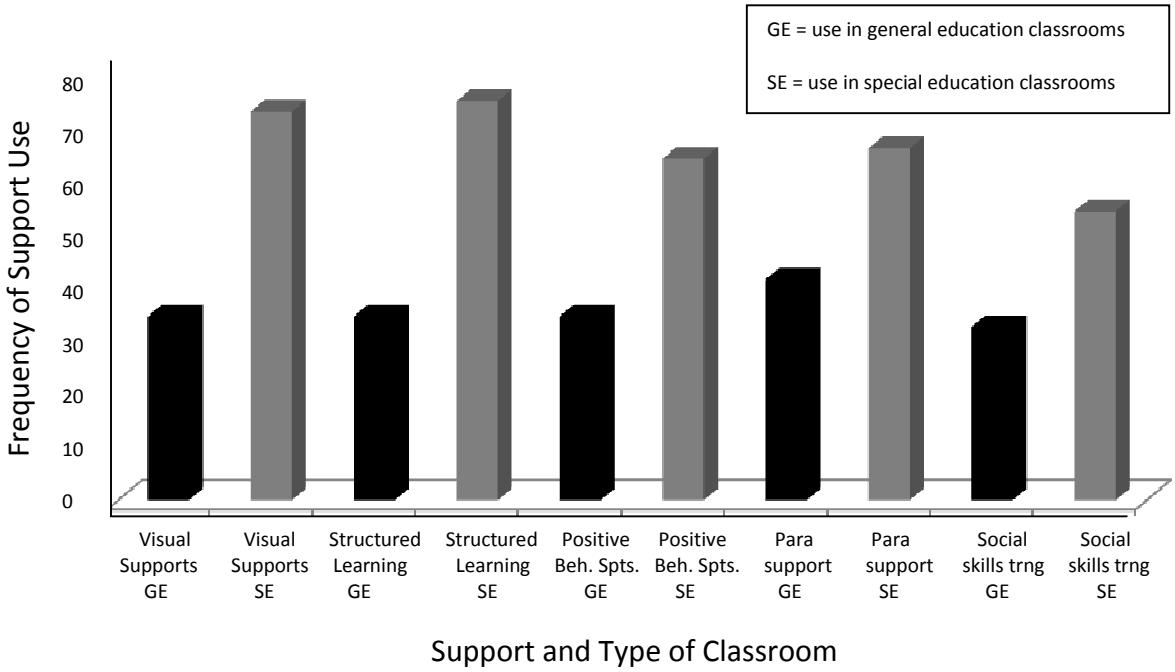

Figure 2. Comparison of the use of five of the autism classroom supports that were perceived as most frequently used in general education classrooms. The comparison indicates that a majority of the supports which are rated as the most frequently used in general education classrooms are perceived as being used even more frequently in special education classrooms to support students with ASDs.

Most frequently used supports: Perceptions of special education. The supports perceived as most frequently used in special education (see Figures 3 and 4) were low student-teacher ratio (63.7%), structured learning environments (61.3%), curriculum designed to address core deficits (61.3%), visual supports (59.7%), targeted direct instruction (54.0%), educational paraprofessionals (54.0%), behavior intervention plans (52.4%), and positive behavior supports (52.4%).

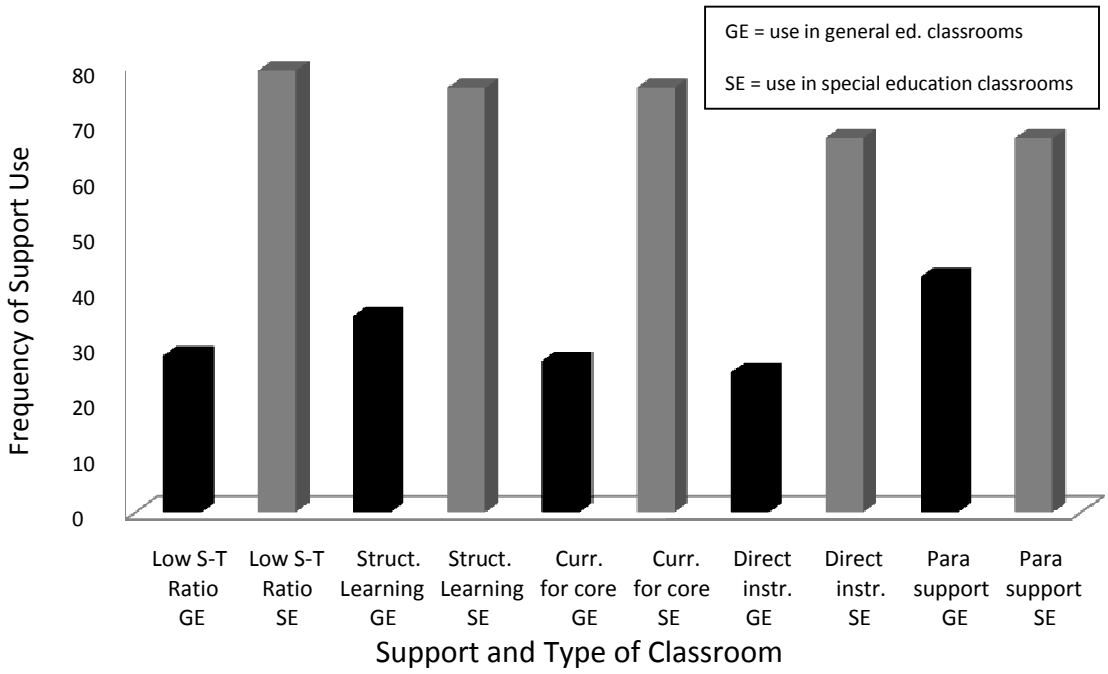

Figure 3. Comparison of the use of five of the autism classroom supports that were perceived as most frequently used in special education classrooms. The comparison indicates that supports which represent more individualized and/or specialized instructional practices were perceived as being used substantially more often by special education teachers than by general education teachers when supporting students with ASDs.

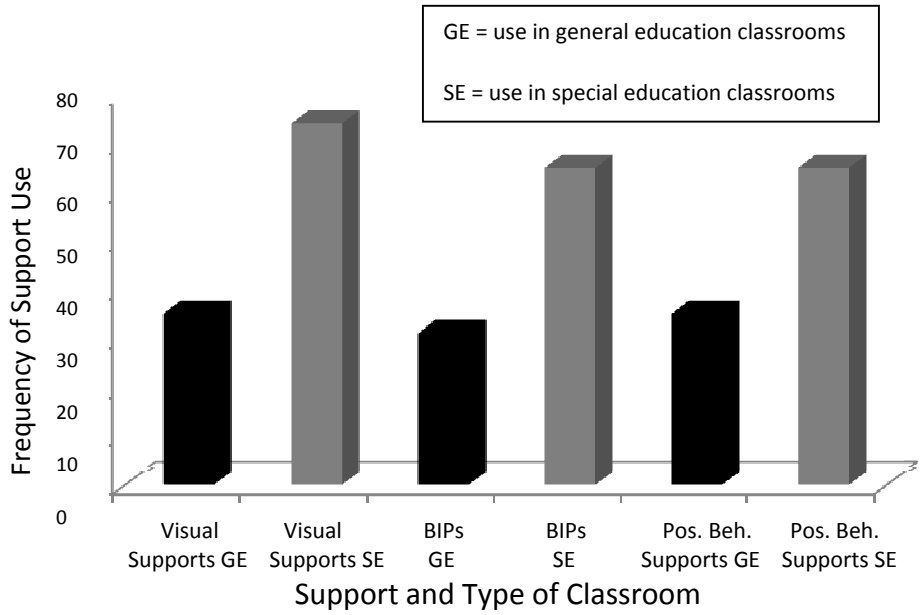

Figure 4. Comparison of the use of three of the autism classroom supports that were perceived as most frequently used in special education classrooms. The comparison indicates that supports which are not necessarily associated with special education classrooms were perceived as being used substantially more often by special education teachers than by general education teachers when supporting students with ASDs.

With the exception of access to general education curriculum, a majority of survey participants reported perceptions that each of the supports was used less frequently in general education classes than in their own classrooms. Conversely, they consistently reported perceptions that these same supports were used more frequently in special education classes than their own classrooms.

Comparison of perceived use of supports in general and special education. Descriptive statistics for perceived use of classroom supports are detailed in Table 10. As can be seen in Table 10, the means for perceived use of autism supports in general education classrooms varied from 1.58 to 3.09 on a four-point scale, with standard

deviations ranging from .99 to 1.31. The perceived use of supports in special education classrooms varied from 1.98 to 3.23, with standard deviations ranging from 1.21 to 1.37.

When compared using *t*-tests, the means for perceived use of individual supports in special education classrooms other than those of the participants were significantly higher than means for perceived use in general education classrooms for 19 of the 21 supports. The perceived use of low student-teacher ratio in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -6.03$, $p = .000$. There is a 95% confidence that the perceived use of low student-teacher ratio in special education exceeds that in general education classrooms by at least .53, but not more than 1.04. The perceived use of ongoing, formative assessment in general education classrooms was significantly different from the perceived use in special education classrooms, $t(122) = -3.02$, $p = .003$. There is a 95% confidence that the perceived use of formative assessments in special education exceeds that in general education classrooms by at least .13, but not more than .63. The perceived use of visual supports in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -3.57$, $p = .001$. There is a 95% confidence that the perceived use of visual supports in special education exceeds that in general education classrooms by at least .23, but not more than .79. The perceived use of augmentative and alternative communication (AAC) in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.70$, $p = .000$. There is a 95% confidence that the perceived use of AAC in special education exceeds that in general education classrooms by at least .29, but not more than

.70. The perceived use of structured learning environments in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.35$, $p = .000$. There is a 95% confidence that the perceived use of structured learning environments in special education exceeds that in general education classrooms by at least .26, but not more than .70. The perceived use of functional behavior assessments (FBAs) in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.11$, $p = .000$. There is a 95% confidence that the perceived use of FBAs in special education exceeds that in general education classrooms by at least .35, but not more than .78. The perceived use of behavior intervention plans in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.82$, $p = .000$. There is a 95% confidence that the perceived use of behavior intervention plans (BIPs) in special education exceeds that in general education classrooms by at least .30, but not more than .73. The perceived use of positive behavior supports (PBSs) in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.00$, $p = .000$. There is a 95% confidence that the perceived use of PBSs in special education exceeds that in general education classrooms by at least .22, but not more than .65. The perceived use of curriculum designed to address core deficits in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -6.46$, $p = .000$. There is a 95% confidence that the perceived use of curriculum designed to address core deficits in special education exceeds that in general education classrooms by at least .55, but not more than 1.03. The

perceived use of targeted direct instruction in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.39$, $p = .000$. There is a 95% confidence that the perceived use of targeted direct instruction in special education exceeds that in general education classrooms by at least .41, but not more than .89. The perceived use of applied behavior analysis services (ABA) in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.06$, $p = .000$. There is a 95% confidence that the perceived use of ABA in special education exceeds that in general education classrooms by at least .32, but not more than .74. The perceived use of educational paraprofessional support in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -3.40$, $p = .001$. There is a 95% confidence that the perceived use of paraprofessional support in special education exceeds that in general education classrooms by at least .16, but not more than .61. The perceived use of discrete trial teaching (DTT) in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.53$, $p = .000$. There is a 95% confidence that the perceived use of DTT in special education exceeds that in general education classrooms by at least .37, but not more than .79. The perceived use of reinforcement systems in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.20$, $p = .000$. There is a 95% confidence that the perceived use of reinforcement systems in special education exceeds that in general education classrooms by at least .34, but not more than .75. The perceived use of social skills training in general education

classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.04$, $p = .000$. There is a 95% confidence that the perceived use of social skills training in special education exceeds that in general education classrooms by at least .36, but not more than .83. The perceived use of video or computer modeling in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.17$, $p = .000$. There is a 95% confidence that the perceived use of video or computer modeling in special education exceeds that in general education classrooms by at least .24, but not more than .67. The perceived use of PECS in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -5.07$, $p = .000$. There is a 95% confidence that the perceived use of PECS in special education exceeds that in general education classrooms by at least .31, but not more than .71. The perceived use of voice output devices in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -4.10$, $p = .000$. There is a 95% confidence that the perceived use of voice output devices in special education exceeds that in general education classrooms by at least .20, but not more than .59. The perceived use of sign language in general education classrooms was significantly different from the perceived use in special education classrooms, $t(123) = -3.94$, $p = .000$. There is a 95% confidence that the perceived use of sign language in special education exceeds that in general education classrooms by at least .20, but not more than .61.

Instruction with typically-developing peers, $t(123) = 1.66$, $p = .10$, and access to the general education curriculum, $t(123) = 1.31$, $p = .19$, for which the mean perceived

use was higher for general education classrooms, were the only compared supports with no statistically significant differences between the means of perceived use in general education and perceived use in special education classrooms.

Table 10

Descriptive Statistics and Statistical Analyses for Perceived Use of Supports by All Respondents $N = 124$

	General Education Classrooms		Special Education Classrooms		*T*-test Comparison		
Type of Instruction or Support	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*
Low student-teacher ratio	2.44	1.24	3.23	1.21	-6.03	123	.000**
Formative assessment	2.57	1.31	2.96	1.37	-3.02	122	.003*
Instruction with typical peers	2.85	1.23	2.64	1.32	1.66	123	.10
Visual supports	2.62	1.28	3.13	1.37	-3.57	123	.001**
Augmentative/alternative communication	1.92	1.19	2.41	1.34	-4.70	123	.000**
Structured learning environments	2.74	1.21	3.23	1.28	-4.35	123	.000**
Functional behavior assessments	2.40	1.22	2.97	1.28	-5.11	123	.000**
Behavior intervention plans	2.59	1.23	3.10	1.27	-4.82	123	.000**
Positive behavior supports	2.70	1.22	3.14	1.24	-4.00	123	.000**
Curriculum designed to address core deficits	2.41	1.24	3.20	1.28	-6.46	123	.000**
Access to general education curriculum	3.09	1.26	2.94	1.33	1.31	123	.19
Targeted, direct instruction	2.44	1.21	3.10	1.30	-5.39	123	.000**
Applied behavior analysis	1.94	1.16	2.48	1.30	-5.06	123	.000**
Educational paraprofessional	2.65	1.31	3.03	1.34	-3.40	123	.001**
Discrete trial teaching	1.71	1.04	2.29	1.31	-5.53	123	.000**
Reinforcement systems	2.35	1.19	2.90	1.29	-5.20	123	.000**
Social skills training	2.37	1.31	2.97	1.26	-5.04	123	.000**
Video or computer modeling	1.66	1.05	2.11	1.28	-4.17	123	.000**
Picture Exchange Communication System (PECS)	1.69	1.11	2.20	1.36	-5.07	123	.000**
Voice output devices	1.60	1.04	1.99	1.26	-4.10	123	.000**
Sign language	1.58	.99	1.98	1.29	-3.94	123	.000**

* significant at $p \leq .05$
**significant at $p \leq .001$

These results of these tests indicate that educational professionals may perceive special education classrooms as more likely to provide the specialized classroom and instructional supports that students with ASDs often require in order to achieve academic success. It also signifies that increased inclusionary opportunities for these students may not provide them with the necessary tools to be successful.

Research question 1 summary. Overall, the results to Research Question 1 indicate that a variety of supports are available for students with autism spectrum disorders in both general and special education settings. The types of supports most frequently used often indicated the instructional focus of the teachers and their usual environment. That is, general education teachers frequently used supports, such as instruction with typically-developing peers and access to the general education curriculum, which maintain a focus on the standards used with a majority of students. Special education teachers, by contrast, most frequently used supports, such as low student-teacher ratio, curriculum designed to address core deficits, and direct instruction, which demonstrated their focus on specialized or individualized instruction.

It was noted that special education teachers showed significantly greater total use of supports. Additionally, special education teachers consistently showed greater use of nearly all individual supports, including a majority of those rated as most frequently used in general education. Furthermore, the respondents expressed overall perceptions that the use of supports was greater in special education settings than in general education

settings.

Research Question 2

Research question two inquired into the ways in which the educational background and ongoing training and development activities of educators affected the quality, quantity, or types of supports available to students with ASDs. In order to answer this question, survey items relating to pre-service educator preparation, certification and licensure relevant to the respondents' current employment positions, and ongoing professional development, including training specifically in autism, were analyzed. Descriptive statistics (frequencies) were reported for each aspect of educational background and ongoing training. Statistical analyses for the effect of these characteristics on the use of autism supports were calculated and reported.

Highest degree earned. The highest degree earned by participants ranged from no degree to a doctoral degree. Four participants, two of whom were educational paraprofessionals, did not respond to this item. However, nearly three-fourths (71.6%) of those who responded had earned a master's degree or higher level of education. The most common degree status was a master's degree (see Table 11).

Table 11

Highest Degree Earned by Respondents

Degree	*n*	%
No response	4	3.2
Bachelor's degree	17	13.7
Bachelor's degree + 15 credits	17	13.7
Master's degree	38	30.6
Master's degree + 15 credits	10	8.1
Master's degree + 30 credits	28	22.6
Specialist degree (Ed.S.)	7	5.6
Doctoral degree	3	2.4

The Pearson *r,* an analysis of correlation, was used to determine the relationship between respondents' highest degrees earned ($N = 124$) and their total use of supports ($N = 124$). The correlation between the two variables was not significant, $r = -.042$, $p = .64$.

