Visual Supports for Young Children with Autism

by

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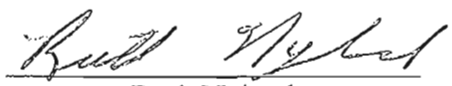

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Abstract

The purpose of this study is to increase the knowledge of educators about interventions to help increase the learning of young children with autism, through examining information about visual supports to broaden the teaching strategies of special education teachers. This literature review will discuss current research about autism, identify interventions with visuals that are currently being used for young children with autism, research the effects visuals on their learning, and why these visuals are/are not beneficial. In order to understand why children with autism are visual learners and benefit from visual strategies, knowledge must be gained in regards to their brain development and differences in thinking. The literature review examines five main interventions, which incorporate the use of visuals; Structured Teaching; Augmentative and Alternative Communication; Picture Exchange Communication System (PECS); The Incredible 5-Point Scale; and Social Stories and Comic Strip Conversations. The literature concludes by exploring various studies, which indicate the effectiveness of incorporating visual strategies into students learning and the implications for educators.

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Chapter I: Introduction

Autism is a developmental disability that is getting much attention in education, the medical profession, and the media recently. More people than ever before are being diagnosed with autism. It is unclear, however, if the increase is due to a broader definition of autism and diagnostic tools or a higher prevalence of the disorder (Center for Disease Control, 2010). No matter what the reason, more and more children are being diagnosed with autism, and will be receiving special education. It is because of the increase in numbers that it is even more important for educators to learn about the disorder and how these students learn. Through learning about autism and current interventions, educators will be knowledgeable to write individual education plans and help these children be successful in their learning.

According to the Autism Society of America (2010), autism is a complex developmental disability that typically appears during the first two years of life and is the result of a neurological disorder that affects functioning of the brain, impacting development in the areas of social interactions and communication skills. Both children and adults with autism often show delays in social interactions, verbal and non-verbal communication and play/leisure activities. Because autism is a spectrum disorder, every individual is unique and can range from mild to severe. Some individuals who are mildly delayed may exhibit only slight delays in communication and greater challenges with social interaction. They may have difficulty following a conversation or initiating play. These individuals can sometimes be described as talking "at" others instead of talking "to" them. They want to participate and be social but tend to appear awkward in doing so. Individuals with severe autism may be non-verbal and in some cases, be aggressive and/or exhibit self-injurious behavior. Individuals with severe autism often have delays in intellectual functioning as well. Some common symptoms of autism include:

resistance to change, difficulty expressing their needs, repeating words or phrases (echolalia), preference to being alone, not noticing others around them, little or no eye contact, unresponsive to normal teaching methods, spinning or lining up objects, over-sensitivity or under-sensitivity to pain, no real fears or dangers, or non-responsive to verbal cues (Autism Society of America, 2010). Many individuals with autism also have sensory integration problems, which may throw their senses off. These individuals can have a heightened sense of touch, where a tag on their shirt or the fuzz on a peach is painful, or a certain smell may make them gag. Some individuals may be bothered by the sound of fluorescent lighting or the hum of a furnace or fan.

Autism is one of five disorders that fall under the umbrella of Pervasive Developmental Disorders. According to the Diagnostic and Statistical Manual of Mental Disorders- Fourth Edition (1994), Pervasive Developmental Disorders (PDD) is a common term used to refer to children with autism and other related disorders, but is not a specific diagnosis. PDD is an umbrella term under which specific diagnoses are defined. There are no medical tests to determine the presence of PDD's, but rather is based off observations of the presence or absence of specific behaviors. The five related disorders include: Autistic Disorder; Asperger's Disorder; Rett's Disorder; Childhood Disintegrative Disorder; and Pervasive Developmental Disability-Not Otherwise Specified (PDD-NOS).

Autistic Disorder is the most common among the five disorders and is characterized by an inability to use verbal and/or non-verbal communication and delays in social interactions. Most individuals also have obsessive interests in objects or information and/or repetitive or stereotyped patterns of behavior, interests, or activities. In order to be classified as an autistic disorder, these symptoms must be noted before the age of three.

Asperger's Disorder has many of the same symptoms as autistic disorder, although the symptoms are not as severe and individuals commonly have an average or above average IQ. Individuals with Asperger's often want to be social, but do not know how. Reading non-verbal cues, body language, and emotions are very difficult. Asperger's is usually identified when children are school-aged.

Rett's disorder, Child Disintegrative Disorder, and PDD-NOS are less common forms of Pervasive Developmental Disorders. Rett's Disorder is a more severe and rare condition than autism and Asperger's. Children with Rett's Disorder develop typically from birth to five months, but from five months to 48 months, their head circumference development slows and causes many developmental problems. These individuals lose motor skills that they previously had and their social and communication skills become impaired. The most rare and severe of the five PDD's is Childhood Disintegrative Disorder. Children develop typically and the onset of Childhood Disintegrative Disorder begins between ages 2 to 10. These children become increasingly less able to interact socially and communicate. They lose motor skills and begin to develop repetitive movements and obsessive behaviors/interests. Pervasive Developmental Disability- Not Otherwise Specified (PDD-NOS) is considered atypical autism and does not fit the criteria for autistic disorder or any other autism spectrum disorder.

Pervasive Developmental Disability terms are most commonly used in the medical field to give specific diagnoses using the DSM-IV (1994). However, when evaluating a child for special education and an Individual Education Plan, school districts use a slightly different criteria to determine whether the child qualifies under an Autism Spectrum Disorder, but does not specify which DSM-IV diagnosis should be given. Although there are many differences in

the key characteristics and symptoms of these five disorders, the treatments and interventions are similar and for the purpose of this literature review, the term autism will be used to describe intervention strategies for all of the above Pervasive Developmental Disabilities.

Autism was first used to describe children with emotional and social problems and research began in the United States in the 1940's. Leo Kanner from John's Hopkins University and Hans Asperger, a researcher from Germany, were two of the leaders in the research about autism (Hirsch, 2009). Since the 1980's and 1990's, more research has been done on the brain development, causes, and interventions of autism. Currently, according to the a study by Catherine Rice through the Centers for Disease Control and Prevention (2010), autism affects an estimated 1 in 100 births, which means approximately 1.5 million Americans are believe to have some form of autism. Based on statistics from the U.S. Department of Education and other governmental agencies, autism is growing at a rate of 10-17 percent per year (Centers, 2010). Autism has not been found to be more prevalent in any race, ethnicity, or socioeconomic status. The incidence of autism is, however, four times more prevalent in boys than girls (Centers, 2010). Autism has been found to run in families and most researchers agree that the causes are likely to be genetic, although the underlying causes are still unknown. Some people argue that environmental factors may also be involved. Although the cause of autism is still unknown, much research has been developed regarding brain functioning, learning styles, and interventions for individuals with autism. So, although there is no cure or prevention of autism at this point, there are many ways to help individuals with autism learn and succeed.

In the school setting, many students with autism are in inclusive classrooms learning successfully and needing minimal assistance and/or adaptations, while others need to be in a

more structured environment in a separate classroom than their typically developing peers. In order to teach any student, learning about the student as an individual and identifying their learning style is very important. Howard Gardener, a professor in education at Harvard University, developed the theory of multiple intelligences to explain the way various students learn. According to Gardner and Hatch (1990), there are 7 different intelligences: logical-mathematical; linguistic; musical; spatial; bodily-kinesthetic; interpersonal; and intrapersonal. Many students in traditional classrooms are auditory and linguistic learners who are able to learn and follow directions just by listening to a teacher. Musical learners learn best through tone and rhythm, which can include rhyming or singing information, while kinesthetic learners learn best by doing and experiencing. Children with autism tend to have strengths in the areas of visual/spatial construction on the Wechsler IQ test but show weakness in the areas of verbal and social reasoning (Mesibov, Shea, & Schopler, 2004). Having communication deficits, like most children with autism have, makes learning through the traditional auditory/linguistic style alone very difficult. The challenge for teachers is how to incorporate the spatial intelligence into their teaching to help individuals with autism learn.

Statement of the Problem

Given the prevalence of children being diagnosed with autism is increasing, it is important to study the use and efficacy of current interventions. The purpose of this literature review is to examine the research regarding interventions, which include visual supports for children with autism and their efficacy.

Research Questions

1. What are the recommended interventions for children with autism that include visual supports for supporting learning in all areas of development?
2. Why are visuals believed to be beneficial for students with autism?
3. What is the efficacy of interventions that incorporate visuals?

Purpose of the Research

The purpose of this study is to increase the knowledge of educators about interventions to help increase the learning of young children with autism, through examining information about visual supports to broaden the teaching strategies of special education teachers. This study will discuss current research about autism, identify interventions with visuals that are currently being used for young children with autism, research the effects visuals on their learning, and why these visuals are/are not beneficial.

Assumptions of the Study

Researchers make assumptions regarding their research. Below are two assumptions for the study of using visual supports for children with autism.

1. Visual supports increase the learning of children with autism and there will be studies available to reinforce this belief..
2. All articles will be readily available, current, and accurate.

Definition of Terms

These are a list of terms that need to be understood for the literature review:

Asperger Syndrome. A pervasive developmental disorder characterized by slight delays in communication and social abilities with an average or above average IQ usually diagnosed around school age (American Psychiatric Association, 1994).

Augmentative and Alternative Communication (AAC). Interventions designed to compensate for the expressive communication impairment of an individual (electronic devices, picture boards, sign language) (Buron & Wolfberg, 2008).

Autism. A pervasive developmental disorder of neural development characterized by impaired social and communication development accompanied by restricted and/or repetitive behavior, which is commonly diagnosed by the age of three (American Psychiatric Association, 1994).

Child Disintegrative Disorder. Pervasive developmental disorder also known as Heller's syndrome or disintegrative psychosis. A rare condition characterized by late onset (>3 years of age) of developmental delays in language, social function, and motor skills (American Psychiatric Association, 1994).

Communication. The process of transferring information from one person to another (Bondy & Frost, 2002).

Expressive Communication. The ability to use language to convey a message (Bondy & Frost, 2002).

Individual Education Plan (IEP). Written document including assessing the student in all areas related to the suspected disability, considering access to the general curriculum, considering how the disability affects the student's learning, and developing goals and objectives for the student (Buron & Wolfberg, 2008).

Pervasive Developmental Disorder. A group of disorders characterized by delays in the development of socialization and communication skills. Autism, Asperger's Syndrome, Childhood Disintegrative Disorder, Rett's Syndrome and PDD-NOW are commonly diagnosed PDD's (American Psychiatric Association, 1994).

Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS). A subthreshold condition in which some, but not all, features of autism or another explicitly identified Pervasive Developmental Disorder is identified (American Psychiatric Association, 1994).

Picture Exchange Communication System (PECS). A form of augmentative and alternative communications that uses pictures instead of words to communicate (Bondy & Frost, 2002).

Physical prompt. Helping an individual by gently guiding them through the use of touch.

Receptive Communication. The understanding of language and messages from others (Bondy & Frost, 2002).

Repetitive and stereotyped patterns of behavior. This may include hand flapping, rocking, spinning (motor stereotypes and mannerisms); development of specific routines and rituals; difficulty with transitions or changes in routine; maintaining a fixed posture or body position (catatonia); and preoccupation with certain objects or activities (Autism Society of America, 2010).

Chapter II: Literature Review

This chapter will include information on the brain development and culture of autism and visual supports. In addition, this chapter will also detail five of the most common intervention strategies that incorporate using visuals as well as other ways visuals are used to teach social skills and positive behaviors. The chapter will conclude by examining research conducted about the efficacy of using visuals to help students with autism in their learning.

Brain Development and the Culture of Autism

Culture refers to a shared pattern of behavior and is an anthropological term generally used to describe specific ethnic groups, tribes, or races. If we look at culture for what it truly is, a shared pattern of behavior, which affects the way people think, eat, dress, work, spend leisure time, communicate, and even how they view natural phenomena; then autism could fit the definition of a culture (Mesibov, Shea, & Schopler, 2004, p. 19). Autism often affects individuals' communication, eating, leisure habits, and the way they think. The Treatment and Education of Autistic and related Communication handicapped Child (TEACCH) coined the phrase culture of autism to address these shared patterns of behavior among individuals with autism (Mesibov, et. al., 2004). Parents and teachers need to learn about and come to understand the culture of autism in order to help their students. TEACCH believes that parents and teachers play the role of cross-cultural interpreter because they understand both cultures and can help translate (Mesibov et. al., 2004, p. 19). As with any culture, there are individual differences including intelligence, age, temperament, interests, and unique patterns of skills.

Within the culture of autism, there are many characteristics including differences in thinking and brain development. Little was known about the brain of individuals with autism until researchers were able to use magnetic resonance imaging (MRI) and functional magnetic resonance imaging (fMRI) (Mesibov et.al, 2004). The functional magnetic resonance imaging was the most significant advance for autism because researchers were then able to measured brain activity during cognitive and language tasks. The fMRI has been repeated using tasks that involve problem solving (Just, Keller, Cherkassky, Kana, & Minshew, 2007); social thinking (Kana, Keller, Williams, Minshew & Just, 2005); and inhibiting context inappropriate behavior (Kana, Keller, Minshew, & Just, 2007). The results have all been similar and suggest a common principle of underdevelopment of the connectivity of the neural systems. Neural systems support higher-order abilities in the brain. These studies indicate that the neural systems of individuals with autism have fewer and smaller centers to call upon and less flexibility to do so (Mesibov et. al., 2004). Which means, when demands change and different abilities are needed, the brain in autism has less flexibility and fewer and smaller resources to draw upon (Buron & Wolfberg, 2008). The fMRI has also revealed differences in the cognitive approach to task, which are not apparent during performance, and many other slight differences. Because of these differences in their brain, individuals with autism will often create compensatory strategies to help them. Temple Grandin (1996) uses visual thinking as a compensatory strategy. She explains that thinking about abstract concepts like justice and honor are difficult, but she thinks of episodes from TV program *Law and Order* (Grandin, 1996). Depending on the situation, compensatory strategies can be a strength or a limitation. Understanding the brain development in individuals with autism is the foundation for effective and appropriate intervention (Buron & Wolfberg, 2008).

Through compiling much research on brain development, TEACCH identified the eight main areas of differences in brain development. As stated previously, in order to plan effective and appropriate interventions, professionals need to consider and understand these differences. The eight differences in thinking are 1) concept of meaning; 2) focus on details; 3) distractibility; 4) concrete vs. abstract thinking; 5) integrating ideas; 6) organization and sequencing; 7) generalization; and 8) time (Mesibov et.al, 2004). These main differences in thinking lead to differences in learning and neurobehavioral patterns, which will also be examined.

One characteristic that sets individuals with autism apart from their peers is their difficulty imposing meaning on their experiences. They can act on their environment, learn skills, and many develop language, but they have a limited capacity to understand what many experiences mean (Mesibov et. al, 2004, p. 21). They have a difficult time drawing relationships between ideas and events, which mean they are walking around in a world that is full of unrelated events and demands.

Individuals with autism are often very good at observing even minute details, especially visual details. They may notice objects have moved or the paint is flaking on a wall. They may also focus on sensory details like the reflection of a light, the sound of a fan, or the feel of a fabric. Individuals with higher IQ's may focus on more cognitive details like letters or numbers. What they have trouble with is assessing the importance of all the details they have noticed and often miss what they should be attending to. The inability to create meaning and their emphasis on details lead to tremendous differences in associations (Mesibov et. al, 2004).