Certifications and licensure. Respondents reported holding a variety of certifications and licensures and earning them in various ways. Three participants did not respond to the certification item, and one reported holding no certifications. A majority (66.9%) of participants reported certification in one or more areas of disability or in generic special education. Nearly one-fifth (19.4%) of respondents reported one additional special education certification; 7.3% reported a third disability certification, and 2.4% reported a fourth area of special education certification. Two participants reported holding conditional or temporary special education teaching certificates. It was

encouraging to note that one respondent had earned National Board certification in exceptionality. More than one-third (34.6%) of respondents reported holding elementary certification, with the vast majority having certification through middle school. One participant (0.8%) who reported holding a primary certificate also held certification for the upper elementary grades. There were no respondents with generic (i.e., cross-subject) middle school certification. Slightly more than one-fifth (21.8%) of respondents reported holding certification in at least one middle school subject. Only two participants (1.6%) held certification in a second subject, and one (0.8%) held certification in a third middle school subject. All respondents with high school licenses (28.2%) reported holding only single content area certifications. All but one (25%) of these participants held certification in core content; the other held an elective area certification. Approximately half of the respondents with high school subject endorsements (13.7%) held special education certifications as well. One high school level participant (0.8%) held an administrative certificate in addition to subject area certification. The respondents who indicated they held administrative certifications (9.3%) were divided almost equally between school administration (5.1%) and other supervisory certification (4.2%), including student services. Few participants in this survey (5.9%) claimed certifications in counseling, school psychology, or educational diagnostics, with the majority in counseling. One respondent (0.8%) reported holding both counseling and school psychology certifications. A small percentage (3.4%) of the participants stated that they had certifications in teaching English to Speakers of Other Languages [ESOL] (1.7%) or bilingual education (1.7%). Five respondents (4.2%) indicated that they held

certifications or state licensure in speech pathology or communication disorders. Four participants (3.2%) reported holding specialist certifications. The specialties represented were physical education, library and media, reading, and gifted education.

A large majority (87.1%) of the participants reported obtaining licensure through a traditional university teacher preparation program (see Table 12). A small percentage reported earning licensure through alternative teacher preparation (8.9%) or some other means (0.8%). Four survey participants (3.2%) did not respond to this item.

Table 12

Teacher Licensure Characteristics

Licensure Route	n	%	Highly Qualified Status	n	%
Traditional university teacher preparation	108	87.1	Highly Qualified in current position	106	85.5
Alternative teacher preparation program	11	8.9	Not Highly Qualified in current position	7	5.6
Other	1	0.8	Not applicable	10	8.1

The Pearson *r* was used to determine the relationship between the respondents' route to licensure ($N = 124$) and their total use of supports ($N = 124$). The correlation between the variables was not significant, $r = -.173$, $p = .054$.

NCLB Highly qualified status. Ten participants (8.1%) reported that a No Child Left Behind Act (NCLB) Highly Qualified status was not applicable for their positions (see Table 12). Of the respondents for whom Highly Qualified status was applicable (91.1%), a large majority (85.5%) were Highly Qualified in their current positions. One

survey participant (0.8%) did not respond to this item.

The Pearson *r* was used to determine the relationship between the respondents' NCLB Highly Qualified status (N = 124) and their total use of supports (N = 124). The correlation between these variables was not significant, r = - .05, p = .62.

Knowledge of autism. A large minority of the respondents (47.6%) reported having some knowledge of ASDs (see Table 13). More than one-fourth of the respondents (28.2%) reported having extensive knowledge of the disorders, while nearly as many claimed limited knowledge (22.6%). Only one respondent (0.8%) reported having no knowledge of ASDs, and one participant (0.8%) did not respond to this item.

Table 13

Respondents' Knowledge of and Experience with Autism Spectrum Disorders

Level of Knowledge	*n*	%	Level of Experience	*n*	%
No response	1	0.8	No response	1	0.8
No knowledge	1	0.8	No experience	6	4.8
Limited knowledge	28	22.6	Limited experience	32	25.8
Some knowledge	59	47.6	Somewhat experienced	53	42.7
Extensive knowledge	35	28.2	Highly experienced	32	25.8

The Pearson *r* was used to determine the relationship between the respondents' knowledge of autism spectrum disorders (N = 124) and their total use of supports (N = 124). The correlation between these variables was significant, r = .39, p = .000.

Knowledge of autism and total use of supports. It was hypothesized that

knowledge of autism would significantly impact the total use of autism classroom supports. After removing the data for the non-responding participant and the participant who reported having no knowledge of autism, descriptive statistics for the remaining knowledge level groups (i.e., limited knowledge, some knowledge, and extensive knowledge) were computed. The mean total use for respondents with limited knowledge (n = 28) was 44.11, with a standard deviation of 24.45. The mean total use for respondents with some knowledge (n = 59) was 57.47, with a standard deviation of 14.92. The mean total use for respondents with extensive knowledge (n = 35) was 61.46, with a standard deviation of 11.20. The mean total use for all of these respondents was 55.55, with a standard deviation of 17.82.

The data for the total supports subscale was compared across knowledge groups using a one-way ANOVA. There were significant differences in the subscale for total use of supports among groups who self-reported limited knowledge, some knowledge, and extensive knowledge, $F(2, 119) = 9.12$, $p = .000$. Post-hoc Tukey testing revealed that a significant difference on the total use subscale existed between respondents with limited knowledge of autism and those with some knowledge of autism, $p = .002$. There is a 95% confidence that the total use of supports by respondents with some knowledge of autism exceeded that of respondents with limited knowledge by at least 4.25, but not more than 22.48. A significant difference on the total use subscale also existed between respondents with limited knowledge and those with extensive knowledge, $p = .000$. There is a 95% confidence that the total use of supports by respondents with extensive knowledge of autism exceeded that of respondents with limited knowledge by at least 7.28, but not

more than 27.42. Post hoc testing revealed no significant difference in the total use subscale between participants with some knowledge and those with extensive knowledge, $p = .51$.

The significance of these results was verified by a non-parametric test, the Kruskal-Wallis. The mean rank for participants who reported having limited knowledge of autism was 43.21. The mean rank for participants who reported having some knowledge of autism was 64.07. The mean rank for participants who reported having extensive knowledge of autism was 71.80. The results of the Kruskal-Wallis showed statistically significant differences between the knowledge level groups, $X^2(2) = 10.78$, $p = .005$.

Knowledge of autism and use of individual supports. It was hypothesized that knowledge of autism would also significantly impact the types of classroom supports used by the respondents. Descriptive statistics for the use of individual supports are summarized in Table 14. As is evident from Table 14, the use of individual supports varied across the knowledge groups. Respondents claiming limited knowledge of autism had means for support use which ranged from 1.11 to 2.71, with standard deviations from .92 to 1.60. Respondents who self-reported some knowledge of autism had means for support use which ranged from 1.59 to 3.22, with standard deviations from .93 to 1.24. Respondents claiming extensive knowledge had means for support use which ranged from 1.71 to 3.54, with standard deviations from .74 to 1.23. These means were subjected to one-way analysis of variance (ANOVA) tests to determine if differences among them were statistically significant.

Table 14

Descriptive Statistics and Statistical Analyses for Use of Individual Supports by Knowledge of Autism

	Limited Knowledge		Some Knowledge		Extensive Knowledge		ANOVA Results		
Type of Instruction/Support	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*df*	*p*
Low student-teacher ratio	2.46	1.50	3.19	1.04	3.14	1.14	3.82	2, 119	.03*
Formative assessment	2.43	1.60	2.81	.99	2.71	1.15	.99	2, 119	.38
Instruction w/ typical peers	2.32	1.59	3.12	.98	3.11	.99	5.15	2, 119	.01*
Visual supports	2.64	1.55	3.22	1.10	3.34	1.08	2.97	2, 119	.06
Augmentative/alternative communication	1.86	1.33	2.36	1.03	2.69	1.23	3.98	2, 119	.02*
Structured learning environments	2.61	1.50	3.31	1.07	3.54	.89	5.64	2, 119	.01*
Functional behavior assessments	2.21	1.42	3.00	.98	3.26	.82	8.12	2, 119	.000**
Behavior intervention plans	2.46	1.55	3.20	.96	3.37	.84	6.04	2, 119	.003*
Positive behavior supports	2.50	1.50	3.17	1.00	3.49	.70	6.81	2, 119	.002*
Curriculum designed to address core deficits	2.61	1.60	3.12	.98	3.20	.90	2.53	2, 119	.08
Access to general education curriculum	2.71	1.56	3.22	.97	3.49	.74	4.05	2, 119	.02*
Targeted, direct instruction	2.21	1.40	2.95	1.07	3.31	.87	7.91	2, 119	.001**
Applied behavior analysis	1.79	1.29	2.41	1.16	2.46	.85	3.58	2, 119	.03*
Educational paraprofessional	2.39	1.60	3.00	1.15	3.14	1.17	3.07	2, 119	.05*
Discrete trial teaching	1.39	1.13	2.08	1.13	2.46	1.01	7.41	2, 119	.001**
Reinforcement systems	1.96	1.43	2.88	1.13	3.26	.95	10.13	2, 119	.000**
Social skills training	2.29	1.46	2.83	.95	3.11	1.13	4.22	2, 119	.02*
Video or computer modeling	1.54	1.17	2.00	1.17	2.23	1.11	2.86	2, 119	.06
Picture Exchange Communi-cation System (PECS)	1.25	1.08	2.20	1.24	2.54	1.22	9.61	2, 119	.000**
Voice output devices	1.11	.92	1.81	1.11	1.71	.96	4.71	2, 119	.01*
Sign language	1.36	1.06	1.59	.93	1.89	1.05	2.24	2, 119	.11

* significant at $p \leq .05$
** significant at $p \leq .001$

The results of the ANOVAs showed significant differences in mean use for 16 of the 21 individual supports. There were statistically significant differences in the use of low student-teacher ratio, $F(2, 119) = 3.82$, $p = .03$ across levels of knowledge. Post hoc Tukey testing revealed that differences in the use of low student-teacher ratio were significant between respondents who claimed limited knowledge of autism and those who reported some knowledge of autism, $p = .03$, but not between respondents who claimed limited knowledge of autism and those who reported extensive knowledge of autism, $p = .07$. There is a 95% confidence that the use of low student-teacher ratio by respondents with some knowledge of autism exceeded that of respondents with limited knowledge by at least .07, but not more than 1.37.

There were statistically significant differences in the use of instruction with typically-developing peers, $F(2, 119) = 5.15$, $p = .01$. Post hoc testing revealed that the difference in the use of instruction with typically-developing peers was significant between respondents who claimed limited knowledge and those with some knowledge, $p = .01$. There is a 95% confidence that the use of instruction with typically-developing peers by participants with some knowledge exceeded that of participants with limited knowledge by at least .17, but not more than 1.42. The difference in instruction with typically-developing peers was also significant between participants with limited knowledge and those with extensive knowledge, $p = .02$. There is a 95% confidence that the use of instruction with typically-developing peers by participants with extensive

knowledge exceeded that of participants with limited knowledge by at least .10, but not more than 1.49.

There were statistically significant differences among the knowledge groups in the use of augmentative and alternative communication, $F(2, 119) = 3.98$, $p = .02$. Post hoc testing showed that the differences in the use of augmentative and alternative communication (AAC) were significant only between those claiming limited knowledge and those with extensive knowledge, $p = .02$, but not between respondents claiming limited knowledge and those with some knowledge of autism, $p = .15$. There is a 95% confidence that the use of AAC by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .13, but not more than 1.53.

The results of the ANOVA showed statistically significant differences among the groups in the use of structured learning environments, $F(2, 119) = 5.64$, $p = .01$. Post hoc testing showed that the difference in the use of structured learning environments was significant between respondents claiming limited knowledge and those with some knowledge, $p = .02$. There is a 95% confidence that the use of structured learning environments by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .08, but not more than 1.32. The difference was also significant between respondents claiming limited knowledge and those with extensive knowledge, $p = .004$. There is a 95% confidence that the use of structured learning environments by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .25, but not more than 1.62.

There were statistically significant differences in the use of functional behavior

assessments, $F(2, 119) = 8.12$, $p = .000$. Post hoc testing indicated that the difference in the use of functional behavior assessments (FBAs) between respondents who claimed limited knowledge and those with some knowledge was significant, $p = .004$. There is a 95% confidence that the use of FBAs by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .21, but not more than 1.36. The difference in the use of FBAs between respondents who claimed limited knowledge and those with extensive knowledge was also significant, $p = .000$. There is a 95% confidence that the use of FBAs by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .41, but not more than 1.68.

There were statistically significant differences among groups of varying knowledge levels in the use of behavior intervention plans, $F(2, 119) = 6.04$, $p = .003$. Post hoc testing revealed that the difference between respondents claiming limited knowledge and those with some knowledge in the use of behavior intervention plans (BIPs) was significant, $p = .01$. There is a 95% confidence that the use of BIPs by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .14, but not more than 1.34. The difference in the use of BIPs was also significant between respondents claiming limited knowledge and those claiming extensive knowledge, $p = .004$. There is a 95% confidence that the use of BIPs by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .25, but not more than 1.57.

There were statistically significant differences among knowledge groups in the use of positive behavior supports, $F(2, 119) = 6.81$, $p = .002$. The difference in the use of

positive behavior supports (PBSs) between respondents who claimed limited knowledge and those who claimed some knowledge was significant, $p = .02$. There is a 95% confidence that the use of PBSs by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .09, but not more than 1.25. The difference in the use of positive behavior supports (PBSs) was also significant between respondents who reported having limited knowledge and those who reported having extensive knowledge, $p = .001$. There is a 95% confidence that the use of PBSs by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .34, but not more than 1.63.

The ANOVA revealed differences among knowledge groups in the use of access to the general education curriculum, $F(2, 119) = 4.05$, $p = .02$. Post hoc testing indicated that the differences in the use of access to the general education curriculum were significant between respondents who claimed limited knowledge of autism and those who reported extensive knowledge of autism, $p = .02$, but not between respondents who claimed limited knowledge of autism and those who reported some knowledge, $p = .11$. There is a 95% confidence that the use of access to the general education curriculum by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .12, but not more than 1.42.

There were statistically significant differences among groups in the use of systematic, targeted direct instruction, $F(2, 119) = 7.91$, $p = .001$. Post hoc testing revealed that the difference in the use of direct instruction was significant between respondents who claimed limited knowledge and those with some knowledge, $p = .01$.

There is a 95% confidence that the use of direct instruction by participants with some knowledge exceeded that of participants with limited knowledge by at least .13, but not more than 1.34. The difference in the use of direct instruction between respondents who claimed limited knowledge and those with extensive knowledge was also significant, p = .001. There is a 95% confidence that the use of direct instruction by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .44, but not more than 1.76.

The ANOVA revealed significant differences in the use of applied behavior analysis, $F(2, 119) = 3.58$, p = .03. Post hoc testing indicated that the difference in the use of applied behavior analysis (ABA) between respondents who claimed limited knowledge and those with some knowledge was significant, p = .04. There is a 95% confidence that the use of ABA by participants with some knowledge of autism exceeded that of participants with limited knowledge by at least .01, but not more than 1.23. The difference in the use of ABA between respondents who claimed limited knowledge and those with extensive knowledge was also significant, p = .05. There is a 95% confidence that the use of ABA by participants with extensive knowledge of autism exceeded that of participants with limited knowledge by at least .00, but not more than 1.34.

There were statistically significant differences among knowledge groups in the use of educational paraprofessional support, $F(2, 119) = 3.07$, p = .05. However, post hoc analysis revealed no significant differences in the use of educational paraprofessional support between any of the groups.

There were significant differences among groups in the use of discrete trial

teaching, $F(2, 119) = 7.41$, $p = .001$. Post hoc testing indicated that the difference in the use of discrete trial teaching (DTT) was significant between respondents who claimed limited knowledge of autism and those who claimed some knowledge, $p = .02$. There is a 95% confidence that the use of DTT by respondents who claimed some knowledge of autism exceeded that of respondents who claimed limited knowledge by at least .09, but not more than 1.29. The difference in the use of DTT was also significant between respondents who claimed limited knowledge and those who claimed extensive knowledge, $p = .001$. There is a 95% confidence that the use of DTT by respondents who claimed extensive knowledge of autism exceeded that of respondents who claimed limited knowledge by at least .40, but not more than 1.73.

The ANOVA showed statistically significant differences among knowledge groups in the use of reinforcement systems, $F(2, 119) = 10.13$, $p = .000$. Post hoc testing revealed that the difference in the use of reinforcement systems was significant between respondents who claimed limited knowledge and those with some knowledge, $p = .002$. There is a 95% confidence that the use of reinforcement systems by participants who reported having some knowledge of autism exceeded that of participants who reported limited knowledge by at least .29, but not more than 1.55. The difference in the use of reinforcement systems between respondents who claimed limited knowledge and those with extensive knowledge was also significant, $p = .000$. There is a 95% confidence that the use of reinforcement systems by participants who reported having extensive knowledge of autism exceeded that of participants who reported limited knowledge by at least .60, but not more than 1.99.

There were statistically significant differences among the groups in the use of social skills training, $F(2, 119) = 4.22$, $p = .02$. Post hoc testing revealed that the differences in the use of social skills training were significant between respondents who claimed limited knowledge of autism and those who reported extensive knowledge of autism, $p = .01$, but not between respondents who claimed limited knowledge and those who reported some knowledge, $p = .10$. There is a 95% confidence that the use of social skills training by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .14, but not more than 1.51.