Focusing on details they find more interesting to them than the task at hand often easily distracts children with autism. They may be attending to an adult, and quickly their focus will be

on a visual behind the adult or on the sensory stimuli they have noticed in the environment. Some individuals' distractibility may stem from internal stimulation like the desire for a specific object they remember from a previous experience. While others may be distracted by internal cognitive processes like rhyming, counting, or computer that they have previously learned (Mesibov et.al., 2004). According to Mesibov et.al. (2004), whatever the source of the distraction, people with ASD have great difficulty interpreting and prioritizing the importance of the external stimulation and internal thoughts that bombard them. (p. 22) Some individuals constantly look, move, and explore while others may appear to shut out everyone and everything around them by becoming preoccupied with their own thoughts or activities.

Concrete thinking vs. abstract thinking is another area where individuals with autism differ from the general population. It is difficult for people with autism to understand symbolic or abstract concepts. They tend to be better with facts and descriptions. To these individuals, words only have one meaning. They do not understand connotations or subtle associations. When individuals with autism learn rules, those rules are black and white and there are no shades of gray (Mesibov et. al., 2004). Being concrete thinkers makes it hard for these individuals to understand flirting or teasing.

Combining or integrating ideas is difficult for people with autism. They are often much better at focusing on single details, facts, or concepts that putting them together. Putting concepts together is especially difficult when it involves contradiction. Mesibov et. al. (2004) gives an example of this concept,

> "A young man went on regular camping trips to a place called Camp Dogwood. Most of the camping trips were in the fall and early spring, never when the dogwoods were

> flowering. Each time this young man came to Camp Dogwood he expressed his wish to see the dogwoods flowering. Finally he got his wish when his group went to Camp Dogwood in April. Knowing how long he had waited, the woman who managed the camp placed a dogwood blossom on his plate, so he could find it when he came down for breakfast the first morning. The young man picked up the dogwood flower and marched straight to the kitchen looking for the manager, no to thank her but to give her a long lecture about the inappropriateness of picking flowers and the importance of protecting nature (he was a member of an environmental club). When it was explained to him that she was a nice woman who had picked the flower as a gesture of affection, he insisted that if she were nice she would know that hurting the environment was wrong, so scolding her was doing her a favor. He could not understand how two inconsistent concepts (nice people save the environment and a nice person picked flowers) could both be accurate." (p. 23)

Related to the difficulty of integrating multiple pieces of information are problems with organization and sequencing (Mesibov et.al., 2004). Organization requires the integration of several elements in order to achieve a predetermined end. This is difficult because it require the individual to focus on the immediate situation and the desired outcome at the same time, where people with autism tend to focus on specific, individual details (Mesibov et. al., 2004). Individuals with autism also have a difficult time sequencing and is common to find a person begin a task, stop, and begin again at the beginning. They have trouble remembering what order to complete a task in and often follow in an illogical sequence like putting their shoes on before their sock. They know they need to put their shoes on, but cannot remember where in the sequence that task comes. They often do not notice their counter-productivity. According to

Mesibov et.al. (2004), while they have mastered the individual steps in a complex process, they do not understand the relationship among the steps, or the meaning of the steps with regards to the final outcome. (p. 24)

Generalization is one of the last two differences in thinking outlined by TEACCH (2004). Because individuals with autism are very concrete and focus on individual facts, they have a difficult time generalizing their skills. They may learn skills in one situation, but have difficulty transferring those same skills to a difference situation (Mesibov et. al, 2004). An individual may be taught to use PECS (picture exchange communication system) to request snack at school, but is unable to use PECS at home to request snack, or may be taught how to wash plates, but is unable to transfer the skill of washing to glasses. A child, who usually uses a green toothbrush independently, may not know what to do if he is handed a blue toothbrush. An individual with autism often needs to be prompted and/or re-taught the skills in a new setting.

Difficulties with the concept of time are common for individuals with autism. They may often perform activities too quickly or too slowly according to general public (Mesibov et. al, 2004). The concept of beginning, middle, and end is also very difficult often need to be made very clear for people with autism. Because of this, it is difficult for individuals to continue with an unpleasant situation because they do not know when it will end, or they may difficulty waiting for things that they desire. These situations often lead to problem behavior.

With the impact of the differences in thinking, how is the learning for individuals with autism impacted? Considering the differences explained above, and the way these individuals learn, will make it easier for educators to make adjustments in their educational programs to help children with autism succeed and learn.

People with autism are visual learners (Quill, 1997). Using visuals can help individuals facilitate their ability to construct meaning, follow sequences, generalize skills, and understand abstract concepts. Temple Grandin (1996) describes in her books that she has learned to facilitate precision in many tasks and will visualize abstract ideas to help her compensate for her difficulties. Along with differences in thinking, individuals with autism also commonly have deficits in both expressive and receptive communication and social skills. Pairing visual supports can help individuals understand cognitive processes as well as social situations and to understand and use language.

Because integration and understanding the world around them is difficult, individuals often count on the people around them to help them. Some individuals may become overly dependent on the prompted and information given to them by others to initiate tasks and follow routines (Mesibov et. al., 2004, p. 25).

In addition to differences in thinking and learning, researchers have also found differences in neurobehavioral patterns including strong impulses, excessive anxiety, and various sensory and perceptual differences (Mesibov et. al, 2004). Individuals with autism often display extraordinarily intense and persistent behaviors when they desire something. These impulsive behaviors can often resemble symptoms of obsessive-compulsive disorder and can be very difficult to control (Mesibov et. al, 2004). Many individuals with autism exhibit excessively high levels of anxiety. This can be due to biological influences and the result of living in an environment that they perceive to be very unpredictable and overwhelming. Not knowing what is expected of them and what is happening can increase anxiety as well. The final neurobehavioral patterns in people with autism are sensory and perceptual differences (Mesibov et. al, 2004).

Unusual food preferences, staring at their fingers flicking, rocking, spinning, hand flapping, not responding to sounds, and rubbing textures against their cheeks are a few sensory patterns seen in autism.

The characteristics described in thinking, learning, and neurobehavioral patterns interact to produce the familiar patterns of behavior characteristics of autism. Attachment to routines, tantrums and aggression, limited social skills and emotional empathy, limited play skills, difficulty with initiation, and noncompliant behavior are common problems that need to be addresses in individual education plans and interventions (Mesibov et. al, 2004). Because individuals with autism are often visual learners, there are many interventions that have been designed, using visual supports, to address these common characteristics and help individuals become more independent and understand their environment. These interventions include: Structured Teaching; augmentative and alternative communication; Picture Exchange Communication System (PECS); behavior supports; The Incredible 5 Point Scale; and Social Stories which will be explained in further detail later in the literature review.

What is a visual?

A visual is anything that is seen (Use Visual Strategies, 2010). Body movements, environmental cues, pictures, objects, and written language can all be used to support communication. Visuals are referred to by numerous names: visual strategies, visual supports or visual tools. All of the terms refer to using something visual to help individuals understand communication better. The visually perceived stimuli can assist an individual in comprehending information and demands (Breitfelder, 2008). In the classroom setting, these supports could be for direction following, schedules, rules, and understanding instructions. Visual strategies help

individuals who are visual learners in many ways. Visuals help communicate information to and from individuals, help students organize their thinking, help give choices, communicate rules, and to give information such as what is happening. By using visual supports, students who have communication delays can have: eased transitions, feeling of empowerment by having visual choices, clearly defined expectations, longer attention span, reduced anxiety, concepts become more concrete, and the ability to express his or her thoughts (Breitfelder, 2008; Gagie & Rao, 2006). Visual strategies have also been successfully used to teach children with autism literacy skills (Broun, 2004), to cook (Orth, 2003), to encourage positive behavior (Crozier & Sileo, 2005), to provide activity schedules using computers and video (Kimball, Kinney, Taylor, & Strommer, 2004), and for signaling activity change and transitions (Dettmer, Simpson, Myles, & Gantz, 2000). Visual supports help bring structure, routine, and sequence to their environment which is needed to function during daily activities (Gagie & Rao, 2006). Visual supports can be developed using simple, inexpensive, everyday materials and inexpensive games to enhance processing ability and teach social skills, play skills, academic skills, positive behaviors, and communication skills to individuals with autism (Gagie & Rao, 2006). According to Cohen and Sloan (2007), there are six features that should be kept in mind when designing a visual support for an individual: type of photos or pictures; durability; portability; clarity; age appropriateness; and response effort required. When developing visual supports, also keep in mind, "What do you want to accomplish? What is your goal?" Some of the most important goals are: getting a students attention; improve understanding; decrease fear and anxiety; support appropriate behavior and participation; improve expressive communication; teach self-regulation so students learn to manage their own behavior; teach self-management and independence; and increase success of the student across settings and situations (Hodgdon, 2007, p. 65). Visual supports are

incorporated into various intervention approaches like TEACCH and Structure Teaching, Picture Exchange Communication System (PECS), Social Stories, The Incredible 5 Point Scale and many others to help children with autism reach their potential in every aspect of their life.

Structured Teaching

Structured teaching is an approach to intervention developed by TEACCH (**T**reatment & **E**ducation of **A**utistic and related **C**ommunication handicapped **CH**ildren) for both children and adults with autism. According to Meibov, et. al. (2004), structured teaching is an array of teaching or treatment principles and strategies based on the understanding of autism and can be applied on an individual basis. (p. 33) Structured teaching focuses not only on characteristic difficulties of autism, but also on individuals' skills, talents, special interests, personality, feelings, and potential. According to The TEACCH Approach to Autism Spectrum Disorders, the goal for educators is to see the world through their eyes, and then use this perspective to teach them to function in our culture as independently as possibly (Mesibov et. al., 2004, p. 31) This approach specifically recognizes the needs of the individual and incorporates into learning visual and written information and external organization. Structured teaching incorporates various elements of visual structure to translate the expectations and opportunities for children with autism who may otherwise not understand due to delays in expressive and receptive communication. The various elements of visual structure that will be examined further include, organization of physical environment, visual schedules, structured work/activity systems, and visually structured activities (Mesibov et. al, 2004).

Children with autism often have a difficult time generalizing skills and need to be specifically taught rules for the classroom, home, playground, riding in a car, etc. Rules are very

difficult to follow due to their lack of understanding, safety awareness and impulse control. Organizing the physical structure of the classroom can help instruct the students what activities happen where and physically mark boundaries in various areas (Mesibov et. al., 2004, p. 39). Arranging the classroom by putting shelves or dividers between center areas, using a rug to designate an activity area, or covering shelves with fabric when not in use are ways to give the classroom physical structure. Labeling with pictures or words or color coding tables and parts of the room also help the child visually understand his/her environment and follow the classroom rules and routines more effectively. There are many benefits to organizing the physical environment of the classroom for students with autism. These benefits can include: decreasing stimulation, limiting distractions, reducing anxiety, promoting independence, and more consistent and effective work (Mesibov et.al., 2004).

Visual schedules play a large role in structured teaching. There are many reasons why using a visual schedule can help children with autism. First, if a direction is given by an adult through verbal language only, there is a chance that the direction will not be fully comprehended due to a lack of understanding in receptive language, but being paired with a visual increases understanding by showing the individual what is expected of them (Mesibov et. al, 2004). Second of all, transitions are often difficult for children with autism because they have a hard time ending preferred activities or have difficulty following adult directives, but having the schedule tell the student what to do instead of a teacher instructing them, will often help defer behavioral difficulties (Mesibov et. al., 2004). Schedules help students become more independent once they have learned to use their schedule by lowing adult prompting during transitions. Visual schedules can also help promote a feeling of security, competence, and independence by visually seeing what is expected. Schedules have numerous uses and styles

depending on the classroom and the student. Classroom schedules show what will happen throughout the day and are most commonly large and placed where all students can access the information. These schedules are relatively consistent from day to day but display slight changes in the routine like going to the gym instead of the playground (Mesibov et. al, 2004). Some students may need an individual schedules as well as the classroom schedule, which are made to meet their individual needs. There are many difference types of schedules including; word, photograph, or symbol schedules; checklists; or concrete object schedules. Early learners or children with severe autism may not yet comprehend the connection between photos or symbols and the real object or activity. Using a piece of the activity or real object to represent what comes next on the schedule increases their understanding of what is expected (Mesibov et. al, 2004). Showing a child their diaper when it is time for the bathroom or showing the child a cup when it is time to eat are ways a concrete object schedule can be used. Depending on the student's level of functioning and the purpose of the schedule, they can be used as to do lists, have the full day or part day schedule, or only show one item. Schedules may be stationary and the child will walk over to check their schedule, or students can be shown their schedule and prompted by a teacher in order to transition. According to Mesibov et. al., (2004) schedules can and generally should include times for free choice by the individual, because making choices strengthens communication skills, increases the person's willingness to cooperate with the schedule, and provides the person with control and pleasure. (p. 42)

Once a student gets to an activity, they often do not know what to do, how long they have to be at the activity or what will happen next. Structured work and activity systems provide answers for four questions without words to show students what is expected of them; 1) What task or activity to do? 2) How much work? or How long with the activity last? 3) How will the

student know they are making progress is being made and the activity is finished? 4) What happens next after the work is done? (Mesibov et. al., 2004, p. 43) These questions are answered in a variety of ways. Like schedules, structured activity/work systems are developed and presented visually at the child's level. Many tasks are set up with the steps of the activity in pictures on the task, while others are simple activities with a clear beginning and end like putting together a puzzle. Tasks and activities that are used in work systems need to be tasks that the student can do independently. When first learning to do a work system, these activities are initially done during 1:1 teaching sessions and moved to the work station as they are followed independently (Mesibov et. al, 2004). Because organizing and sequencing is difficult for children with autism, work task centers have a visual schedule of the activities to complete with a bin to put the tasks when they are finished. Identifying what tasks need to be completed can be set up in many way including putting out the number of tasks or giving a schedule with pictures, colors, numbers, or words. This addresses the confusion that many individuals with autism have about beginning, middle, and end by visually showing them the progress they have made (Mesibov et. al, 2004). At the end of the task schedule will be a visual as to what the student is to do when they are finished with their work systems. The visual may tell the student to check their schedule, show them a choice picture to choose an activity or direct them to a specific activity.

Visually structuring activities is important because traditional education techniques for introducing new tasks or concepts have often not been successful for students with autism (Mesibov et. al, 2004). Traditional techniques most often incorporate language only instruction, which is not effective due to delays in communication for students with autism. Because individuals with autism have strengths in the area of visual perception, being engaged in activities that are visually clear and meaningful to them helps them to best accomplish the tasks

(Mesibov et. al, 2004, p. 45). Being able to see, hold, or touch something helps to visualize the concept being taught. Visually structuring activities include three components: visual instructions, visual organization, and visual clarity.

Visual instructions help the student know what they are to do and are the most essential element of visually structuring activities (Mesibov et. al, 2004). Often the materials will visually show the instructions, such as a block tower being placed in front of a student and extra blocks to replicate the tower. A jig, or a silhouette, is another common way to visualize instructions. A jig indicates exactly where to place the object. Because individuals with autism like matching and puzzles, jigs can be a very useful component for visual instructions (Mesibov et. al., 2004, p. 46) In order to teach a student how to set a table, a jig of a knife, fork, spoon, and napkin can be made. Instructions can also be displayed through written words or pictures. Visual instructions should reduce the content, compress the content to only contain the essential information, and be short and to the point like directions on a soup can (Buron & Wolfberg, 2008, p. 45).

Visual organization involves evenly distributing and stabilizing the materials for a task. By neatly organizing and stabilizing the materials, the distractibility of the student is lowered (Mesibov et. al, 2004). Individuals with autism are easily distracted and overwhelmed if there are pieces from different activities mixed or items are rolling around. Examples of ways to increase the visual organization of activities include using separate containers for various pieces (different colors), putting papers in folders, using baskets or trays for individual activities, and using velcro to make objects stay in place.