The ANOVA revealed statistically significant difference among knowledge groups in the use of PECS, $F(2, 119) = 9.61$, $p = .000$. Post hoc testing indicated that the difference in the use of PECS between respondents who claimed limited knowledge and those with some knowledge was significant, $p = .002$. There is a 95% confidence that the use of PECS by participants with some knowledge exceeded that of participants with limited knowledge by at least .30, but not more than 1.61. The difference in the use of PECS between respondents who claimed limited knowledge and those with extensive knowledge was also significant, $p = .000$. There is a 95% confidence that the use of PECS by participants with extensive knowledge exceeded that of participants with limited knowledge by at least .57, but not more than 2.02.

There were statistically significant differences among the groups in the use of voice output devices, $F(2, 119) = 4.71$, $p = .01$. Post hoc testing revealed that the differences in the use of voice output devices were significant between respondents who claimed limited knowledge of autism and those who reported some knowledge of autism,

$p = .01$, but not between respondents who claimed limited knowledge of autism and those who reported extensive knowledge of autism, $p = .054$. There is a 95% confidence that the use of voice output devices by respondents with some knowledge of autism exceeded that of respondents with limited knowledge by at least .15, but not more than 1.26.

These results indicate that, particularly at the beginning of the learning curve for autism teachers, increasing knowledge of autism significantly increases the use of some supports. This increased availability of supports, in turn, can allow greater student access to the instructional milieu.

Training in autism teaching. A large percentage of respondents reported received their training for working with students with ASDs from inservice or professional development courses (43.5%). A substantial minority received training through standard university teacher preparation programs (31.5%), with few respondents receiving training from either alternative teacher preparation programs (3.2%) or some other (3.2%) means. Disturbingly, 17.7% of the participants reported having received no formal training in ASDs. One participant (0.8%) did not respond to the item on training (see Figure 5).

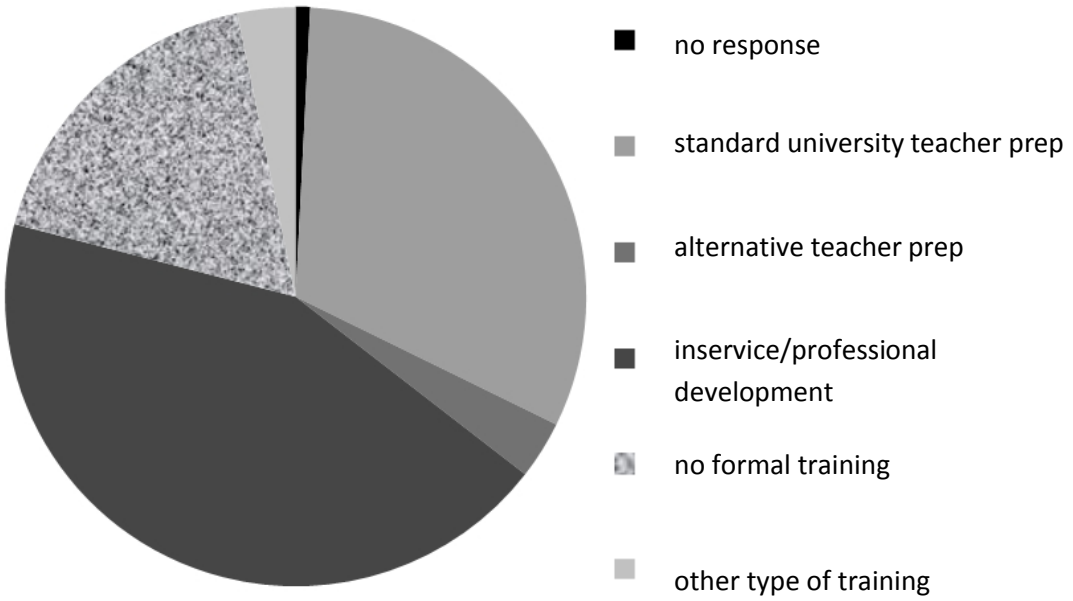

Figure 5. Respondents' means of training in autism spectrum disorders. Comparisons among types of training indicate that most educators receive training in autism through either inservice or professional development training or standard university teacher preparation programs.

The Pearson *r* was used to determine the relationship between the respondents' method of training in working with students with autism spectrum disorders ($N = 124$) and their knowledge of autism ($N = 124$). The correlation between these variables was not significant, $r = -.08$, $p = .39$. The Pearson *r* was also used to determine the relationship between the respondents' training in working with students with autism spectrum disorders ($N = 124$) and their total use of supports ($N = 124$). The correlation between these variables was significant, $r = .25$, $p = .006$.

Training in autism and use of individual supports. Descriptive statistics were calculated for the use of each of the 21 supports by the type of training the respondents received: no formal training, standard university teacher preparation, and inservice or

professional development training (see Table 15). As shown in Table 15, the mean reported use of individual supports varied for groups with diverse training backgrounds. Respondents who reported receiving no formal training in autism had a range of mean use ratings from 1.05 to 2.32 on a four-point scale, with standard deviations from 1.02 to 1.85. Respondents who reported receiving standard university teacher preparation in autism had a range of mean use ratings from 1.72 to 3.51, with standard deviations from .60 to 1.20. Respondents who reported receiving inservice or professional development training in autism had a range of mean use ratings from 1.50 to 3.50, with standard deviations from .50 to 1.29.

Table 15

Descriptive Statistics for Use of Individual Supports by Training in Autism

Type of Instruction or Support	No Training		Standard		Inservice	
	M	*SD*	*M*	*SD*	*M*	*SD*
Low student-teacher ratio	2.23	1.60	3.10	.97	3.50	.58
Formative assessment	2.05	1.70	2.90	.94	3.25	.96
Instruction w/ typical peers	2.36	1.79	3.10	.88	3.50	.58
Visual supports	2.27	1.70	3.51	.60	3.25	.96
Augmentative/alternative communication	1.59	1.47	2.64	.93	2.25	1.26
Structured learning environments	2.45	1.85	3.33	.77	3.25	.50
Functional behavior assessments	2.05	1.59	3.13	.77	2.50	1.29
Behavior intervention plans	2.32	1.78	3.36	.71	2.50	1.29
Positive behavior supports	2.27	1.75	3.26	.75	2.75	1.26
Curriculum designed to address core deficits	2.23	1.72	3.15	.93	2.50	.58
Access to general education curriculum	2.32	1.70	3.33	.81	3.75	.50
Targeted, direct instruction	2.14	1.67	2.82	1.05	3.28	.81
Applied behavior analysis	1.68	1.56	2.69	.95	2.50	1.00
Educational paraprofessional	2.23	1.66	3.00	1.12	2.50	1.29
Discrete trial teaching	1.27	1.35	2.21	1.03	1.75	.96
Reinforcement systems	1.59	1.47	3.18	.94	1.75	.96
Social skills training	1.91	1.51	3.03	1.04	2.50	.58
Video/computer modeling	1.27	1.24	2.33	1.13	1.75	.96
Picture Exchange Communi-cation System (PECS)	1.23	1.19	2.31	1.20	1.75	.96
Voice output devices	1.05	1.09	1.72	1.05	1.50	1.00
Sign language	1.09	1.02	1.77	1.01	1.50	1.00

Training in autism and total use of supports. It was hypothesized that the method by which respondents received training in autism would significantly impact the total use of autism classroom supports. Descriptive statistics were calculated for total use by type of autism training. The mean on the total use subscale for the group who had received standard university teacher preparation for teaching autism (n = 39) was 59.87, with a standard deviation of 10.41. The mean on the total use subscale for the group who had received alternative teacher preparation for teaching autism (n = 4) was 53.50, with a standard deviation of 12.61. The mean on the total use subscale for the group who had received inservice or professional development training for teaching autism (n = 54) was 60.44, with a standard deviation of 10.04. The mean on the total use subscale for the group who had received some other type of training for teaching autism (n = 4) was 37.75, with a standard deviation of 25.43. The mean on the total use subscale for the group who had received no formal training for teaching autism (n = 22) was 39.59, with a standard deviation of 28.98.

The means for the total use subscale among the training groups with larger numbers of respondents (i.e., inservice/professional development, standard university teacher preparation, and no formal training) were compared using a one-way ANOVA. The differences among the group means of respondents who reported standard university teacher preparation in autism, those who reported inservice or professional development training, and those who reported no formal training were statistically significant, $F(2, 112) = 15.64$, $p = .000$. A post hoc Tukey test revealed that the significant differences existed between respondents with no formal training and respondents with standard

university teacher preparation, $p = .000$. There is a 95% confidence that the total use of supports by respondents with standard university teacher preparation exceeded that of respondents with no formal training by at least 10.43, but not more than 30.13. Significant differences also existed between respondents with no formal training and those with inservice or professional development training, $p = .000$. There is a 95% confidence that the total use of supports by respondents with inservice or professional development training exceeded that of respondents with no formal training by at least 11.51, but not more than 30.20. There were no statistically significant differences between respondents who reported standard university teacher prep and those who reported inservice or professional development training on mean total use of supports, $p = .98$.

The significance of the results was confirmed using the Kruskal-Wallis test, a non-parametric comparison measure. The mean rank for respondents with no formal training was 39.91. The mean rank for respondents with standard university teacher preparation was 61.49. The mean rank for respondents with inservice or professional development training was 62.85. The differences among the training groups were significant, $\chi^2(2) = 8.06$, $p = .02$.

The results of these comparisons indicated that training in autism is essential to expanding both the number and types of autism classroom supports utilized by educators. Notably, inservice training and professional development in autism appeared to be as effective as standard university teacher preparation courses in preparing teachers to effectively use autism supports.

Experience with students with ASDs. A large proportion of respondents stated that they were somewhat experienced (42.7%) in working with children with ASDs. Approximately one-fourth of the participating educators stated that they were highly experienced (25.8%), with an equal number claiming limited experience (25.8%). A small percentage (4.8%) indicated having no experience at all working with children with ASDs, and one participant did not respond to this item. The dispersion of respondents' self-reported experience with autism spectrum disorders mirrored their level of knowledge of the disorders (see Table 13).

The Pearson *r* was used to determine the relationship between experience in working with students with ASDs ($N = 124$) and knowledge of autism ($N = 124$). The correlation between the variables was significant, $r = .80$, $p = .000$. The Pearson *r* was also used to determine the relationship between experience in working with students with ASDs ($N = 124$) and total use of supports ($N = 124$). The correlation between the variables was significant, $r = .48$, $p = .000$.

Experience with students with ASDs and use of individual supports. Descriptive statistics for the use of the 21 individual supports were computed for use of each support by respondents who reported limited experience, those who reported being somewhat experienced, and those who reported being highly experienced (see Table 16).

Table 16

Descriptive Statistics for Use of Individual Supports by Experience with Autism

	Limited Experience		Somewhat Experienced		Highly Experienced	
Type of Instruction or Support	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low student-teacher ratio	2.23	1.60	3.10	.97	3.50	.58
Formative assessment	2.05	1.70	2.90	.94	3.25	.96
Instruction with typical peers	2.36	1.79	3.10	.88	3.50	.58
Visual supports	2.27	1.70	3.51	.60	3.25	.96
Augmentative/alternative communication	1.59	1.47	2.64	.93	2.25	1.26
Structured learning environments	2.45	1.85	3.33	.77	3.25	.50
Functional behavior assessments	2.05	1.59	3.13	.77	2.50	1.29
Behavior intervention plans	2.32	1.78	3.36	.71	2.50	1.29
Positive behavior supports	2.27	1.75	3.26	.75	2.75	1.26
Curriculum designed to address core deficits	2.23	1.72	3.15	.93	2.50	.58
Access to general education curriculum	2.32	1.70	3.33	.81	3.75	.50
Targeted, direct instruction	2.14	1.67	2.82	1.05	3.28	.81
Applied behavior analysis	1.68	1.56	2.69	.95	2.50	1.00
Educational paraprofessional	2.23	1.66	3.00	1.12	2.50	1.29
Discrete trial teaching	1.27	1.35	2.21	1.03	1.75	.96
Reinforcement systems	1.59	1.47	3.18	.94	1.75	.96
Social skills training	1.91	1.51	3.03	1.04	2.50	.58
Video or computer modeling	1.27	1.24	2.33	1.13	1.75	.96
Picture Exchange Communication System (PECS)	1.23	1.19	2.31	1.20	1.75	.96
Voice output devices	1.05	1.09	1.72	1.05	1.50	1.00
Sign language	1.09	1.02	1.77	1.01	1.50	1.00

As shown in Table 16, the means for the use of individual supports by participants with limited experience varied from 1.05 to 2.45, with standard deviations ranging from 1.02 to 1.85. The means for support use by participants who reported being somewhat experienced varied from 1.72 to 3.51, with standard deviations ranging from .60 to 1.20. The means for support use by participants who reported being highly experienced varied from 1.50 to 3.75, with standard deviations ranging from .50 to 1.29.

Experience with students with ASDs and total use of supports. It was hypothesized that experience in working with students with autism spectrum disorders would significantly impact the total use of autism classroom supports. After data for the non-responding participant was removed, descriptive statistics were computed for groups with varying levels of experience with autism. Respondents who reported no experience with autism (n = 6) had a group mean on the total use subscale of 28.83, with a standard deviation of 32.21. Respondents who reported limited experience with autism (n = 32) had a group mean for total use of 48.75, with a standard deviation of 22.94. Respondents who reported being somewhat experienced with autism (n = 53) had a group mean on the total use subscale of 57.83, with a standard deviation of 10.29. Respondents who reported being somewhat experienced with autism (n = 32) had a group mean on the total use subscale of 63.66, with a standard deviation of 10.30.

The data on the total use subscale by respondents claiming limited experience, those who claimed to be somewhat experienced, and those who claimed to be highly experienced were compared using a one-way ANOVA. The differences in total use among the experience groups were statistically significant, $F(2, 114) = 8.25$, $p = .000$. A

post hoc Tukey test indicated the groups for whom statistically significant differences in means existed. There were significant differences between the means for total use of respondents who reported limited experience and those that reported being somewhat experienced, $p = .02$ There is a 95% confidence that the total use of supports by participants who reported being somewhat experienced in autism teaching exceeded that of participants who reported having limited experience with autism teaching by at least 1.19, but not more than 16.97. There were also significant differences between the means for total use of respondents who reported limited experience and those who reported being highly experienced, $p = .000$. There is a 95% confidence that the total use of supports by participants who reported being highly experienced in autism teaching exceeded that of participants who reported having limited experience with autism teaching by at least 6.10, but not more than 23.72. There were no significant differences between the means of respondents claiming to be somewhat experienced and those claiming to be highly experienced, $p = .19$.

Experience in working with students with ASDs significantly affected both the quantity and the quality of autism classroom and instructional supports used. Therefore, it is in the students' best interests to have teachers with greater experience with autism. This, in turn, makes retention of autism teachers a substantive concern for school districts and parents of students with ASDs.

Number of students with ASDs. Nine participants (7.3%) either did not respond to the item inquiring into their number of students with ASDs or reported having no students with ASDs in the past three years. Sixty-three participants (50.8%) reported working with 1 – 5 students with

ASDs. Thirty-one (25%) of the participants indicated that they had worked with 6 – 10 students with autism. Eleven of the participants (8.9%) reported working with 11 – 15 students with ASDs. Five respondents (4.0%) indicated that they had worked with 16 – 20 students with ASDs, and five (4.0%) reported working with more than 20 students with autism in the past three years. The participants reported working with an average of 6 students in the past three years (M = 6.36, SD = 6.1; minimum = 0, maximum = 28). The median was 4 students, and the mode was 3 students.

The Pearson *r,* an analysis of correlation, was used to determine the relationship between the number of students with whom the respondents had worked in the past three years (N = 124) and their total use of supports (N = 124). The correlation between the two variables was significant, r = .32, p = .000.

Qualitative Analyses

Open-ended survey items. Across 21 survey participants, an expressed need for quality, ongoing training and professional development specifically dealing with autism teaching comprised a large percentage of the total comments. Some of these comments related to training staff other than the respondent. For example, one special education teacher at the elementary level stated, “Not enough training has been done for general education teachers.” A paraprofessional added, “The general ed. population of teachers need to be aware of autism and have some training or info. When they have students in their classroom, it would make for a better learning environment.” However, many respondents expressed need for their own initial or ongoing training in autism. One elementary special education teacher admitted, “I don't know much about autism and even less on how autistic children learn. I definitely think there should be more

information about autism." Another remarked, "It would be helpful to get training specifically to meet the needs of these kids." An elementary general education teacher disclosed, "Most of us are not formally trained and have had to find our own way." A preschool special educator indicated a, "Need for training for teachers and parents." Another preschool teacher proposed that, "Teachers need more time to learn new techniques and reflect on the effectiveness as they are applying them." Other respondents indicated that all educators require more training in autism spectrum disorders. A special educator posited, "There is not enough knowledge among educators for them to feel comfortable working with students on the spectrum."

Follow- up interview items. Participants in the follow-up interviews were encouraged to provide additional comments to clarify their responses to the 7 scaled response items. All of the interview respondents agreed that specific training in working with autism spectrum disorders was important, with 26.7% agreeing somewhat and 73.3% strongly agreeing. A vast majority (93.3%) expressed some level of agreement that all staff members working with those students should be trained. A high school special education teacher's comment served as an exemplar of this pervasive belief. "Would that it were possible to get everyone on the same page."