Visual clarity in an activity helps to identify the most important components and features (Mesibov et. al., 2004). As with visual organization, visual clarity helps to decrease confusion and the feeling of being overwhelmed. Educators can increase the clarity of a task by

highlighting what needs to be read, decreasing the amount of math problems by cutting and pasting problems to give the student more space for their work, or using distinctive colors or shapes. Using distinctive colors or shapes involves using "red vs. green" rather than "red vs. orange" or "huge vs. tiny" instead of "large vs. medium".

Together, organizing the physical environment and using visual schedules, structured work/activity systems, and visually structuring activities helps to accomplish the four main goals of structured teaching. The goals of structured teaching include 1) learning that situations have meaning and predictability 2) learning skills for adult life 3) spontaneous communication and 4) independence (Mesibov et. al., 2004, p. 38). In conclusion, according to Mesibov et. al. (2004), "structure teaching is based on the assumption that programs matching the neurological needs and preferences of individuals will facilitate their understanding and learning. Structured environments with strong visual cues meet the needs of individuals with autism more effectively than typical language-based educational settings, because organized, visually clear environments and cue are more closely related to the ways they process their environment." (p. 47).

A study conducted by O'Reilly, Sigafoos, Lanciono, Edrisinha, and Andrews (2005) examined the effects of a classroom activity schedule on levels of self-injury and engagement for a child with autism. The study only had one participant, Brandon, a 12-year old boy with autism and intellectual disabilities, who did not speak and engaged in self-injury of slapping his palm to either side of hit face or forehead. The self-injury behaviors occurred daily and ranged from a few minutes to several hours. The study also measured Brandon's engagement in activities in the second part of the study.

The first part of the study involved a functional analysis of his behavior. During phase 1, a series of four functional analysis conditions were examined (i.e., attention, no interaction,

demand, and play) to determine what factors affected his behaviors. The results showed that Brandon's self-injury behaviors primarily occurred when academic demands were placed on him (O'Reilly et.al., 2005). Self-injury did not occur during the attention condition and rarely occurred during the play sessions. In phase 2 of the study, the researchers interspersed demand sessions with play sessions to see if this would have a controlling effect on the self-injury. The results of phase 2, however, seemed to suggest that the transition between the demands and play did not provide a clear enough signal the demand session was over, and self-injury continued across demand and play sessions. In phase 3, the researchers examined the effects of a sequence of sessions that consisted of demand-no interaction-play-demand. For this phase, O'Reilly et. al. (2005) hypothesized that a brief demand session (5-min), followed by the removal of all activities (no interaction) and then followed by preferred activities (play) may lower self-injury behaviors. No self-injury occurred during phase 3, so they decided to further examine the effects of this schedule of activities within the context of the classroom.

Observations in the classroom were conducted in 30-min sessions with both no schedule and using the schedule from the functional analysis. One of the sessions (No Schedule or Schedule) was conducted one day a week at the same time. Self-injury and engagement were both measured during the observations. After 5 months, data was compiled. When the schedule was used, Brandon's self-injury was low, less than 10% of intervals and his engagement was up 70% over all the intervals. During the sessions with no schedule, Brandon's self-injury and engagement varied but his self-injury was significantly higher and engagement was lower than when a schedule was used.

This study demonstrated how using an activity schedule could reduce self-injury and increase engagement. When activity schedules are tailored to the students needs, they can increase motivation and positive behaviors (O'Reilly et.al., 2005)

A different study by Betz, Higbee, and Reagon (2008) examined using joint activity schedules to promote peer engagement. The purpose of this study was to investigate whether inclusion of a joint activity schedule would result in higher levels of engagement for pairs of children with autism during interactive games. The study included three pairs of preschool children who had been diagnosed with autism and were currently receiving intensive behavioral interventions. All of the students were fluent followers of independent activity schedules and were able to select activities from a choice board. Six interactive games were chosen for having a clear beginning and end and allowing two people to play at the same time (e.g. Don't Break the Ice; Hungry Hippos; Don't Spill the Beans; Crocodile Dentist). The children were taught how to play the games prior to the beginning of the research. Each dyad had a joint photographic activity schedule displayed in a three-ring binder. Each schedule book contained two pre-chosen activity pages followed by two choice games where the remaining four games were used as choices. The pre-chosen activity page included a picture of the responsible participant at the top and a picture of the game that was to be completed. The participant on a particular page was responsible for initiating play by reading the script "Let's play __." The scripts were faded as the students became more independent at initiating play. In order to demonstrate that the sequence was not controlling student responding, each days the pages were displayed in a different order. The results of this study showed that peer engagement increased rapidly and persisted above 80% with no prompting or a single prompt. During a brief reversal probe where the schedule was taken away, engagement decreased to 0% but was immediately increased when the schedule was

reintroduced. All three pairs learned how to follow joint activity schedules. This study showed a joint activity schedule could be a promising tool to increase peer engagement (Betz et. al., 2008).

Augmentative and Alternative Communication Systems (AAC)

Children with autism often have delays in communication. Communication is described by Bondy and Frost (2002) as a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior. (p. 1) Receptive and expressive are two broad types of communication. Receptive language is a person's ability to understand and comprehend language, while expressive language is an individuals ability to express and use language. The ability to use communication may be independent of the ability to understand language, which means individuals may or may not have deficits in both expressive and receptive language (Bondy & Frost, 2002). The cause of communication delays in children with autism is unknown and varies from child to child. Some children develop speech rapidly, others barely make sounds, while still other children may begin to speak and then loose their communication skills.

Many children with autism use augmentative and alternative communication systems to help with their language development. AAC's are interventions designed to compensate for expressive communication impairments (Bondy & Frost, 2002). AAC's can include but are not limited to: residual speech; vocalizations; pictures or symbols; Braille; gestures; American Sign Language; and various switch activated devices. Individuals with autism may often use multiple AAC's depending on the situation and they skill level because just one AAC does not meet all of their needs (Bondy & Frost, 2002). Under the Individuals with Disabilities Education Act (IDEA), AAC's are considered a type of assistive technology, and the amendment in 1997 to IDEA assures every student the right to assess the need for assistive technology (Bondy, p44)

AAC's most often use aided symbols, however, there are unaided symbols like gestures and body language. Aided symbols are external devices that are used for communication. A PECS (picture exchange communication system) book, real objects and a voice output device are examples of aided systems. Aided systems rely on the use of visuals to help the individual communicate.

Picture Exchange Communication System (PECS)

Picture exchange communication system, PECS, is a form of augmentative and alternative communication (AAC) that uses pictures instead of words to help children communicate. PECS was designed especially for individuals with autism who have communication delays. Before PECS, children were taught to point to pictures to communication. This technique worked, but had multiple problems, including; if the student didn't have an audience, they didn't know how to get their audience's attention, some children did not know how or physically could not point, the individual was not always focused on the pictures and not always point to what they truly wanted, and this technique was teacher oriented and dependent on prompts from the teacher (Bondy & Frost, 2002, p. 69).

In designing the PECS system, it's creators Andy Bondy, Ph.D., and Lori Frost, M.S., CCC/SLP hoped to accomplish a child initiated communication system where the child would have to ability to find a communication partner and approach them, and learn to use a single picture to communicate (Bondy & Frost, 2002, p. 70). They also hoped to build a system and avoid the needing prerequisites of learning imitation, eye contact, how to sit in a chair, and matching like the pointing technique involved. The PECS system involved teaching in 6 phases: 1) initiating communication 2) expanding the use to other people, places and rewards 3) making

specific choices between pictures 4) simple sentences 5) responding to the question, "What do you want?" 6) commenting (Bondy & Frost, 2002).

In order to teach an individual to communicate, you need to determine what is rewarding and motivating to them so they want to learn to communicate (Bondy & Frost, 2002). Observing what the child plays with, or asking the child's parents or caregivers are ways to determine their preferences. Although many children with autism have a limited number of interests, it is recommended to limit the amount of food or drink used. Prioritizing interested is recommended prior to teaching PECS as well.

The first phase of teaching PECS is initiating. In this phase, the child learns to pick up the picture and exchange the picture for the real object. Two adults will often be needed for teaching initiating exchange. One person is to sit in front of the child, without any verbal prompting, with the preferred object. As the child naturally reaches for the object, the second person, who is behind the child, guides the child to pick up the picture, reach to the first person, and finally place the picture in their open hand (Bondy & Frost, 2002). The first person then gives them the item while saying the word, which encourages learning the verbal. As this skill is practiced, the second person reduces their physical prompting from end to start. In other words, the first physical prompt to be removed is helping to place the picture in the open hand. This process can take a few minutes to learn up to several days to learn. It is important to end the session while the child is successful and the item is still motivating.

Phase two involves expanding the use of pictures and making the process more realistic. Once the child is independently initiating exchange, gradually move away from the child but keep the picture in front of them (Bondy & Frost, 2002). This makes the child aware that they may have to move to where an adult is to request the preferred object. Always having the correct

picture right in front of them is not typical of the real world, so the next part of phase two is moving the picture away from the child but still in their line of sight (Bondy & Frost, 2002, p. 81). This makes the child expand more effort in order to bring the picture to the adult and obtain the desired object. During phase two is when the communication binder is introduced. This is often a three-ring binder with Velcro affixed to the cover. The communication binder is specific to the child and will contain all the pictures they are currently using to exchange. Phase two is also the time where more motivational items are introduced. It is important to introduce an item that is not similar to the first. For example, if a food was used as the first motivation item, food should not be used for the second item. The second item could be a favorite toy or book. Using different types of items is important in order to teach the child functional communication in all aspects of life and not just at snack or mealtime (Bondy & Frost, 2002). To summarize phase two, the goals are to increase the distance from the child to the communicative partner, the distance from the child to the pictures, and the number of items that the child can request.

Once a child has learned the essence of communication, they can then begin to discriminate between pictures and be given a choice. Phase three involves choosing a message within PECS. The literature suggests that there is no one perfect strategy for teaching discrimination. During phase one and two, the child is learning that in order to get something, they need to exchange a picture, but whether they truly make the connection to understanding the picture represents the object is unknown (Bondy & Frost, 2002). The first step in message selection is teaching the child the symbol depicts the item received. Teaching discrimination is often taught using one picture of a preferred item and one picture as a distracter picture. The distracter picture could be something that you know the child dislikes (lemons, pickles) or is neutral (tissue, piece of paper) or a picture that looks distinctly different. Choosing a distracter

that looks distinctly different can involve leaving the picture blank or having a contrast of colors, background, or size. In each case, the distracter picture should still be a picture of an item the child does not prefer. If a child is given the choice between candy and a fork, when the candy picture is exchanged give the candy, when the fork picture is exchanged, given them the fork. You know the strategy generally is successful if they are slightly upset when given the non-preferred item and may look more closely at the pictures the next time (Bondy & Frost, 2002, p. 85).

Once the child is able to discriminate between pictures and make choices about what they want, it is time to expand their PECS ability into using a sentence. Even young children who are only speaking with one word are able to change their intonation to communicate whether they are requesting or commenting (Bondy & Frost, 2002). When using PECS and only one picture, the communicative partner is not able to identify the intent of the child. Phase four encompasses introducing sentence structure within PECS. Because PECS was developed around student motivations, the first sentence the system teaches is "I want..." When making an "I want" icon, do not separate the two words because the child does not understand what the pronoun I means yet (Bondy & Frost,.2002). The lesson begins by having the "I want" picture on the cover of the binder and guiding the child to put the picture of what they want on the sentence strip and handing the entire sentence strip to the adult. After the child understands the concept of placing the picture on and handing the strip to an adult independently, they can then be taught to put the "I want" icon on the strip as well. Teaching the child to request using attributes like color, size, shape, etc can also continue phase four. This helps the child clarify what they want.

According to Bondy and Frost (2002), if your training in PECS has gone well up to this point of the training sequence, your child should be able to request spontaneously, using sentence

structure and possibly attributes. (p. 103) Phase five of PECS involves teaching answering of simple questions. Learning to respond to simple questions is an important first step to learning to comment (Buron & Wolfberg, 2008). Teaching a child who can spontaneously request with a sentence strip should be relatively easy (Bondy & Frost, 2002, p. 104). Simply ask, "What do you want?" prior to presenting the child with a desired object. If needed, point to the "I want" icon while asking the question.

The sixth and final phase of teaching PECS teaches commenting. Once a child is able to answer the questions, "What do you want?" they are ready to learn to respond to other simple questions like "What do you see?" or "What do you hear?" While teaching these lessons, however, we must keep in mind that when the child responds, they will not receive the object, but instead get a response like, "Yes, it's a car! I see the car too." This is the way to teach the child the difference between requesting and commenting. If they received the car, after answering the question "What do you see?" they may think, "I see the car," is another way to request. Secondly, typically developing children do not tend to comment on common items or events so we need to understand what motivates children to comment and use that knowledge when planning PECS lessons (Bondy & Frost, 2002). Try to place activities where an interesting more appealing item will be used. For example, start the lesson by taking a new toy out of a bag. As you pull the toy out ask, "Oh! What do you see?" or "Look! What is it?" While asking the question, point to the "I see" icon on their communication binder. The child can then place the appropriate picture next to "I see," hand the strip to the teacher. The teacher then reads the full sentence back to the child and enthusiastically praises them.

Once a child has completed the six phases of PECS, they should be able to request and comment spontaneously in their world. The use of visuals in learning communication is essential

in PECS and helps motivate the student to want to communicate (Bondy & Frost, 2002). The PECS program was designed to be easy to use at home, in school, and out in the community. The key to success in PECS is to use it as often as possible. Teaching other language concepts like greeting others, asking for a turn, and answering yes/no questions can also be taught by using the visual pictures of PECS.

The majority of the information about PECS involved expressive communication. PECS and visual strategies can also be used to enhance receptive language or the understanding of language. Understanding instructions is a very important and fundamental skill. Children are often told to go get an object, go to a location, or answer a question. Because many individuals with autism respond better to visual cues that auditory skills, pairing a visual with an auditory direction may help the child understand the direction and increase follow through (Buron & Wolfberg, 2008). There are many personal and public visual cues in the daily life of a typically developing individual. Personal visuals include using timers, calendars, clocks, to-do lists, shopping lists and planners, while public visuals include road signs, restroom symbols, lines painted on the road, and route numbers on buses. There are many visuals in our environment that individuals must learn to understand and children who do not speak can learn to understand these visual symbols and an array of others (Cohen & Sloan, 2007). In order to begin teaching direction following, the result must be meaningful and rewarding for the child (Bondy & Frost, 2002). For example, being told to go to the bathtub if the child dislikes baths or water is not a motivating experience to teach direction following. However, if a child loves to play outside, being told to go to the door will be motivating if after following the direction, they get to go outside. This skill can also be taught through requesting. If a child requests candy through the use of PECS, you could respond by communicating that the candy was in the kitchen. When the

child walked into the kitchen, they are then rewarded with candy, making the experience rewarding. When beginning the process of teaching direction following, there should be no verbal prompting, just show the child the picture and quietly walk the child through the routine, gradually removing the physical prompting (Bondy & Frost, 2002). If the visual and the verbal direction is given together and the direction is followed, it is not know whether the child understood the picture or the verbal language. Beginning with only the visual ensures that the child understands the visual cues in isolation from the auditory cues. According to Bondy and Frost (2002), to start this kind of lesson, we first make sure the object to be used in teaching the child to follow instructions is very familiar to them...one that the child enjoys (like a ball) or that they know what to do with (e.g. put plates on the table just before a meal). (p. 126) For example, if a child always plays with a specific toy in the bathtub, using a picture of that toy would be a good choice for teaching him to follow the direction "go take a bath." When it is time for the bath, show the child the picture of his favorite bath toy and quietly walk him through the routine. Overtime, the lesson should be started the same way but prompting should be decreased until following the direction is independent. At other times of the day, other pictures should be used to teach the same strategy for different activities to try to build a set of specific picture that represent activities the child understands.