Respondents gave varying responses to the open-ended interview question, which inquired into the helpfulness of training in preparing educators for the demands of their current positions. Some participants found their training lacking, as expressed by one special education teacher: "I didn't have that much of it; it wasn't all that helpful. It was just basic special ed. – not anything really relating to autism." However, a majority of

participants expressed some level of satisfaction with the training they had received. One elementary special education teacher stated, “Nothing prepares you totally for these students but it [training] was helpful.” Another remarked, “My education was a sufficient, but the randomness of ASDs means that no university can really prepare anybody. Autism is so intricate. The kids are like a box of chocolates. You never know what you’re gonna get.” A doctoral-level educator responded, “If I was a novice and had no background, I would not have called it adequate. Since I already knew something about it [autism], it was informative.” Other respondents expressed more positive associations with their training. For example, a teacher new to special education indicated that her training was, “Very helpful; I’m a first year teacher who had no training with autism. I’ve been to a couple of trainings so I can learn about my students.” Some respondents specified the training they sought. A school psychologist, for instance, stated, “I would like to see specific college courses that cover autism. I don't believe a workshop is sufficient.”

An administrator detailed the aspects of his training that he found helpful: “The training I received after graduation from my master’s was the most beneficial. I was able to get trained at the same time I worked with the students. The hands-on training…was the most beneficial for me. Also, applying what I learned immediately was beneficial as well.” A special education teacher responded similarly, indicating that practical training was most helpful: “I had a week-long, 40-hour training about 8 years ago that was very good. It was the first one that gave ‘nuts and bolts.’ It talked about what do you really do… emphasized procedures.”

Research question 2 summary. The results for Research Question 2 show that educational background and ongoing training have varying effects on the quantity and quality of supports available to students with ASDs. Notably, the focus of background knowledge and training makes a critical difference in its effects on teaching practice. For example, general educational background, including the highest degree earned, certification and licensure, and NCLB Highly Qualified status had no significant effect on the use of supports. Conversely, background knowledge, training, and experience specifically related to autism teaching had significant positive effects on the number and types of supports used. Moreover, although the method of training (i.e, university courses or inservice/professional development) did not have an effect on the use of supports, the participants expressed opinions that the type of training made a difference in the impact of that training on their teaching practice. These respondents expounded that practical, technique-based training was necessary to truly inform daily teaching. Furthermore, qualitative data revealed a belief that training in autism for all professionals working with students with ASDs would improve instructional outcomes for these students.

Research Question 3

Research question three inquired into the ways in which the personal and professional opinions and attitudes of educators affected the quality, quantity, or types of supports available to students with ASDs. In order to answer this question, survey items relating to respondents' personal and professional demographics were analyzed using statistical software (SPSS 17). Descriptive statistics were reported for each characteristic. Statistical analyses for the impact of these characteristics on the use of autism supports

were calculated and reported.

Respondent demographics: Personal characteristics. Respondents were predominantly (84.7%) female**.** A large majority of respondents (83.1%) identified themselves as Caucasian/non-Hispanic. One participant (0.8%) declined to answer the question on race. The remaining respondents identified themselves as 9.7% African-American, 4% Hispanic, 0.8% Asian, and 1.6% bi-racial.

The participants had a mean age of 45.9 years with a standard deviation of 10.6 years (see Figure 6). The minimum age was 23 years, and the maximum age was 65 (range 42; mode 43). Two participants (1.6%) did not respond to the item on age.

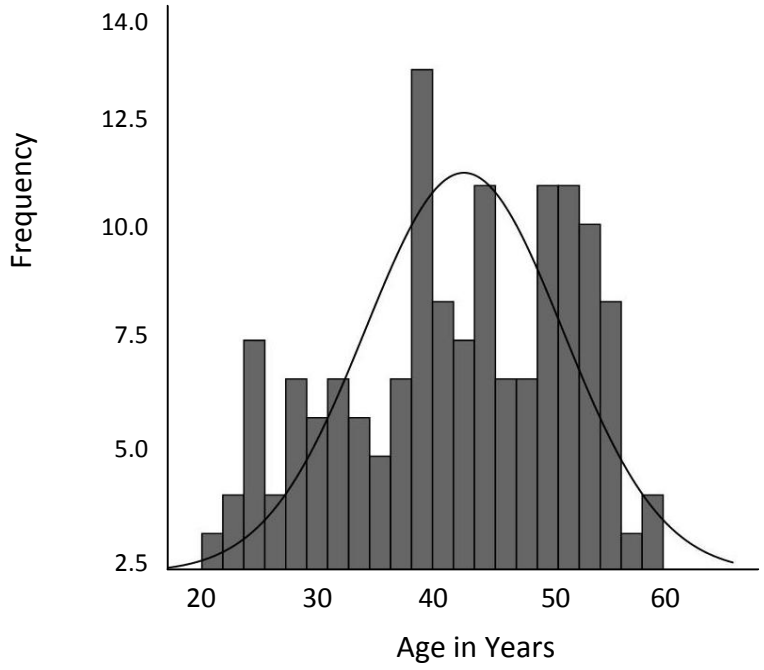

Figure 6. Frequency of participants' ages at the time of the survey with normal curve for comparison. The participants' ages were negatively skewed (skewness = -.34).

Geographic location. Respondents from 35 of the 50 United States participated in this study (see Table 17)**.** One participant did not respond to this item. Although at least one state from each major geographic area of the United States was represented, the states were neither equally nor proportionally represented in the responses. It was noted that the Northwestern United States had little representation in these results, with respondents only from the coastal states.

Table 17

Respondents by State

State	*n*	%	State	*n*	%
Alabama	2	1.6	Missouri	3	2.4
Arizona	2	1.6	New Hampshire	3	2.4
Arkansas	1	0.8	New Jersey	6	4.8
California	4	3.2	New Mexico	2	1.6
Colorado	1	0.8	New York	7	5.6
Connecticut	2	1.6	North Carolina	4	3.2
Florida	3	2.4	North Dakota	1	0.8
Georgia	5	4.0	Ohio	8	6.5
Hawaii	1	0.8	Oregon	1	0.8
Iowa	1	0.8	Pennsylvania	7	5.6
Illinois	7	5.6	South Carolina	1	0.8
Indiana	1	0.8	Tennessee	1	0.8
Kansas	3	2.4	Texas	10	8.1
Massachusetts	5	4.0	Virginia	10	8.1
Maryland	3	2.4	Washington	3	2.4
Maine	3	2.4	Wisconsin	3	2.4
Michigan	3	2.4	West Virginia	2	1.6
Minnesota	3	2.4			

The geographical categorization criteria (see Table 18) proposed by the National Center for Education Statistics (NCES) were used to classify respondents' school settings. A large minority of respondents (37.9%) worked in suburban schools, with

nearly as many rural (35.5%) and fewer urban school settings (25.8%) represented (see Figure 7). One participant (0.8%) did not respond to this item.

Table 18

Geographic Settings for Schools

Setting	Description
Urban	inside a metropolitan area and inside a principal city with a population of <100,000 – 250,000 or more
Suburban	outside a principal city and inside a metropolitan area with a population of <100,000 – 250,000 or more
Rural	area that is ≤ 5 miles – >25 miles or more from a metropolitan area

Adapted from the National Center for Education Statistics (2007) urban-centric locale categories

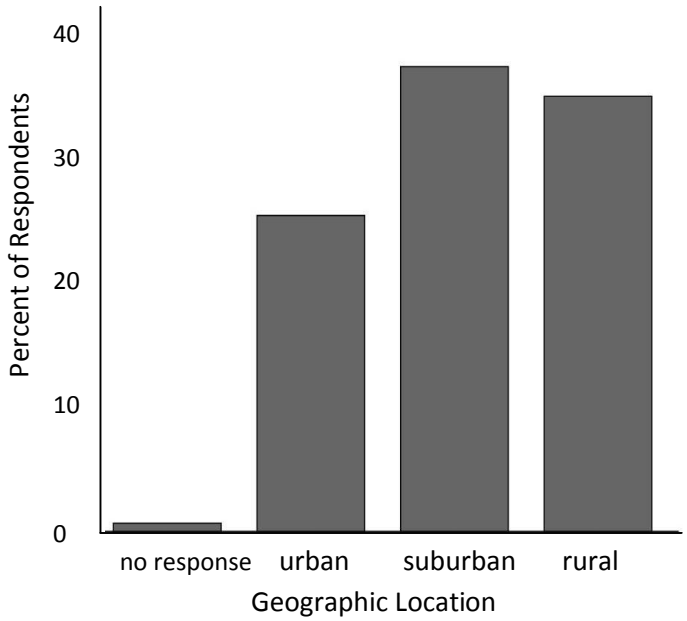

Figure 7. Frequency of respondents from each geographic area, as defined by the National Center for Education Statistics (2007). The respondents were well-distributed across the three geographic settings.

Descriptive statistics were computed for each geographic location. The mean for the total use subscale by respondents from urban areas (n = 32) was 53.25, with a standard deviation of 23.09. The mean for the total use subscale by respondents from suburban areas (n = 47) was 57.04, with a standard deviation of 17.50. The mean for the total use subscale by respondents from rural areas (n = 44) was 55.68, with a standard deviation of 13.24.

School district size. NCES criteria were also used to classify the size of the respondents' school districts (see Table 19)**.** Nearly half of all respondents (49.2%) identified their school systems as medium-sized; however, a large minority (31.5%) identified their systems as large in size. Less than one-fifth (18.5%) of respondents identified their systems as small. One survey participant did not respond to this item (see Figure 8)**.**

Table 19

School District Size

District Size	Number of Enrolled Students
Small	1-799
Medium	800 – 4,999
Large	5,000 – ≥100,000

Adapted from the National Center for Education Statistics (2008) district size scales

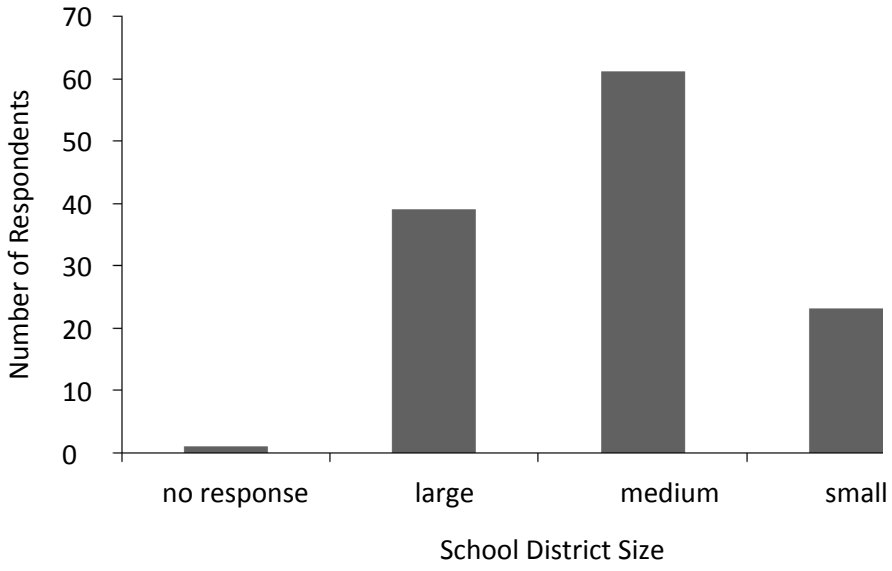

Figure 8. Frequency of respondents by school district size, as defined by the National Center for Education Statistics. The figure shows that, although the respondents were distributed across the three school district sizes, the highest number of respondents reported working for medium-sized school districts.

Descriptive statistics for each size of school district were calculated. The mean for the total use subscale by participants from large school districts (n = 39) was 57.97, with a standard deviation of 16.84. The mean for the total use subscale by participants from medium-sized school districts (n = 61) was 54.03, with a standard deviation of 18.92. The mean for the total use subscale by participants from small school districts (n = 23) was 55.57, with a standard deviation of 16.24.

Respondent demographics: Professional characteristics. The respondents identified themselves as working in a variety of employment positions and at diverse educational levels (see Table 20). A majority (63.5%) of the respondents identified themselves as special education teachers**,** with two (1.6%) teaching at the preschool level, 34 (27.4%) at the elementary level, 6 (4.8%) at the middle school level, and 36 (29%) at

the high school level. Two individuals identified themselves as being in supervisory or district-level roles in special education. General education teachers comprised 20.6% of all respondents. Of these, one (0.8%) taught at the preschool level, 11 (8.8%) taught at the elementary level, and 14 (11.1%) taught at the high school level. No general education middle school teachers responded to this survey.

With only 7 respondents, administrators comprised the smallest percentage of the respondents (5.6%). Five reported serving at the elementary level (4%), one at the secondary (0.8%), and one at a district level (0.8%)**.** Other educator groups represented 8.7% of the respondents to this survey. The 11 respondents in other groups included school psychologists (1.6%), school counselors (0.8%), educational diagnosticians (0.8%), speech pathologists (0.8%), and professionals who identified with alternative schools and programs (1.6%). Additionally, three special education paraprofessionals (2.4%) responded to the survey, with two at the elementary level and one at the secondary level. One respondent did not indicate an educational level.

Table 20

Teacher and Administrator Employment Characteristics

General Education	(*n* = 26)	Special Education	(*n* = 80)	Administrators	(*n* = 7)
Educational Level	*n*	Educational Level	*n*	Educational Level	*n*
Preschool	1	Preschool	2	Preschool	0
Elementary	11	Elementary	34	Elementary	5
Middle School	0	Middle School	6	Middle School	0
High School	14	High School	36	High School	1
				District Level	1

Demographics above exclude other educational professionals, n = 11, *and non-responders, n* = 1

Aggregated educational level and use of individual supports. Some of the education levels had very small numbers of participants (e.g., preschool, *n* = 3). Therefore, the various levels were aggregated into two groups: pre-kindergarten through elementary and middle school through 12th grade or age 22. Descriptive statistics for use of individual supports were calculated for responding participants at the two aggregated levels (see Table 21). As can be seen in Table 21, the means for the use of individual supports by respondents working at the pre-kindergarten through elementary level ranged from 1.60 to 3.34, with standard deviations from .99 to 1.30. The means for use of individual supports by respondents working at the middle school through adult level ranged from 1.48 to 3.19, with standard deviations from .95 to 1.30.

Table 21

Descriptive Statistics for Use of Individual Supports by Educational Level

	Pre-K to Elementary (n = 58)		Middle School to Adult (n = 62)	
Type of Instruction or Support	*M*	*SD*	*M*	*SD*
Low student-teacher ratio	3.07	1.26	2.95	1.21
Formative assessment	2.74	1.18	2.68	1.25
Instruction with typical peers	2.97	1.12	2.90	1.28
Visual supports	3.22	1.26	3.02	1.22
Augmentative/alternative communication	2.31	1.26	2.31	1.14
Structured learning environments	3.34	1.16	3.08	1.21
Functional behavior assessments	2.83	1.13	2.94	1.14
Behavior intervention plans	3.22	1.09	2.95	1.19
Positive behavior supports	3.29	.99	2.94	1.23
Curriculum designed to address core deficits	3.10	1.12	3.00	1.19
Access to general education curriculum	3.17	1.08	3.19	1.16
Targeted, direct instruction	2.97	1.18	2.84	1.10
Applied behavior analysis	2.29	1.14	2.24	1.17
Educational paraprofessional	2.97	1.30	2.82	1.30
Discrete trial teaching	2.22	1.22	1.94	1.09
Reinforcement systems	3.10	1.09	2.42	1.30
Social skills training	2.81	1.10	2.73	1.23
Video or computer modeling	1.91	1.13	1.97	1.21
Picture Exchange Communication System (PECS)	2.40	1.28	1.71	1.18
Voice output devices	1.67	1.08	1.48	.95
Sign language	1.60	1.03	1.58	.98

The Pearson *r* was used to determine the relationship between the educational level at which the respondents worked ($N = 124$) and their total use of supports ($N = 124$). The correlation between the two variables was not significant, $r = .02$, $p = .78$. It was hypothesized, therefore, that total use of classroom supports would not differ significantly by educational level.

Aggregated educational level and total use of supports. Descriptive statistics on the total use subscale were calculated for responding participants at the pre-kindergarten through elementary level and those at the middle school through 12th grade or 22 years level The mean on the total use subscale for respondents at the pre-kindergarten through elementary level ($n = 58$) was 57.22, with a standard deviation of 16.70. The mean on the total use subscale for respondents at the middle school through 12th grade or age 22 level ($n = 62$) was 53.58, with a standard deviation of 18.81. The data for the total use subscales were compared using a *t*-test. There was no statistically significant difference between the dichotomized educational level groups on the total use subscale, $t(118) = 1.12$, $p = .27$.

These results of these comparisons show that the use of supports varies insignificantly across educational levels. If the self-reporting on use levels is accurate, this indicates that educators at all levels are able to provide the supports which are necessary for student success through academic transitions.

The Pearson *r,* an analysis of correlation, was used to determine the relationship between respondents' employment positions ($N = 124$) and their total use of supports (N

= 124). The correlation between the two variables was not significant, $r = .006$, $p = .95$.

Primary work setting. The primary work settings of the participants were distributed across general education and special education settings (see Table 22). Of those in teaching positions, more respondents spent the majority of their time in primarily special education settings (38.1%) than in primarily general education settings (27.8%). A sizable minority of teacher respondents reported spending their time equally in both general and special education settings (23.0%). Of the administrators who responded, 1.6% supervised primarily special education teachers, while 4% supervised both general education and special education equally. No administrators reported supervising primarily general education teachers**.** Four survey participants (3.2%) reported primary work settings other than those available as response categories. One respondent (0.8%) did not provide information about work setting.

Table 22

Respondent Primary Work Settings

Primary Work Setting	*n*	%
Primarily General Education settings	35	28.2
Primarily Special Education settings	48	38.7
General & Special Education settings equally	29	23.4
Supervising Primarily General Education	0	0.0
Supervising Primarily Special Education	2	1.6
Supervising General & Special Education equally	5	4.0
Other	4	3.2
No response	1	0.8

Primary work setting and use of individual supports. Descriptive statistics were computed for the use of the 21 individual supports by primary work setting (see Table 23). As can be seen in Table 23, the means and standard deviations for the use of individual supports varied across the respondents' primary work settings. Respondents who worked in primarily general education settings had means between 1.40 and 3.29 on a four-point scale, with standard deviations of .91 to 1.31. Respondents who worked in primarily special education settings had means between 1.71 and 3.54, with standard deviations of .93 to 1.30. Respondents who worked in both general and special education settings equally had means between 1.48 and 3.45, with standard deviations of .98 to 1.30. For a majority of the supports, the means were highest for respondents working primarily in special education settings.

Table 23

Descriptive Statistics for Use of Individual Supports by Primary Work Setting

	Primarily Gen. Ed.		Primarily Special Ed.		Both Gen. Ed. & Special Ed. Equally	
Type of Instruction or Support	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low student -teacher ratio	2.66	1.24	3.29	1.15	3.03	1.09
Formative assessment	2.91	1.17	2.69	1.08	2.41	1.30
Instruction with typical peers	2.97	1.29	2.90	.93	3.07	1.22
Visual supports	2.83	1.20	3.48	1.03	3.07	1.22
Augmentative/alternative communication	2.23	1.17	2.44	1.20	2.24	1.19
Structured learning environments	2.94	1.33	3.54	.87	3.10	1.18
Functional behavior assessments	2.77	1.24	3.23	.97	2.90	1.15
Behavior intervention plans	3.11	1.26	3.05	1.28	2.93	1.13
Positive behavior supports	3.00	1.21	3.31	.97	3.03	1.05
Curriculum to address core deficits	2.86	1.24	3.29	.94	2.93	1.13
Access to general education curriculum	3.29	1.15	3.04	.99	3.45	1.06
Targeted, direct instruction	2.66	1.06	3.25	.98	2.72	1.22
Applied behavior analysis	2.11	1.13	2.42	1.15	2.21	1.08
Paraprofessional support	2.54	1.31	3.29	1.13	2.83	1.26
Discrete trial teaching	1.71	1.20	2.29	1.09	1.86	1.03
Reinforcement systems	2.29	1.25	3.19	1.00	2.66	1.29
Social skills training	2.46	1.15	3.15	1.03	2.59	1.12
Video or computer modeling	1.66	1.11	2.23	1.19	1.86	1.16
PECS	1.60	1.12	2.46	1.30	1.86	1.19
Voice output devices	1.54	.98	1.71	1.05	1.48	1.09
Sign language	1.40	.91	1.83	1.06	1.62	.98

Primary work setting and total use of supports. It was hypothesized that experiences in diverse teaching settings, and the resulting professional opinions, would impact the total use of supports. Descriptive statistics for groups of respondents who directly instructed students (i.e., teacher or paraprofessional positions) were computed. The mean total use for teachers who worked primarily in general education settings (n = 35) was 51.54, with a standard deviation of 19.05. The mean total use for teachers who worked primarily in special education settings (n = 48) was 60.04, with a standard deviation of 13.91. The mean total use for teachers who worked in general education and special education settings equally (n = 29) was 53.86, with a standard deviation of 16.49. The data for the total use subscale were compared using a one-way ANOVA to determine if the differences among them were statistically significant. There were no significant differences among the total use of supports by teachers who worked primarily in general education settings, those who worked primarily in special education settings, and those who worked equally in both settings, $F(2, 109) = 3.02$, $p = .053$. These results were supported by an analysis of correlation. The Pearson r was used to determine the relationship between respondents' primary work setting (N = 124) and their total use of supports (N = 124). The correlation between the two variables was not significant, r = .02, p = .86.

Experience in current employment position. There was a large variance (89.02) in participants' years of experience in their positions at the time of the survey (see Figure 9). The respondents had a mean of 11.30 (SD 9.44) years experience in their positions (median 8; mode 4; range 34). The minimum number of years in the respondents' current

positions was 1, and the maximum was 35. Two participants did not respond to this item. It was noted that the data were skewed toward relative inexperience, with nearly half (43.5%) of all respondents having 6 or fewer years of experience.

The Pearson *r,* an analysis of correlation, was used to determine the relationship between respondents' years of experience in their current jobs ($N = 124$) and their total use of supports ($N = 124$). The correlation between the two variables was not significant, $r = -.04$, $p = .66$.

There was a wide dispersion of respondents by years of experience. The respondents were, therefore, categorized into five experience level groups: 0 to 5 years, 6-10 years, 11-15 years, 16-20 years, and more than 20 years.

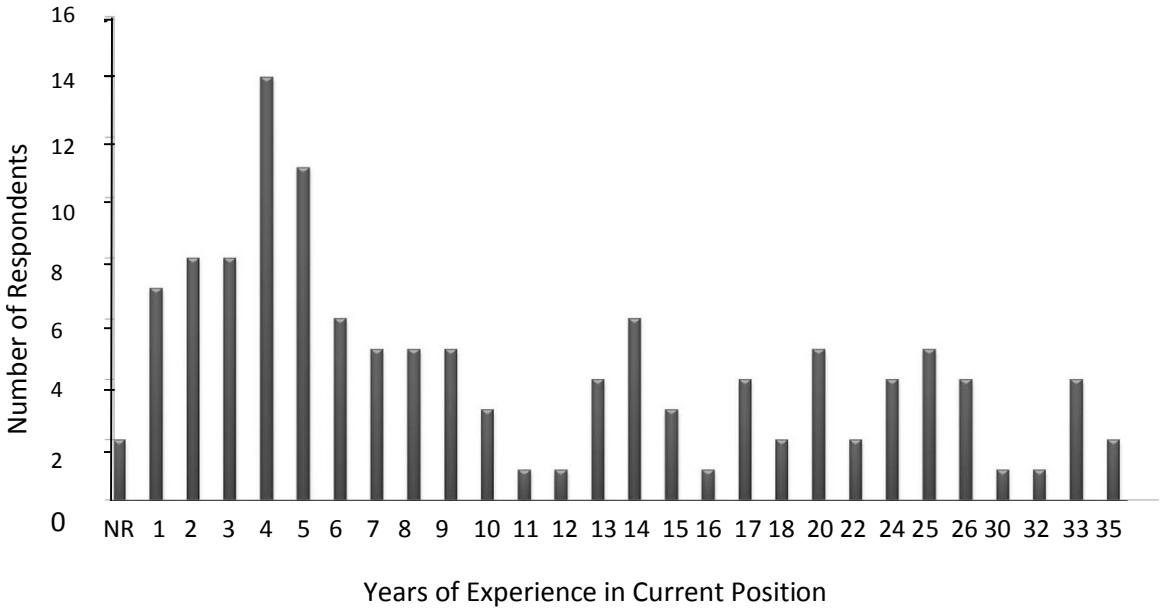

Figure 9. Frequency of educators' number of years in their employment positions at the time of survey completion.

Experience in current position and total use of supports. Descriptive statistics on the total use subscale were computed for the varying experience level groups (see Table 24). The mean on the total use subscale for respondents with 0 – 5 years experience was 55.98, with a standard deviation of 16.03. The mean on the total use subscale for respondents with 6 – 10 years experience was 53.04, with a standard deviation of 22.51. The mean on the total use subscale for respondents with 11 – 15 years experience was 57.40, with a standard deviation of 17.7. The mean on the total use subscale for respondents with 16 – 20 years experience was 56.75, with a standard deviation of 21.19. The mean on the total use subscale for respondents with more than 20 years experience was 52.91, with a standard deviation of 19.03. As can be seen in Table 24, the means, standard deviations, and maximum values varied across experience levels.

Table 24

Means for Total Use Subscale by Experience Level Groups

Experience Group	*n*	*M*	*SD*	*Minimum*	*Maximum*
0 – 5 years	48	55.98	16.03	0.00	81.00
6 – 10 years	24	53.04	22.51	0.00	81.00
11 – 15 years	15	57.40	17.78	0.00	76.00
16 – 20 years	12	56.75	21.19	0.00	76.00
> 20 years	23	52.91	19.03	0.00	72.00

Comfort in working with students with ASDs. A large majority of participants reported feeling either somewhat comfortable (33.9%), or very comfortable (34.7%) working with children with ASDs. Approximately one-sixth (16.1%) of respondents

reported neutral feelings about working with students with ASDs. A small percentage of participants reported feeling somewhat uncomfortable (7.3%) and slightly fewer (6.5%) reporting feeling very uncomfortable (see Figure 10). The respondents reported working with a mean of 6 students with autism (median 4; mode 3; range 28) in the past three years.

The Pearson *r,* an analysis of correlation, was used to determine the relationship between the respondents' comfort in working with students with ASDs ($N = 124$) and their total use of supports ($N = 124$). The correlation between the two variables was significant, $r = .30$, $p = .001$.

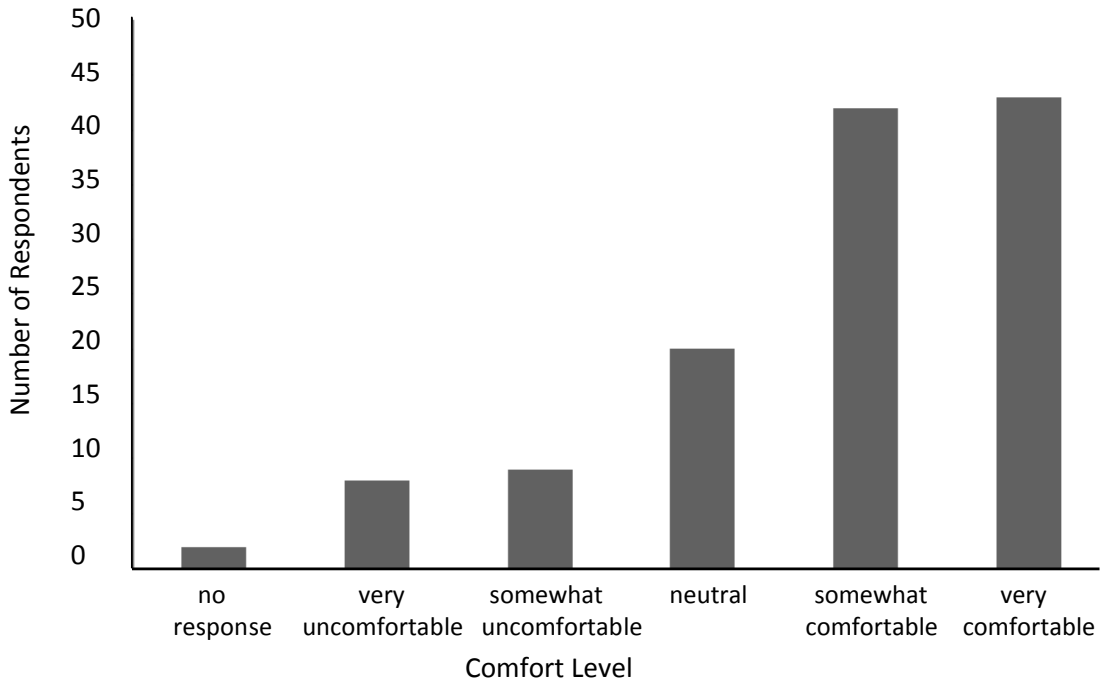

Figure 10. Number of respondents at each comfort level in working with children with ASDs. The figure shows that a large majority of respondents felt either somewhat or very comfortable.

Rated importance of supports. Respondents were asked to rate the importance of classroom and instructional supports for students with autism spectrum disorders (see Table 25). The supports that were rated as very important by a majority of survey participants were low student-teacher ratio (74.2%), social skills training (69.4%), visual supports (68.5%), structured learning environments (65.3%), positive behavior supports (65.3%), curriculum to address core deficits (63.7%), targeted direct instruction (56.5%), behavior intervention plans (55.6%), instruction with typically-developing peers (51.6%), educational paraprofessional (50.8%), and ongoing, formative assessment (50.0%).

Table 25

Importance of Autism Classroom Supports

	Percentage of Perceived Importance				
Type of Instruction/Support	Very Important	Somewhat Important	Somewhat Unimportant	Very Unimportant	no response
Low student-teacher ratio	74.2	12.9	2.4	2.4	8.1
Formative assessment	50.0	31.5	1.6	2.4	14.5
Instruction with typical peers	51.6	33.9	4.0	1.6	8.9
Visual supports	68.5	16.9	2.4	3.2	8.9
Augmentative/alternative communication	36.3	26.6	20.2	8.1	8.9
Structured learning environments	65.3	23.4	0.8	2.4	8.1
Functional behavior assessments	47.6	33.9	8.1	3.2	7.3
Behavior intervention plans	55.6	29.0	5.6	2.4	7.3
Positive behavior supports	65.3	0.0	25.0	2.4	7.3
Curriculum designed to address core deficits	63.7	24.2	2.4	2.4	7.3
Access to general education curriculum	49.2	37.1	3.2	2.4	8.1
Targeted, direct instruction	56.5	30.6	2.4	2.4	8.1
Applied behavior analysis	35.5	34.7	16.1	5.6	8.1
Educational paraprofessional	50.8	32.3	5.6	1.6	9.7
Discrete trial teaching	21.0	37.9	22.6	9.7	8.1*
Reinforcement systems	47.6	29.0	10.5	4.8	8.1
Social skills training	69.4	20.2	0.8	2.4	7.3
Video or computer modeling	23.4	28.2	28.2	9.7	10.5
Picture Exchange Communi-cation System (PECS)	27.4	27.4	21.0	14.5	9.7
Voice output devices	20.2	24.2	27.4	16.9	11.3
Sign language	21.8	23.4	29.8	15.3	9.7

*missing n = 1 (0.8%)

Calculation of overall importance subscale. The subscale for overall importance of supports was calculated for each participant by adding the importance ratings for all individual supports. The overall importance ratings were analyzed for mean, standard deviation, minimum and maximum values. Descriptive statistics for the subscale of overall importance by employment position are summarized in Table 26. As shown in Table 26, the means, standard deviations, and maximum values for the overall importance subscale varied by position. General education teachers and educational professionals other than teachers or administrators had means below the total sample mean (63.03) for overall importance. The "other" group had the lowest mean on the overall importance subscale (54.18). Special education teachers and administrators had means above the total sample mean. Special education teachers had the highest mean on the overall importance subscale (66.15).

Table 26

Means for Overall Importance Subscale by Employment Position

Position	*n*	*M*	*SD*	*Median*	*Minimum*	*Maximum*
Gen Ed Teacher	26	57.27	26.41	68.00	0.00	81.00
Sp Ed Teacher	80	66.15	15.57	68.00	0.00	84.00
Administrator	7	63.14	28.92	74.00	0.00	84.00
Other	11	54.18	30.54	66.00	0.00	84.00
Total	124	63.03	20.88	68.00	0.00	84.00

Overall importance ratings and total use of supports. It was hypothesized that ratings of the overall importance of supports would directly relate to total use of supports. For that reason, the Pearson's r was used to determine the relationship between respondents' ratings of the overall importance of autism classroom supports and their total use of supports. Total use of supports yielded a mean of 55.12, with a standard deviation of 18.37. Overall importance of supports yielded a mean of 63.03, with a standard deviation of 20.88. There was a statistically significant correlation between the subscales for total use and overall importance, $r = .66$, $p = .000$.

Calculation of the perceived use of supports subscales. The subscale for perceived use of supports in general education classrooms was calculated by adding the ratings of perceived use in general education for all individual supports. The subscale for perceived use of supports in special education classrooms was calculated by adding the ratings of perceived use in special education for all individual supports. Descriptive statistics were computed for the perceived use subscales across employment positions (see Table 27).

Perceived use of supports in general education. As can be seen in Table 27, the mean perceived use of supports in general education classrooms by general education teachers was 50.85, with a standard deviation of 22.01. The mean perceived use in general education classrooms by special education teachers was 48.55, with a standard deviation of 17.38. The mean perceived use in general education classrooms by administrators was 50.71, with a standard deviation of 26.27. The mean perceived use in general education classrooms by other educational professionals was 39.45, with a standard deviation of 27.65.

Perceived use of supports in special education. The mean perceived use of supports in special education classrooms by general education teachers was 52.04, with a standard deviation of 29.27. The mean perceived use in special education classrooms by special education teachers was 61.32, with a standard deviation of 17.11. The mean perceived use in special education classrooms by administrators was 62.43, with a standard deviation of 27.75. The mean perceived use in special education classrooms by other educational professionals was 5.91, with a standard deviation of 30.38.

Table 27

Descriptive Statistics on Subscales for Perceived Use of Supports

	Employment Positions			
	Gen. Ed. Tchr.	Sp. Ed. Tchr.	Admin.	Other
Mean (SD) Perceived Use in Gen. Ed.	50.85 (22.01)	48.55 (17.38)	50.71 (26.27)	39.45 (27.65)
Mean (SD) Perceived Use in Sp. Ed.	52.04 (29.27)	61.32 (17.11)	62.43 (27.75)	45.91 (30.38)

As evident in Table 27, respondents in general education positions had the highest mean for the subscale of perceived use of supports in general education. Respondents in administrative positions had the highest mean on the subscale of perceived use of supports in special education classrooms. Respondents in other educational positions had the lowest means for perceived use on both the general and special education subscales.

Influences on autism teaching. Responses to queries about the most significant influences on participants' teaching of students with autism spectrum disorders varied

(see Table 28). However, the majority of responses were evenly distributed among teaching colleagues (30.6%) and district inservices (30.6%) as sources of significant impact on teaching practice. Of the remaining influences, teacher education programs comprised the greatest outstanding percentage (27.4%). Administrators appeared to have little significant impact on autism teaching practice (2.4%).