Researchers Schwartz and Garfinkle (1998) conducted two studies to examine PECS as a way of teaching functional communication skills to young children with severe communication delays. The first study examined the rate of acquisition of PECS for preschool children, while the second study examined the effects of PECS on overall communication abilities.

Experiment one had thirty-one participants who ranged in age from 3 to 6. Sixteen of the children had been diagnosed with autism while the remaining children had a diagnosis of Down

Syndrome or other developmental disabilities. All of the children had severe social, communication, and cognitive delays and qualified for special education services. All interventions took place in the children's classroom and data was collected on all children by recording when they started PECS training and tracking each child's progress through the program. The training consisted of the steps described above: basic exchange, distance and persistence, discrimination, sentence building, and PECS with peers (Frost & Bondy, 2002).

The results of the study indicated that all 31 participants learned to use the PECS system. The mastery criterion required 80% or higher independent correct responses over 3 training sessions (Schwartz & Garfinkle, 1994). On average, preschool-age students learned to exchange a symbol with a communicative partner to receive a preferred material within 2 months from starting the training. On average, 2 months after the mastery of exchange, the students mastered the distance and persistence phase. After an average of 3 additional months, the children were able to complete the discrimination phase, and in another 4 months were able to master the sentence-building phase. Finally, after 3 additional months (approximately 14 months after beginning the training), the children mastered PECS with peers. This data shows that within a 14-month average, children with severe social, communication, and cognitive delays can learn to communicate in a functional manner with adults and peers by using PECS.

The method for the second experiment used eighteen preschool children, which were a subset of the participants in the first experiment. Data for this experiment was collected in the children's classrooms during snack and free-choice activities. Data collection was taken through a language sample to assess the children's communication during a teacher-directed activity (snack) and during free choice to assess their communication in a more child-directed activity (Schwartz & Garfinkle, 1994). Each child was observed three times over a 12-month period

across 2 school years (spring, fall, spring). During the data collection, the form of communication used was recorded including gestures, vocalizations, manual signs, PECS, and verbal. The following communicative functions were also noted: requests, comments, protests and responses.

The results of this study were broken into data regarding the acquisition of spontaneous speech and communication profiles by function. When spontaneous speech was the only variable considered, the children split into two evidently distinct groups: children who readily talk, and children who did not. Of the 18 participants, 8 children were categorized as talkers and 10 as non-talkers. When looking at their communication by function, the results varied from snack to choice activities. Four different patterns emerged when the data was analyzed at snack. The first pattern included 9 children who initially were most successful at making requests, however these requests decreased over time. There were few protests, but comments and responses increased across the collection periods. Five children fit into the second pattern in which requests were the only function recorded. Two participants demonstrated high rates of requests, but by the third data collection demonstrated a more balanced communicative profile. The fourth pattern emerged representing two of the participants. Initially the requests were low, but increased during the second session and then decrease slightly during the third. Protests were the highest during the first observation and decreased over time. By the third observation, some comments and responses were recorded. During free-choice time, three patterns represented the communication and although there were consistencies across children, the patterns didn't mirror exactly the patterns at snack. Ten children fit into the first pattern during free choice in which requests increased over time, protests decreased, and some comments and responses were recorded in the last observation. Six children demonstrated behaviors consistent with the second

pattern. These children initially demonstrated high levels of requests but decreased toward the third session. This decrease was accompanied by a slight increase in protests, a steady increase in comments, and a slight increase in responses. The last group consisted of two children with severe global developmental delays who had more steady levels of requests, comments, and responses across all observations.

The data presented in these two studies show that children who learn the PECS can use the system across settings. Many of the children acquired unprompted, non-echolalia spoken communication and all children demonstrated many successful communicative interactions across functions and settings (Schwartz & Garfinkle, 1994).

The Incredible 5 Point Scale

Teachers Buron and Curtis (2003) understand that addressing problems of social understanding can be confusing for teachers and parents because we are only just beginning to understand their impact on the development and prognosis of people with autism. (p.1) The objective of their program, The Incredible 5-Point scale, it is utilize a simple 5-point scale to support a program for teaching social understanding (Buron & Curtis, 2003, p. 1). This program teaches students to talk in numbers rather than social emotional words. Knowing the research behind the thinking and learning of individuals with autism, the program makes sense given that the scales are visual and they reduce abstract ideas to simple numbers. According to Buron and Curtis (2003), the idea is that how we act, react, and interact in difficult situations depends on our ability to quickly and efficiently assess what is happening and consider the consequences for our actions. (p. 3) Students who lack social competence can benefit when repetitive problems are broken down into clear, concrete parts." The scales can be used with young children through adolescents and teens. The program is introduced during 1:1 teaching sessions, and as the child

becomes more knowledgeable and comfortable with the scales, they can be used at school and at home. Using a social story developed by Carol Gray can also help introduce the scale to children and help them visualize the social information (Buron & Curtis, 2003). The scales can be used in a variety of ways where sometimes a 5 may be positive and for other situations a 5 may mean there is a lack of control. Examples of the issues that can be addressed using the 5-point scale include: when words hurt; learning about control; controlling anxiety; learning about touching others; addressing obsessions; when using a quiet voice isn't a good thing; and learning to control fear. Almost any behavior can be put on a continuum, which can in turn be taught using the five-point scale. During the 1:1 teaching sessions, the key is to help the child learn what their body may look and feel like at certain numbers. The program involves brainstorming with the child, if they are able, to describe what they may "look like", "feel like", and identify what they can "try to do" at each number on the scale (Buron & Curtis, 2003). For younger children, this may be identified by the teacher and uses pictures instead of words. By brainstorming and practicing these skills, children slowly begin to understand and try to control their emotional responses.

Social Stories and Comic Strip Conversations

Carol Gray first developed social Stories. Social Stories describe a situation, skill, or concept in terms of relevant social cues, perspectives, and common responses in a specifically defined style and format (Gray, 2000). Lynch, Simpson and Spencer (2008) define a Social Story as a short simple story written from the child's perspective. (p.58) According to Gray (2000), the goal of a Social Story is to share accurate social information in a patient and reassuring manner that is easily understood by its audience. Gray also states, "Half of all Social Stories developed should affirm something the individual does well." Depending on the needs of the child, Social

Stories can include text only or text and pictures. Lynch et. al. (2008) provides a number of reasons that social stories are effective for children with autism: such stories are visual; the are permanent, thereby allowing the child to access the story repeatedly; they are written based on the child's needs, the focus on what people are thinking and doing; and they are written in a predictable format. (p.59) When developing a social story, there is an explicit formula to follow, which is 5 to 10 sentences describing the skill, the appropriate behavior, and others' feelings of the behavior. Gray (2000) developed the framework for writing and implementing social stories. There are nine key steps in developing and teaching Social Stories: 1) Define the inappropriate behavior; 2) define an alternative positive behavior; 3) Write the story using the social story format; 4) Locate pictures to illustrate the story; 5) read the story to the child; 6) practice the social skill used in the social story; 7) remind the child of the situation where the social skill should be used; 8) prompt the child to use the social skill at appropriate times throughout the day; and finally, 9) affirm and praise the child when they use the appropriate social behavior (Lynch et. al., 2008). As mentioned above, social stories follow a predictable pattern involving specific types of sentences: two to five sentences describing the appropriate behavior (descriptive); one sentence describing positive, observable, appropriate responses (directive); one sentence describing the viewpoint of others as they react to the situation (perspective); one optional sentence describing a shared value or opinion; and one sentence that reminds the child of the appropriate behavior in the social situation (control) (Gray, 2000). Gray (2000) also recommended, if possible, involve the child in the brainstorming and writing process. Once the child begins demonstrating the social skill independently, the use of the social story should be faded, but can always be used again if needed. Social stories are a great intervention, but will not address or cure all behavioral needs (Lynch et. al., 2008). Social stories can be implemented as

part of an educational plan along with other intervention strategies. Below is an example of the text from a social story for cleaning up at center time from Lynch et. al. (2008);