Table 28

Significant Influences on Autism Teaching

Influence	*n*	%
Teacher education program	34	27.4
Teaching colleagues	38	30.6
Administrators	3	2.4
District inservices	38	30.6
Other	6	4.8
No response	5	4.0

Follow- up interviews. Follow-up interviews were conducted with 15 survey respondents (12.1%). Although a total of 46 (37%) respondents who completed the survey agreed to participate in follow-up interviews, it was not possible to complete interviews with all of them. Some respondents who indicated a willingness to participate in the follow-up interviews could not be reached due to incomplete or missing contact information. Specifically, six volunteers (4.8%) gave assent via the word, "yes," but provided no email or phone number at which they could be reached; another simply wrote, "email," rather than providing an actual email address. One teacher provided the

main number for the high school in which she taught, but gave no extension or name by which to locate her individually. The remaining non-respondents were contacted 2 – 3 times via their chosen mode of communication, but were repeatedly unavailable.

The interview respondents were predominantly Caucasian, non-Hispanic females. Their mean age was 45.5 years. A majority were employed in elementary level special education positions, and most had earned a master's degree or higher (see Table 29). Because of their positions and their relatively high level of education, it is posited that this subgroup had a greater than typical expertise in autism instruction and supports.

Table 29

Interview Respondent Demographics $n = 15$

Position	Race	Gender	Age	Highest Degree	State
school psychologist	Caucasian/non-Hispanic	female	37	master's degree	PA
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	38	master's degree	FL
elem. sp. ed. teacher	African-American	female	56	doctoral degree	NJ
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	34	master's +30	NJ
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	49	master's +30	OH
district level admin.	Caucasian/non-Hispanic	male	38	master's +30	OH
HS sp. ed. teacher	Caucasian/non-Hispanic	male	60	master's +30	TX
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	43	master's degree	OH
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	56	master's +30	WV
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	23	bachelor's degree	IA
MS sp. ed. teacher	Caucasian/non-Hispanic	female	41	master's +30	PA
elem. sp. ed. teacher	Hispanic	female	57	education specialist	CA
elem. sp. ed. teacher	Caucasian/non-Hispanic	female	58	bachelor's degree	TX
elem. instr. assistant	African-American	female	42	bachelor's +15	VA
elem. gen. ed. teacher	Caucasian/non-Hispanic	female	51	bachelor's +15	TX

Interview participants were asked to express personal and professional opinions about autism training and educational programming decisions. They were also asked their perceptions of the benefits of various autism educational practices. The responses to the quantitative follow-up items are summarized in Table 30.

Table 30

Follow-up Interview Results

Item	Response Option	*n*	%
Students benefit from from staff trained in autism	Strongly agree	11	73.3
	Agree somewhat	4	26.7
	Neither agree nor disagree	0	0
	Disagree somewhat	0	0
	Strongly disagree	0	0
All staff should be trained in autism	Strongly agree	9	60
	Agree somewhat	5	33.3
	Neither agree nor disagree	1	6.7
	Disagree somewhat	0	0
	Strongly disagree	0	0
Students with ASDs should be included in general ed. classes	Strongly agree	5	33.3
	Agree somewhat	3	20
	Neither agree nor disagree	7	46.7
	Disagree somewhat	0	0
	Strongly disagree	0	0
Students with ASDs benefit from social (non-academic) inclusion in general ed. settings	Strongly agree	8	53.3
	Agree somewhat	3	20
	Neither agree nor disagree	4	26.7
	Disagree somewhat	0	0
	Strongly disagree	0	0
Students with ASDs benefit from academic instruction	Strongly agree	4	26.7

in general ed. settings	Agree somewhat	3	20
	Neither agree nor disagree	7	46.7
	Disagree somewhat	1	6.7
	Strongly disagree	0	0
Students with ASDs should have access to whatever supports are necessary for them to be successful	Strongly agree	10	66.7
	Agree somewhat	5	33.3
	Neither agree nor disagree	0	0
	Disagree somewhat	0	0
	Strongly disagree	0	0
Students with ASDs should need fewer supports if they are educated in inclusive settings	Strongly agree	0	0
	Agree somewhat	0	0
	Neither agree nor disagree	4	26.7
	Disagree somewhat	3	20
	Strongly disagree	8	53.3

Qualitative Analyses

Open-ended survey items. Participants were asked to comment on how they selected supports for students with ASDs. A total of 161 references to selection of supports were collected from 100 different respondents. Thirty-five emic themes emerged from the data. The themes that recurred most frequently related to knowledge of each child's individual needs and abilities and special education case management, including review of IEPs and other file documents, and seeking the expertise of special educators, related service providers, and other professionals with whom students with ASDs work.

Other themes related to state standards, professional development through literature, research, or training, and specific intervention strategies.

Approximately one-fourth (24.8%) of the responses to the item on the selection process for supports indicated that participants based their choice of autism classroom and instruction supports on the individual deficits, abilities, preferences, and needs of their students with ASDs. As one high school special education teacher phrased her rationale, “Each student I have taught that was on the spectrum has had very different abilities both socially and academically.” A high school science general education teacher noted the importance of parent contributions to teachers’ knowledge about students with autism by responding, “Each child has different needs that are revealed by parent contact.” An elementary special education teacher explained the way in which individual differences impact teaching practice for her in this way: “Every student with autism is different and can't be taught the same as another student with autism.” An educational diagnostician added, “There are very different strategies used with my Asperger's students than there are with my self-contained, severely autistic students.”

Nearly one-fifth of comments to the supports selection item (19.3%) related that respondents relied on the advice of professionals with expertise in autism to guide them in selecting appropriate supports. A general education teacher at the elementary level expressed her ease in collaborating with her colleagues by stating, “I would use the expertise of the Special education teacher to decide upon the instruction for the student.” A special education teacher who claimed limited knowledge about autism reported that she would, “Talk to the speech and language therapist,” to gain insight into appropriate

supports. An elementary administrator related that she made decisions about appropriate supports for children with ASDs, "Based on recommendations of support staff, parents and doctors." A speech pathologist mirrored this statement in her comment about deciding upon supports "with a team of professionals, as well as the students' parents or guardians." A special education teacher at the high school level related training to perceived autism expertise in her statement, "The special ed. teachers in our building are the only teachers with a great deal of training directly related to autism."

Approximately one-tenth (11.2%) of responses to this survey item indicated that the selection of classroom and instructional supports was dependent upon each student's IEP. One elementary special educator stated, "We the team who work on the IEP come up with appropriate instructional supports."

Although they represented only a small portion of the responses (3.7%), some participants expressed that experience with children with ASDs was the method by which they chose supports. A special education teacher at the elementary level phrased this philosophy, "Each student is different and each student requires their own methods to insure proper instruction and/or support. You need to find out what works, often through trial and error."

Three survey respondents remarked that they, in fact, did not select supports for their students with ASDs. For two of these teachers, the lack of input toward supports seemed involuntary. In response to the query about how participants chose classroom and instructional supports, a general education high school teacher replied, "I don't; someone else does." An elementary special education teacher also indicated that the choice of

supports was beyond her control in her statement, “I take what the district gives me, such as paraprofessional support for the child.” It was noted, however, that one general education high school teacher appeared not to select supports by choice. She stated, “I do not have time to differentiate instruction. Students with autism receive the same instruction as all other students in the class.”

A large majority of survey participants shared additional comments about autism programs and teaching practice. Several emic themes emerged from review of the data. The themes which appeared most frequently in respondents’ comments related to autism program improvement (e.g., increased or improved instructional and classroom supports, better service delivery) and increased or improved professional development training for staff.

Supporting their overall responses on forced choice survey items, a number of respondents indicated that appropriate instructional supports were essential to meet the needs of their students with ASDs. A Board-certified special education teacher from Ohio wrote that, “As every child's needs are different, every child needs instruction and support to be individualized.” Accordingly, several participants stated that, although it was sometimes difficult to manage, increased or improved supports were necessary in order to adequately teach those students particularly in integrated or inclusionary settings. A high school special education teacher summarized her dilemma this way: **“**The current autism program in our building could be improved if there were more supports available for the students with autism. It's difficult to address all of their needs within an inclusionary environment.” Furthermore, it was noted that some respondents felt that the

availability and use of classroom instructional supports was beyond their control. For example, an elementary general education teacher eloquently stated, "What is best for students is often sacrificed due to actual cost of services. Many teachers have students whose needs go far beyond their training, experience, and/or desire to serve. This lack of stewardship of teachers and students sets up self-defeating and damaging situations for all stakeholders."

Some of the respondents' comments corresponded to concerns and necessary changes in autism programming. Several participants expressed a need for improved curriculum design and service delivery. For example, one high school special education teacher stated, "We need to have more structured programs for our more severe students with autism." Other respondents indicated that students in autism programs might have been mislabeled. An elementary special education teacher reported, "Students were placed in there [autism program] that did not belong. Too many kids are labeled autistic that have behavior problems when they are very young." A concurring general education teacher at the elementary level added, "Many students are not diagnosed or not properly diagnosed within our school system, and then services are not well supplied." Other participants indicated that educator attitudes interfered with student programming. A special education teacher reported, "I have found, regrettably, that most of our general education teachers are not willing to put into place the tools I provide (picture schedules, visual prompting, picture supports)."

Administrator comments, although few in number, addressed socially significant issues, including professional development for staff members and the financial burden of

autism-specific programs. The retention of teachers trained in autism was noted by an elementary principal who reported, **"**I am concerned about the 'burn-out' factor with my self-contained classroom teacher. My current teacher has informed me she will not return next year. She has been in the program for 2 years."

Follow-up interview items. Approximately half of the interview respondents (53.3%) agreed that students with ASDs should be included in general education classes. This philosophy is summarized well in the comments of a special education teacher: "I feel it is very important that all students be included into the general education classes as much as possible. Even the severe students can be included. It is important that they be included as early as possible. They should be included as early as kindergarten. The general education students will accept them at that age and protect them and watch out for them throughout their school years if it is started at the kindergarten level. Typical students also benefit from the experience and grow to become caring adults in society." The remaining 46.7% of participants gave neutral responses to the inclusion item. The comments provided for this item largely (83.3%) expressed a need for individual evaluation of each student's needs, abilities, and level of functioning. A general education teacher related that,"This [inclusion] needs to be decided based on the needs of the student, including how high functioning the student is, as well as LRE for the general education classroom. I have had years when my autistic students' needs were far too great than was equitable for the other students and/or me. More people than not were short changed." A special educator responded that, "It depends upon the severity of the spectrum disorder." However, some comments dealt with student needs, such as skill

mastery and generalization: “They [students with ASDs] need to learn the skills in the natural setting.”

A large majority of respondents agreed that students with ASDs benefit from social (i.e., non-academic) inclusion in general education settings. It was noted by several survey participants that positive and accommodating teacher and peer attitudes are necessary for successful inclusionary experiences. When asked if she agreed that students with ASDs benefit from social inclusion in general education settings, one general education teacher answered, “Theoretically - yes. In practice, education and support for all participants need to be in place. The teacher has to "buy in" and model for the students as they're practicing their skills. It takes a special climate to offer this support. It can't be mandated.” A special education paraprofessional added, “If we’re not teaching peers to deal with them, they don’t pay any attention to them. It happens a great deal. And then, what’s the benefit?” Conversely, less than half of the follow-up participants (46.7%) agreed that students with ASDs should receive academic instruction in general education settings. However, those who agreed with academic instruction in general education were straightforward in their opinions. One district-level administrator responded, “Strongly agree. They *do* benefit.” Many interview participants responded neutrally to this item, providing comments which emphasized individual assessment of the benefits of general education instruction when making decisions for students with autism. This theme is encapsulated in the remarks of a paraprofessional who responded, “It depends on the ability of the child. What’s the purpose or goal of their being there? Is the goal written so that it’s something they can meet? They could use that time in the special ed. setting and

benefit from it so much more if they're not independent [in gen. ed.]."

All of the participants in the follow-up process indicated that, regardless of the educational setting, they agreed that students "should have whatever supports they need, no matter where they are," due to their highly individualized needs. A general education teacher at the elementary level remarked, "Students, whoever they are, need what they need, no matter where they are educated. One would hope an inclusion setting was serving the needs of those in that setting." A large majority (73.3%) of respondents disagreed that students with ASDs should need fewer supports if they are educated in inclusive settings. The remaining participants gave neutral responses to this item. However, it was noted by several participants that achieving and maintaining appropriate supports across settings "is often easier said than done." A special education teacher admitted, "I know it makes it difficult for classroom teachers, but children should receive whatever supplemental services they need."

Additional comments. The comments that some interview participants provided at the end of their interviews expressed both frustration with, and hope for, autism programs. A special educator shared, "I think that, as educators, we should take into account that students with an ASD are increasing. I believe it is essential that we do everything possible to help these individuals to fit into society to the best of their ability. On the other hand, I think it is crucial that the public in general be educated with respect to ASDs and learn to be a little more open and tolerant to those who are not 'neurotypical.' I also believe that these students can learn to do many more things that we might think they are capable of. I believe that part of the educational process is getting

the student to actually understand what it is you are asking of him or her. Communication is the number one priority before any kind of learning can occur." Notably, however, a special education teacher from New Jersey who remarked, "Too many people try to make the square peg fit in the round hole," also stated, "I'm happy there is an increasing awareness about autism."

Research question 3 summary. The results of Research Question 3 indicated varying effects of personal and professional attitudes and opinions on the availability of autism supports. The participants' comments and text entries on the survey and follow-up interview measures showed no association between personal demographic characteristics and attitudes or opinions about autism teaching. Professional characteristics, such as experience in the current position, educational level, and primary work setting, which were not significantly correlated with the total use subscale, had no significant effect on the use of supports. Although Research Question 1 showed that statistically significant differences existed between general education and special education teachers on the available supports, there was no significant correlation between employment position and total use of supports across all respondents.

Attitudes specifically related to autism were positively associated with total use. The respondents' comfort in working with students with ASDs was significantly correlated with total use of supports. Opinions related to the use of supports were particularly relevant to the availability of supports. For example, the perceived importance of supports was significantly correlated to the total use. This supported the observation that five of the seven individual supports that were most frequently used

were also rated as very important by a majority of respondents.

Attitudes and opinions about the selection of supports and their incorporation into the instructional programs of students with ASDs were perhaps most enlightening. A sizeable percentage (approximately 30%) of survey participants expressed that they selected supports based upon the individual needs of students. This was supported by the comments of a large majority of interview participants, who related the critical importance of individualized evaluation of need when selecting supports for inclusionary settings. Approximately 20% of survey participants noted that they relied on the opinions of professionals with expertise in autism to assist them in the selection of supports.

Although 100% of the interview participants expressed opinions that students with ASDs should have access to whatever supports are necessary for them to be successful, regardless of the setting, it was noted that educator attitudes often influence what supports are actually made available to students. Therefore, the "buy-in" of professionals appears to be important in increasing the quantity and types of supports used for students with autism.

Triangulation of Data

The quantitative and qualitative results were compared to determine overall consistency of the data. This allowed greater confidence that the results accurately represented educator opinions, attitudes, and actions, and, subsequently, increased the validity of findings. Overall consistency between quantitative and qualitative results was considered to be strong. No discrepancies between the types of data and results were noted, and congruency across major topics of interest in the study was found.

Comments from the respondents, such as, “More teacher training is needed so that students with ASD can have the full experience of being educated with their peers. Many teachers do not understand the social problems associated [with autism],” indicated that adequate training in autism teaching was both critically important and a significant need for public school staff. This supported the quantitative data, which showed that, regardless of years of experience, more than two-thirds of responding general education teachers (43.5%) and nearly one-fifth of administrators (18.2%), and nearly one-half of other educators (45.5%) had no formal training in autism. Fortunately, only 6.2% of the responding special education teachers indicated that they had no formal training in autism.

The quantitative results obtained from the electronic survey and follow-up interviews indicated that many school districts have attempted to meet the need for autism training by providing professional development courses for their staff members. Nearly half of the responding special education teachers (47.5%) and a large proportion of general education teachers (43.5%) and administrators (42.9%) reported on the survey that they relied on district inservices and professional development opportunities to receive training in autism. However, qualitative data from the survey comments and follow-up interviews indicated that these trainings varied in their practicality and helpfulness in preparing for the educators’ daily responsibilities. As summarized by a special education teacher with 15 years of experience, “Some were wasteful, and some were very good.” Furthermore, a number of respondents indicated that they based their classroom instruction and selection of supports for students with ASDs on experience in

lieu of necessary training.

Quantitative survey data on the use of instruction with typically-developing peers and follow-up data on inclusionary instruction was supported by respondents' comments expressing strong advocacy for appropriate inclusionary opportunities for students with ASDs based upon their individual strengths and needs. More than three fourths of survey respondents (77.4%) reported using instruction with typically-developing peers some, most, or all of the time. These results were mirrored in the follow-up interviews, in which 73.3% of respondents agreed with social inclusion, and an even greater majority of respondents either agreed with (46.7%) or gave neutral ratings (46.7%) to academic instruction in general education settings.

The topic of programming for students with autism also allowed triangulation of quantitative and qualitative data. Numerous comments from the participating educators indicated a perceived need for changes in autism programming, including curriculum development and service delivery. This supported quantitative results from the survey regarding the use and importance of curriculum designed to address the core deficits in autism and systematic, targeted instruction. Although 68.7% of the respondents to the item on curriculum reported that this support was very important, more than half (52.2%) of respondents reported using specialized curriculum some of the time, very little of the time, or never. Likewise, although 61.4% of respondents to the item on targeted direct instruction rated it as very important, 61.9% reported using this support some of the time, very little time, or never. The obvious discrepancy between rated importance and actual use of supports is congruent with a need for changes in the way autism programs are

managed and services are delivered.

5. Discussion

Research Question 1

Autism as a widespread and well-known educational phenomenon is relatively new. However, the results of this survey indicated that a variety of supports are available to students with ASDs in public school settings. Within the survey sample, however, it appeared that significantly different quantities and types of supports are regularly available in general education versus special education classroom settings.

None of the supports listed in the survey received ratings indicating no use by educators. The supports used least frequently by the survey respondents overall on a four-point scale were sign language, voice output devices, video or computer modeling, discrete trial teaching, and applied behavior analysis. There were no comments or text entries relating to these supports; therefore, it is unknown whether their infrequent use is due to unavailable equipment, lack of training or technical skill in utilizing the supports, district policy, personal preference, or some other reason.

When they rated the frequency of use of individual supports in their own classrooms, a large majority of the respondents reported that they used 7 of the 21 supports either most or some of the time. The autism classroom supports that respondents reported using most frequently overall (i.e., most of the time) were structured learning

environments, visual supports, access to general education curriculum, behavior intervention plans, curriculum designed to address core deficits, educational paraprofessional support, and positive behavior supports. These same supports were rated as very or somewhat important by a large majority of respondents. This observed association was statistically validated by the correlation between total use and ratings of overall importance of autism classroom supports.

The availability of autism classroom supports varied across teacher positions. Descriptive statistics showed that special education teachers had a higher mean for use of each individual type of support than their general education colleagues. This was true even for supports, such as access to the general education curriculum and instruction with typically-developing peers, which might be expected to have higher usage ratings among general education teachers. The use of individual supports was aggregated into a total use subscale, which was used to compare teacher groups. There were statistically significant differences in the overall use of supports by general and special education teachers, with special education teachers using a significantly greater number of supports.

The respondents expressed perceptions that the supports available most frequently in general education classrooms and special education classrooms other than their own differed greatly. The supports perceived as most frequently used in special education were low student-teacher ratio, structured learning environments, curriculum designed to address core deficits, visual supports, targeted direct instruction, educational paraprofessionals, behavior intervention plans, and positive behavior supports. The supports that respondents perceived as most frequently used in general education were

access to the general education curriculum, educational paraprofessionals, instruction with typically-developing peers, visual supports, structured learning environments, positive behavior supports, ongoing formative assessment, and social skills training.

Although these settings shared several common supports, including structured learning environments, educational paraprofessionals, visual supports, and positive behavior supports, the perceived frequency of use of these supports varied substantively. Furthermore, a majority of supports were not shared. It was noted that the supports which differed seemed to relate to the particular characteristics of the target populations and/or settings. Specifically, the access to the general education curriculum, instruction with typically-developing peers, and ongoing formative assessment exemplified the standards-based approach that defines the general education environment and is used with a majority of students; therefore, the more frequent use of these supports in general education is logical. Furthermore, the social norms of the general education environment necessitate, for some students, explicit in social skills, which was also highly rated. Conversely, the low student-teacher ratio, curriculum designed to address core deficits, targeted, direct instruction, and behavior intervention plans are intended to meet the highly individualized academic and behavioral needs of students with disabilities, such as ASDs.

When compared using *t*-tests, the means for perceived use of individual supports were significantly higher for special education classrooms than for general education classrooms for 19 of the 21 supports. The exceptions were instruction with typically-developing peers and access to the general education curriculum, for which the means for

perceived use were higher for general education classrooms.

A comparison of the means for use of supports by the participants and their perceptions of the use of supports in other general and special education classrooms revealed two phenomena: The participants expressed perceptions that they used a majority of the supports more frequently than the general education classrooms in their buildings. They also reported perceptions that they used those same supports less frequently than special education classrooms. Across all participants, therefore, there was an expressed perception that special education settings provided substantially greater support than general education settings.

Although IDEA requires greater involvement of general education teachers in the educational programming for students with disabilities, the higher means for perceived use of most supports in special education settings may indicate a lingering perception that special education classrooms are more likely to provide the specialized classroom and instructional supports that students with ASDs may require and, therefore, may be more appropriate settings for students with more significant needs. It also signifies that a belief that inclusionary experiences for these students may not be as beneficial as they are intended to be, as the necessary supports may not be provided.

Research Question 2

Respondents' educational background had varying effects on their total use (quantity) of autism classroom supports and the types (quality) of supports used. General educational background and training was not significantly correlated with the use of supports; however, background characteristics specifically relating to autism had

significant effects on both the quantity and quality of supports used.

The respondents reported high degree attainment, with a large majority at or above the master's degree level. A large majority of respondents reported obtaining licensure through traditional university teacher preparation programs. It was encouraging that most reported being Highly Qualified, according to NCLB standards, in their current positions. Respondents reported a wide range of years of experience (1 – 36 years) in their current positions. However, the distribution of experience was skewed toward relative inexperience, with nearly half of the respondents reporting 6 or fewer years. It was noted that none of these general educational background characteristics was correlated to the participants' use of autism supports.

Educational background specifically related to autism, by contrast, was significantly correlated with the use of autism classroom supports. More than three-fourths of respondents reported having either some or extensive knowledge of autism spectrum disorders. This was encouraging, as the correlation of knowledge of autism with total use of supports was significant at the .001 level. Comparisons among knowledge level groups showed no difference between respondents with some knowledge and those with extensive knowledge on total use of autism supports or in use of any individual supports. However, there were significant differences between groups with limited knowledge and higher knowledge groups on both total use of supports and the use of 16 of 21 individual classroom supports. These results would seem to indicate that increasing knowledge, particularly early in an educator's experience with autism, is especially important to increasing the overall use and variety of classroom supports.

Nearly one-fifth of the respondents reported having received no training in autism, which indicated a need for increased training. A large majority of participants reported receiving training in autism through either standard university teacher preparation programs or inservice and professional development courses. Notably, a greater proportion of educators received their training in ASDs from inservice or professional development courses than from standard university teacher preparation programs or other avenues. A Pearson's *r* test revealed no significant relationship between the form of training and knowledge of autism, indicating that high-quality training is available through a variety of training avenues.

However, training in autism was significantly correlated to the respondents' total use of autism classroom and instructional supports. Comparisons between groups receiving training through disparate means revealed significant differences between educators who received no formal training and both those trained through university teacher preparation and those trained through inservice or professional development courses in total use of supports. Yet, these comparisons showed no significant difference between educators trained in standard university teacher preparation programs and those trained in inservice or professional development courses on total use of supports. Training specifically in autism teaching was also highly promoted in the respondents' comments throughout the survey and interview follow-up. Participants indicated that practical, hands-on training was most beneficial in improving their teaching practice. These results indicate that a focus on specialized autism training across educational settings would likely improve educational outcomes for students with autism spectrum

disorders.

The respondents' experience levels appeared to be similar to their knowledge levels of autism. This was supported by a strong correlation between their experience levels and their knowledge levels. Nearly all of the respondents reported having at least limited experience teaching students with ASDs. However, the disparity in experience levels had a significant impact on teacher practice. The results of comparisons among experience levels indicated that significant differences in total use existed between respondents with limited experience and both those who reported being somewhat experienced and those who reported being highly experienced. No differences in total use existed between the respondents who reported being somewhat experienced and those who reported being highly experienced. These results were supported by a Pearson's *r* analysis, which indicated that experience in working with students with autism was significantly correlated with total use of autism supports. Greater experience in working with students with autism significantly increased the respondents' use of autism classroom and instructional supports. It is essential, therefore, that school districts strive to retain experienced autism teachers, who are likely to provide greater access to the supports which can allow students to be successful in a variety of educational settings.

The respondents reported working with a mean of 6 students with autism in the past 3 years. A majority of respondents expressed some level of comfort in working with students with ASDs, with nearly equal percentages feeling somewhat or very comfortable. This was encouraging, as comfort level with autism was significantly correlated to total use of autism supports.

Educational background and training in autism significantly affected both total use of supports and utilization of individual supports. Knowledge of autism, training in

autism, and experience with autism each significantly impacted the supports available for students with autism spectrum disorders in a variety of settings.

Qualitative data from both the survey and the follow-up interviews supported the critical importance of ongoing autism training. A large majority of the free-response comments from 21 survey participants expressed a need for quality, ongoing training and professional development devoted specifically to the teaching of students with ASDs. All of the 15 interview respondents agreed that autism-specific training was important. Furthermore, 14 of the 15 interview participants expressed some level of agreement that all staff members working with students with ASDs should be trained to do so effectively. Participants reported that hands-on training courses, in which they directly interacted with students with autism, were most beneficial, whereas theory-based courses were largely unhelpful in preparing them to meet the challenges of teaching these students.

Research Question 3

Respondents' personal and professional attitudes and opinions showed varying impact on the type and total use of supports they chose for students with ASDs. It was noted that many of these results were extrapolated from more subjective, qualitative data than other parts of the survey. Therefore, the researcher's perspective in career special education must be considered relevant in the reading and interpreting of the information presented.

Descriptive statistics were reported for personal demographic characteristics, including gender, race, age, geographic location, and size of school district. However, the

participants' comments and text entries on the survey and follow-up interview measures showed no association between personal demographic characteristics and attitudes or opinions about autism teaching.

When it became evident that several participants considered their personal relationships with individuals with ASDs cogent to their responses, this group's opinions were explored separately. It was noted that the mean importance ratings of participants who indicated that they personally knew someone with autism were inconsistent (range 2.76 – 3.86 out of 4). These results did not appear to reflect the relationships themselves, as all but one of these individuals reported that children with ASDs were their own. Instead, the results may have reflected the variability in symptoms found among the disorders themselves and in the ways in which these symptoms affect educational programming.

General professional characteristics, such as the respondents' employment positions, the educational levels at which they worked, and their primary work settings, were reported. However, these characteristics were not significantly correlated with the total use of autism supports, nor were there significant differences among respondents' total use of supports when analyzed by these characteristics.

Professional opinions related to the selection of supports were relevant to the use of supports. Specifically, the subscale of overall importance of supports was significantly correlated to the subscale for total use. This supported findings that the most frequently used supports were also rated by the respondents as very or somewhat important. Furthermore, special education teachers, who had the highest mean on the overall

importance subscale, also had the highest mean for total use of autism supports.

An overwhelming majority of the respondents expressed opinions that autism classroom and instructional supports should be individually selected, based upon each student's strengths and needs. Many also indicated that these supports should be available to students regardless of their educational setting. However, it was apparent from a number of comments that teachers believed that, due to the structure of various classroom settings or teacher attitudes toward accommodation for disabilities, an open availability of supports was more the exception than the norm.

Some participants expressed opinions that the selection of classroom and instructional supports was neither their responsibility nor their purview. Several teacher respondents indicated that, due to the actual or perceived limits of their employment positions, district or school policy, or simple availability of resources, they lacked control over the supports that were available to students in their own classrooms. The professional attitudes expressed by these participants included apathy due to reported time constraints, lack of experience or training with students with ASDs, and an external locus of control on professional decision-making.

Results indicated that positive attitudes toward appropriate autism supports were perhaps necessary, but not sufficient, to guarantee their regular use. Despite the fact that a majority of responding teachers rated research-validated supports as very important, few of the teachers reported utilizing those supports most or all of the time in their classrooms. For example, ABA has a long history of research validation across disciplines, yet only 13.7% of teachers overall reported using it most or all of the time.

Comments and suggestions shared by the respondents, expressing a need for increased practical training were instructive on this point. They indicated that, even when the educators intellectually understood best practice strategies and supports, they were unlikely to implement these measures effectively without practical, hands-on training.

The theme of training needs was evident across professional positions and personal demographic characteristics. A substantive majority of the respondents indicated that improved teacher training is necessary to improve educational outcomes for students with ASDs. Those who had received training expressed that it was foundational to their professional performance. A number of those who had not yet received training or had received what they considered to be substandard training expressed feelings of inadequacy in their ability to appropriately educate students with ASDs. Most of the recommendations for training focused on practical, hands-on training in using effective strategies for students with ASDs, rather than on theories of development or diagnostic characteristics of autism spectrum disorders. It was noted that even educators who described themselves as highly experienced in teaching students with ASDs valued continuing professional development activities and training in autism. This need for ongoing training clearly speaks to the complexity of providing appropriate educational programming for students with autism.

Implications for Teacher Preparation and Professional Development

In this study, it was noted that, despite the comparatively high percentage of educators who reported having five or fewer years experience in their current positions, the mean age of respondents was higher than would be expected based upon a normal

distribution of educator ages (see Figure 9). This phenomenon has been documented in other recent educational research (Johnson & Cornman, 2008) and likely corresponds to the notable increase during the past decade in career changers and delayed entrants who become older candidates for teaching. These new-to-teaching professionals, who often hold graduate degrees and may have substantive experience in other fields, are often hired in areas of high need, such as special education. However, as adult learners entering the field of education, these individuals present unique challenges for teacher preparation programs, including the need for specific, tailored, and practical training (Haselkorn & Hammerness, 2008). These characteristics may account, in part, for some of the comments related to training needs that were made by participants in this study.

Although the results of this study must be viewed with caution, they seem to indicate that many educators do not receive or feel they receive the preparatory training that would allow them to adequately meet the diverse instructional and support needs of students with autism spectrum disorders.

Curry and Killion (2009) recommended that professional development for teachers include both opportunities for cognitive learning through traditional professional development models and application learning through reform-oriented models. These researchers emphasized that, although traditional professional development offers an "expedient way to build the fundamental knowledge and skills associated with innovations in curriculum and instruction. Reform-oriented professional development, however, increases implementation and transformation of practice, researchers are finding. Implementation in classrooms is what impacts student learning" (p. 58).

Public education systems are beginning to address the specific and increasing needs of autism teacher preparation. For instance, in its December, 2008, report, the Washington Professional Educator Standards Board recommended far-reaching modifications in educator preparation and ongoing professional development. This Board recommended, among other things, that preparation programs for all educational staff, including teachers, support personnel, and administrators, provide training in ASD characteristics, effective strategies, and available resources. Further, they suggested that autism training include experiences with parents of students with ASDs. They also recommended that ongoing professional development, through mentoring, coaching, and support services, be available to school personnel to increase their expertise in working with students with autism.

The Washington Board's report (2008) supports the findings of this study, which indicate that ongoing training in autism strategies is necessary for all staff members who interact with students with ASDs. Special education teachers alone cannot meet the diverse needs of these students, and consultation with single building or district "experts" is no longer a viable alternative for this burgeoning population. Moreover, flexible, ongoing training and support are required in order for educators to adequately and appropriately serve students with ASDs in a variety of settings.

Measurement Error

de Leeuw et al. proposed that well-designed and adequately tested surveys reduce measurement error (p. 11). They further suggested that web-based surveys provide the potential for higher data quality and decreased measurement error (p. 282). The authors

submitted that the defining aspects of internet surveys, including the participants, mode and method of data collection, are responsible for this decreased error. Specifically, web surveys are comprised of essential characteristics, such as visual representation of all response choices, allowing the respondent to avoid relying on auditory cues and memory alone, and the absence of an interviewer, leaving the locus of control with the respondents and reducing interviewer error. Moreover, the self-pacing of internet surveys permits adequate time for respondents to reflect on the questions (p.12).

Regrettably, the non-response rate for this survey was extremely high, thereby greatly increasing the chances for measurement error. The mitigating factors mentioned by de Leeuw et al. did not substantively ameliorate non-response on this survey. It is unknown why the response rate was so low. However, it may have been due, at least in part, to the relative novelty of the topic. Autism spectrum disorders and the educational programming associated with them retain a somewhat esoteric quality, expressed succinctly through the email of a non-participant: "I received the information pertaining to your research study and would love to participate, but I do not work with students with ASDs and would not be able to provide very much information." As a result of the limited information available about the sample overall, a reasonable estimate of non-response error was not possible.

Limitations

This study was limited by the relatively small sample size of 3,000 individuals for a national research study. This sample is unlikely to have adequately represented the overall population of public school educators. In addition, the percentage of actual

respondents from each employment position was not representative of the beginning sample. Specifically, a majority of the survey respondents (64.5%) reported holding special education teaching positions. It is probable that the respondents with backgrounds in special education possessed increased familiarity with ASDs and the classroom instructional strategies and supports appropriate for them; this, in turn, could have skewed the results. Moreover, the completion of a lengthy electronic survey likely ensured that only educators with a dedication to educational research would participate. Both the sample size and respondent demographics of this study delimit the conclusions one can draw about the overall population from which the sample was drawn (i.e., pre-kindergarten to twelfth grade educators and administrators).

The low response rate further limited the generalizability of this research. It is noted that survey research has historically elicited relatively low response rates, and that the relative rates of internet research are still being evaluated. However, this survey was completed by very few participants (4.8% of the initial email pool and 4.1% of the postal mail pool), which is considered very low, even when compared to other electronic surveys. When the representative from Market Data Retrieval was contacted in early April, she indicated that the average response rate for campaigns involving their email solicitations was one percent, which may have compounded the extant issue of non-response. Furthermore, the five and one-half-week data collection period for this survey was relatively brief, decreasing the opportunities to respond. The short duration of data collection thereby increased the probability of non-response error.

Implications for Future Research

Autism is a rapidly growing educational phenomenon, yet its impact on educational programming remains largely unknown. Moreover, large scale research into autism classroom and instructional supports across settings and states is still limited. Therefore, much information still needs to be gathered. Future research into education and programming for students with ASDs might extend the current study through modifications of the research procedures. Surveying a larger population sample would help to establish a baseline from which to formulate more comprehensive recommendations for educator preparation and support. In addition, the inclusion of educators from a wider variety of educational placement settings, including residential and alternative programs, in the sample might help to establish whether or not specialized knowledge about ASDs and intensive, ongoing training in autism teaching is especially significant for educators in more restrictive settings. Furthermore, modifying the notification process by adding a pre-notification to school districts and mailing the postcard invitation prior to email notifications would likely decrease the number of returned email invitations and increase the total response rate. Also, providing the survey in paper format by postal mail as well as, or in lieu of, the electronic format would probably increase overall participation. More detailed follow-up, directed toward the foundations of educators' personal and professional attitudes, opinions, and actions (i.e., why they believe or act the way they do) would yield information that is missing from these results. This might assist educator preparation programs in creating transformational courses which foster positive attitudes and opinions about autism strategies and supports and professional development activities which allow guided

practice in their application.

Since adequate training was, by far, the greatest concern of the educators in this survey, there is a need for future studies to examine various types of training and both the perceived benefits and actual application of each. Perhaps most importantly, however, future research might illuminate the effect of autism training on the educational outcomes for students with ASDs in a variety of educational settings. After all, the bottom line for any instructional intervention is its effectiveness.

Appendix A

Dear Educational Professional,

As a doctoral candidate in George Mason University's College of Education and Human Development, I am conducting a research study about the instructional programming for students with autism spectrum disorders (ASDs).

I am requesting your participation in a survey on the types of supports that are available to students with ASDs in a variety of public school settings in the United States. Your participation will assist in increasing the research base in education and may lead to better programming for students with autism.

The survey is web-based and is located at the following URL:
http://spedsurvey.gmu.edu/snap/support_for_students_with_autism_disorders/

This survey should take approximately 15 minutes to complete. I greatly appreciate the effort and time you invest in completing this survey. Your input is very important. Should you have questions, please feel free to contact me. Thank you for your time and attention.

Very Sincerely,

Cheri Sandford
Doctoral Candidate
George Mason University

Appendix B

Supports Available to Students with Autism Spectrum Disorders

INFORMED CONSENT

Research Procedures: This research is designed to study the instructional, strategic, technological, and behavioral supports available to students with autism spectrum disorders in a variety of general and special education settings in public schools in the United States. If you agree to participate, you will be asked to take an internet-based survey. This survey should take approximately 15 minutes of your valuable time.

There is an opportunity to provide additional information or clarification by phone or email. If you would like to participate in this follow-up, you will be asked to enter your contact information after the survey questions. Participants will be randomly selected from those indicating their willingness to be interviewed. The follow-up interview should take an additional 15-20 minutes of your time.

Risks: There are no foreseeable risks for participating in this research.

Benefits: There are no direct benefits to you. However, the study is likely to yield information on the educational structure afforded to students with autism spectrum disorders in public schools.

Confidentiality: All data collected from this web-based survey will be kept confidential. Names and other identifiers will not be placed on surveys or other research data. Your responses will not be identified with you personally. No individual demographic information will be shared, and all information will be incorporated in the group data. Your contact information will only be used to follow up with you should you choose to volunteer for follow-up or wish to receive a copy of the study results.

While no computer transmission is perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmissions. To further protect your responses, it is recommended that you close the internet browser once you have completed this survey.

Participation: Your participation is entirely voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party for participating in this research.

Contact: This research is being conducted by Cheri Sandford as part of a doctoral dissertation in George Mason University's College of Education and Human Development. If you have questions or wish to report a research-related problem, Ms. Sandford may be contacted via email at csandfor@gmu.edu or by phone at 703-475-7779. The faculty chairperson for this research is Dr. Margo Mastropieri. She may be reached at mmastrop@gmu.edu or 703-993-4136. If you have questions regarding your rights as a participant in this research, you may contact the Office of Research Subjects Protections at 703-993-4121.

Consent: I have read this form and agree to participate in this research study. It is recommended that you print out a copy of this page to keep as documentation of your informed consent. The George Mason University Human Subjects Review Board has waived the requirement for a signature on this document. However, if you wish to sign a paper consent form, please contact Cheri Sandford at csandfor@gmu.edu.

Appendix C

Supports Available to Students with Autism Spectrum Disorders

Part 1: DEMOGRAPHIC INFORMATION

What is your current employment position?

- General education teacher
- Special education teacher
- Administrator

Other: (please specify) _____

Including this year, how many years of experience do you have in your current position? [Please write a whole number; for example, 7.]

_____

What is the highest level of education you have completed?

- Bachelor's degree
- Bachelor's + 15 credits
- Master's degree
- Master's + 15 credits
- Master's + 30 credits
- Specialist degree (e.g., Ed. S.)
- Doctoral degree

At what level do you teach or supervise teachers?

- Early intervention (prior to age 3)
- Preschool (ages 3-6)
- Elementary
- Middle School
- High School
- Post-secondary
- Other (please specify) _____

What certifications/licenses do you hold? (Please list all grade level, specialty and subject area

endorsements.)

Are you Highly Qualified, according to the No Child Left Behind Act, in your current position?

- Yes
- No
- Not applicable

How did you obtain your teaching licensure?

- traditional university program
- alternative teacher preparation program
- Other (please specify)

What is your gender?

- Female
- Male

What is your age? [Please write a whole number; for example, 43.]

What is your race/ethnicity?

- African American
- Asian
- Caucasian/Non-Hispanic
- Hispanic
- Native American or Alaskan Native
- Other (please specify)

In your current position, where do you spend most of your time?

- In general education settings
- In special education settings
- In both general and special education settings equally
- In an administrative position, supervising primarily general education
- In an administrative position, supervising primarily special education

- In an administrative position, supervising both general and special education equally
- Other (please specify)

What is the geographic setting of your school?

- Urban = inside a metropolitan area and inside a principal city with a population of <100,000 – 250,000 or more
- Suburban = outside a principal city and inside a metropolitan area with a population of <100,000 – 250,000 or more
- Rural = area that is ≤ 5 miles – >25 miles or more from a metropolitan area

What is the size of the school system in which you work?

- Large = 5,000 – ≥100,000 students
- Medium = 800 – 4,999 students
- Small = 1-799

In what state is the school system in which you teach?

PART 2: AUTISM KNOWLEDGE AND EXPERIENCE

What level of knowledge do you have about autism spectrum disorders?

- No knowledge
- Limited knowledge
- Some knowledge
- Extensive knowledge

Where did you receive your training for working with individuals with autism?

- standard university teacher preparation program
- alternative teacher preparation program
- inservice/professional development programs in school district
- no formal training received
- Other (please specify)

What level of experience do you have in working with students with autism spectrum disorders?

- no experience
- limited experience
- somewhat experienced
- highly experienced

What is your comfort level in working with students with autism spectrum disorders?

- very uncomfortable
- somewhat uncomfortable
- neutral
- somewhat comfortable
- very comfortable

With how many students with autism spectrum disorders have you worked directly or indirectly in the past 3 years?

Administrators, go to Part 4.

Part 3: AUTISM CLASSROOM INSTRUCTION AND SUPPORTS

Please rate how often the classroom supports below are available to students with autism spectrum disorders in the classroom(s) in which you spend the majority of your time. Then rate how important they are in this setting.

Use of Classroom Supports

	Never	*Very Little Time*	*Some of the Time*	*Most or All of the Time*
Low student: teacher ratios				
Ongoing formative assessment				
Instruction with typically-developing peers				

Visual supports (schedules, room organization, etc.)	○	○	○	○
Augmentative and alternative communication (AAC)	○	○	○	○
Structured learning environments	○	○	○	○
Functional behavior assessments	○	○	○	○
Behavior intervention plans	○	○	○	○
Positive behavior supports (school-wide, group, or individual)	○	○	○	○
Curriculum designed to address core deficits	○	○	○	○
Access to the general education curriculum	○	○	○	○
Systematic, targeted direct instruction	○	○	○	○
Applied behavior analysis consultative services	○	○	○	○
Educational Paraprofessional	○	○	○	○
Discrete trial teaching	○	○	○	○
Reinforcement systems (contingency-based systems, such as token economies, tangibles, etc.)	○	○	○	○
Social skills training	○	○	○	○
Video or computer modeling	○	○	○	○
Picture Exchange Communication System (PECS)	○	○	○	○
Voice output devices	○	○	○	○

Sign language	○	○	○	○

Importance of Classroom Supports

	Very Unimportant	*Somewhat Unimportant*	*Somewhat Important*	*Very Important*
Low student: teacher ratios	○	○	○	○
Ongoing formative assessment	○	○	○	○
Instruction with typically-developing peers	○	○	○	○
Visual supports (schedules, room organization, etc.)	○	○	○	○
Augmentative and alternative communication (AAC)	○	○	○	○
Structured learning environments	○	○	○	○
Functional behavior assessments	○	○	○	○
Behavior intervention plans	○	○	○	○
Positive behavior supports (school-wide, group, or individual)	○	○	○	○
Curriculum designed to address core deficits	○	○	○	○
Access to the general education curriculum	○	○	○	○
Systematic, targeted direct instruction	○	○	○	○
Applied behavior analysis consultative services	○	○	○	○
Educational Paraprofessional	○	○	○	○

Discrete trial teaching	○	○	○	○
Reinforcement systems (contingency-based systems, such as token economies, tangibles, etc.)	○	○	○	○
Social skills training	○	○	○	○
Video or computer modeling	○	○	○	○
Picture Exchange Communication System (PECS)	○	○	○	○
Voice output devices	○	○	○	○
Sign language	○	○	○	○

Please rate how often you perceive the classroom supports below are available to students with autism spectrum disorders in (other) general and special education classrooms in your building.

General Education Classrooms

	Never	*Very Little Time*	*Some of the Time*	*Most or All of the Time*
Low student: teacher ratios	○	○	○	○
Ongoing formative assessment	○	○	○	○
Instruction with typically-developing peers	○	○	○	○
Visual supports (schedules, room organization, etc.)	○	○	○	○
Augmentative and alternative communication (AAC)	○	○	○	○
Structured learning environments	○	○	○	○

Functional behavior assessments	○	○	○	○
Behavior intervention plans	○	○	○	○
Positive behavior supports (school-wide, group, or individual)	○	○	○	○
Curriculum designed to address core deficits	○	○	○	○
Access to the general education curriculum	○	○	○	○
Systematic, targeted direct instruction	○	○	○	○
Applied behavior analysis consultative services	○	○	○	○
Educational Paraprofessional	○	○	○	○
Discrete trial teaching	○	○	○	○
Reinforcement systems (contingency-based systems, such as token economies, tangibles, etc.)	○	○	○	○
Social skills training	○	○	○	○
Video or computer modeling	○	○	○	○
Picture Exchange Communication System (PECS)	○	○	○	○
Voice output devices	○	○	○	○
Sign language	○	○	○	○
Special Education Classrooms				
	Never	*Very Little Time*	*Some of the Time*	*Most or All of the Time*

Low student: teacher ratios	○	○	○	○
Ongoing formative assessment	○	○	○	○
Instruction with typically-developing peers	○	○	○	○
Visual supports (schedules, room organization, etc.)	○	○	○	○
Augmentative and alternative communication (AAC)	○	○	○	○
Structured learning environments	○	○	○	○
Functional behavior assessments	○	○	○	○
Behavior intervention plans	○	○	○	○
Positive behavior supports (school-wide, group, or individual)	○	○	○	○
Curriculum designed to address core deficits	○	○	○	○
Access to the general education curriculum	○	○	○	○
Systematic, targeted direct instruction	○	○	○	○
Applied behavior analysis consultative services	○	○	○	○
Educational Paraprofessional	○	○	○	○
Discrete trial teaching	○	○	○	○
Reinforcement systems (contingency-based systems, such as token economies, tangibles, etc.)	○	○	○	○

Social skills training	○	○	○	○
Video or computer modeling	○	○	○	○
Picture Exchange Communication System (PECS)	○	○	○	○
Voice output devices	○	○	○	○
Sign language	○	○	○	○

Part 4: RATIONALES FOR AUTISM CLASSROOM INSTRUCTION AND SUPPORTS

What is the most significant influence on your teaching students with autism spectrum disorders?

- ☐ Teacher education program
- ☐ Teaching colleagues
- ☐ Administrators
- ☐ District inservices
- ☐ Other

Please use the space below to describe how you select classroom instruction and supports for students with autism.

Part 5: ADDITIONAL COMMENTS

In the space below please address you opinions or concerns about strengths and needs of current autism programs.

Did you respond to this survey after receiving:

- ☐ an email?
- ☐ a postcard?

If you would be willing to provide additional information or clarification by phone or email, please enter your contact information below. All information will be kept strictly confidential.

THANK YOU

Thank you for your time and effort in completing this survey. Your input is important!

Please contact me if you would like a copy of the results.

Appendix D

Follow-Up Interview Questions for Autism Supports Survey

You indicated in the survey that you had _____training in working with students with autism spectrum disorders. How helpful did you feel that training was in preparing you to meet the demands of your current job?

Please respond to the following statements using the following scale:

1 = strongly disagree
2 = disagree somewhat
3 = neither agree nor disagree
4 = agree somewhat
5 = strongly agree

NOTE: The interviewer may prompt further comment on any statement. "Why do you say….?" or "Can you tell me more about…?"

1. Students with autism spectrum disorders benefit from instruction by staff members specifically trained to work with autism.

2. It is important for all staff members, including teachers, instructional assistants, specialists, related service providers, and support personnel, to receive training specifically for working with children with autism spectrum disorders.

3. Students with autism spectrum disorders should be included in general education classes.

4. Students with autism spectrum disorders benefit from social (i.e., non-academic) inclusion in general education settings.

5. Students with autism spectrum disorders benefit from academic instruction in general education settings.

6. Students with autism spectrum disorders should have access to whatever supports are necessary for them to be successful.

7. Students with autism spectrum disorders should need fewer supports if they are educated in inclusive settings.

Is there anything else you would like to share with me about your views on autism supports?

Appendix E

Statistical Test	Rationale	Results/Significance	Total Significant Tests	Total Tests Not Significant
Cronbach's Alpha on survey subscales and total instrument	internal consistency	high internal consistency on all subscales (.958 - .976) and overall measure (.986)	N/A	N/A
Means/SDs for Total Use of Supports & Mann-Whitney for gen. ed./sp. ed. teacher groups	RQ 1 difference in supports available Non-parametric: gen. ed. n = 26 sp. ed. n = 80	1 significant difference	1	0
Means/SDs for Perceived Use of Individual Supports in Gen. Ed. / Sp. Ed. classrooms & (21) T-tests comparing ratings for 2 major groups	RQ 1 difference in availability of individual supports (perception) across settings	19 significant differences; 2 tests not significant	20	2
Pearson r – highest degree with total use of supports	RQ 2 correlation between educational background and total use of supports	1 test not significant	20	3
(2) Pearson r – route to licensure and NCLB HQ status with total use of supports	RQ 2 difference in total use (quantity) by educational background	0 significant differences	20	5
Pearson r – knowledge of autism with total use of supports	RQ 2 correlation between educational background and total use of supports	1 significant correlation	21	5
1-way ANOVA (verified by Kruskal-Wallis) with post-hoc Tukey for knowledge of autism	RQ 2 educational background and total use of supports	significant difference among groups (limited & some; limited & extensive)	22	5
1-way ANOVAs (21) with post-hoc Tukey for knowledge of autism and use of individual supports	RQ 2 educational background and use of individual supports	16 significant differences among groups (limited & higher knowledge groups); 5 tests not significant	38	10

(2) Pearson *r* – training in autism and knowledge of autism; training in autism and total use of supports	RQ 2 correlation between educational background and total use of supports and between background characteristics	1 test not significant – training method and knowledge of autism; 1 significant correlation – training method and total use	39	11
1-way ANOVA with post hoc Tukey for training in autism and total use of supports; verified by Kruskal-Wallis	RQ 2 educational background and total use of supports	1 significant difference (no training & inservice; no training & university prep)	40	11
(2) Pearson *r* – experience and knowledge; experience and total use of supports	RQ 2 correlation between educational background and total use of supports and between background characteristics	2 significant correlations	42	11
1-way ANOVA with post hoc Tukey for experience with autism and total use	RQ 2 educational background and total use of supports	1 significant difference – limited experience and somewhat experienced; limited experience and highly experienced	43	11
Pearson *r* – number of students with ASDs and total use of supports	RQ 2 correlation between educational background and total use of supports	1 significant correlation	44	11
Pearson *r* – educational level and total use	RQ 3 correlation between professional characteristics and total use	0 significant correlations	44	12
T-test for total use by aggregated educational level	RQ 3 professional attitudes/opinions and total use of supports	0 significant differences	44	13
Pearson *r* – employment position and total use of supports	RQ 3 correlation between professional characteristics and total use	0 significant correlations	44	14
Pearson *r* –primary work setting and total use of supports	RQ 3 correlation between professional characteristics and total use	0 significant correlations	44	15
1-way ANOVA for total use by primary work setting	RQ 3 professional attitudes/opinions and total use of supports	0 significant differences	44	16
Pearson *r* – primary work setting and total use of supports	RQ 3 correlation between professional characteristics and	0 significant correlations	44	17

	total use			
Pearson *r* – years of experience and total use of supports	RQ 3 correlation between professional characteristics and total use	0 significant correlations	44	18
Pearson *r* - comfort with autism and total use	RQ 3 correlation between professional characteristics and total use	1 significant correlation	45	18
Pearson *r* – importance of supports and total use of supports	RQ 3 correlation between professional characteristics and total use	1 significant correlation	46	18
SUMMARY OF TEST SIGNIFICANCE			71.9% of statistical tests showed significant results	28.1% of statistical tests showed no significant results

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