We like to play with toys during center time. (Descriptive sentence)

When it is time to clean up centers, my teacher sings the clean-up song. (Descriptive sentence)

Sometimes we are having fun playing and do not want to clean up. (Descriptive sentence)

After we clean up our toys we can go outside to play. (Descriptive sentence)

Even when we want to keep playing, we pick up our toys. (Directive sentence)

My teacher is very happy when we clean up our toys. (Perspective sentence)

It is very important to keep our toys neat and to pick up. (Perspective sentence)

I will try to remember to pick up my toys when I hear the clean-up song. (Control Sentence) (p. 60)

Carol Gray also developed using comic strip conversations as a visual support in the early 1990's. The comic strip conversation incorporates simple cartoon characters to teach a specific social skill (Cohen & Sloan, 2007). For example, if a child is having difficulty in school sharing, the comic strip will show two children; 1) asking for the toy; 2) the second child responding appropriately if she is not done with the toy, and 3) the first student thanking her for sharing the toy.

A recent study conducted by Schneider and Goldstein (2010), through Florida State University, examined using social stories and visual schedules to improve socially appropriate behaviors in children with autism. In the experiment, social stories were read to three students with autism to address particular off-task behavior that were not being addresses by another intervention. The specific questions addressed were as follows: What are the relations between

Social Story intervention and on-task behaviors? and If the child does not positively respond to the Social Story alone, or there is room for improvement, can the social story be replaced by a novel component to increase appropriate behavior? (Schneider & Goldstien, 2010). One Social Story was written for each child according to Gray's guidelines. The Social Story was read to the child each day before the targeted routine, and the child was asked questions to ensure comprehension. Child one showed a 50% improvement for on-task behavior, but the researchers felt there was more room for improvement. They conducted a follow-up where they used a visual schedule with the pictures from the Social Story that replaced the reading of the story. After the story was transformed into a schedule, child one's on-task behaviors increased to a mean of 72%. Child two and three only used the social story. Child two's ability to remain on-task increased from 56% during baseline to 76% using the Social Story while child three's ability to stay on task increased from 60% to 73%. The study showed that classroom on-task behavior can be improved through the use of Social Stories, however, sometimes the effects of Social Stories alone, may not be optimal (Schneider & Goldstein, 2010).

Other Social and Behavioral Visual Supports.

In addition to programs like PECS, Social Stories, and Structure Teaching, many other visual supports are used to teach social skills and appropriate behavior skills. Some individuals may benefit from the use of Power Cards, Social Skills Picture Books, and/or Video Modeling.

Elisa Gagnon developed Power Cards specifically for students with Asperger's syndrome or autism. According to Gagnon (2001), they were designed in order to take advantage of these students' strong interests as a means of motivating behavior change. For example, if you were working with a child who really enjoyed Spiderman, you could use Spiderman to model certain social rules like not running in the hallway. Power Care are typically small, business card or

index card size, and intended for children who can read, but can be adapted for younger children by using pictures clearly representing the skill or rule being taught. The card will include a representative picture and the list of steps involved in the skill/rule being taught. Using a favorite character is often a motivation to participate in the lesson and can be used by parents and teachers (Mesibov et. al., 2004).

Social Skills Picture books were developed by Jed Baker and are based on the concept that children with autism learn better through pictures (Mesibov et. al., 2008). Jed Baker has a series of books with simple pictures depicting a social skill. These pictures can be used to teach and discuss a certain skill. Baker also strongly recommends for students to create their own book to make the learning more meaningful (Cohon & Sloan, 2007, p. 21). This can be done by using a digital camera and taking pictures of the student performing the social skill.

Video modeling is yet another way to visually teach students with autism. This involves video taping one or more people demonstrating the skill needing to be taught. Video modeling is often used to model more complex behavior that is difficult to be depicted in pictures. For example, video modeling can be used to teach: social skills (how to initiate play); performing a critical life skill (using an inhaler); and non-interactive skills such as how to use a toy (Cohon & Sloan, 2007).

Chapter III: Conclusions and Discussion

This chapter will include a summary of the main findings from the literature review in chapter two, implications for practice, and conclusions and recommendations for further research.

Summary of Main Findings

Given the prevalence of children being diagnosed with autism is increasing, it is important to study the use and efficacy of current interventions. The purpose of this literature review was to examine the research regarding interventions that include visual supports for children with autism and their efficacy.

Research Questions #1:

What are the recommended interventions for supporting learning for children with autism that include visual supports? As indicated through the literature review, there is a wide range of interventions that incorporate the use of visuals for teaching young children with autism. Depending on the area of development, skill, or behavior that is the focus of learning will determine which interventions are used. Structured teaching involves organizing the physical environment and structuring routines and transitions through the use of schedules and work systems. This is turn increases the predictability of the environment for children with autism (Mesibov et.al., 2004). Structuring the environment and using visuals helps students in their understanding of language, which is commonly delayed. PECS and augmentative and alternative communication typically focus on expressive language, the use of language, but can also assist in receptive language (Bondy & Frost, 2002). Social Stories and the Incredible 5-Point Scale focus more on teaching social, emotional, and behavioral skills through the use of visuals (Gray, 2000;

Buron & Curtis, 2003). Because most interventions only focus on a specific area of development, teachers are encouraged to incorporate numerous strategies and base the strategies used on the needs of the student (Cohen & Sloan, 2007).

Research Question #2:

Why are visuals believed to be beneficial for students with autism? Through research using fMRIs and other medical research, professionals have been able to compare the brains of individuals with autism to "typically" developing brains and identify differences in thinking, learning, and neurological characteristics. According Mesibov et. al. (2004), individuals with autism exhibit differences in thinking in the following areas: the concept of meaning; focus on details; ability to prioritize the relevance of details; distractibility; concrete vs. abstract thinking; combining or integrating ideas; organization and sequencing; generalizations; and time. The differences in brain development and thinking lead to differences in learning, which include: being a visual learner and depending on prompts from others. Visual supports are beneficial because they are part of everyone's communication system, can attract and hold a student's attention, enable the student to focus on the message and reduce anxiety, make abstract concepts more concrete, help students understand language and directions, and express his or her thoughts (Gagie & Rao, 2006).

Research Question #3:

What is the efficacy of interventions that incorporate visuals? The various intervention strategies outlined in this review have all shown at least some evidence of effectiveness in the area being evaluated. The research conducted by Schneider and Goldstein (2010) reported increases in on-task behavior after being read social stories prior to the situation. Schwartz and Garfinkle (1998) provided research on the effectiveness of PECS. In their study, all the 31

participants learned to use PECS in an average of 14 months and their data showed that children who used PECS could use the system across settings. In an examination of the effects of classroom activity schedules, O'Reilly et. al. (2005) provided data to show that using a schedule can help reduce self-injury behavior and increase engagement. One common theme of all of the studies is: even though their studies showed improvement in skills, every researcher believed that using more than one approach would improve learning even more. Another common theme of the studies is that each visual support needs to be modified for the specific individual, which means there will always be more than one variable in the study.

Limitations of Literature:

After completing the literature review, here are some limitations of the research. Although the researcher attempted to be exhaustive in her search for research on interventions including visual supports, certain information may have been overlooked. Some of the information used in the literature review may have had a biased view regarding the effectiveness of interventions including visual supports. There are other interventions that include visual supports not discussed in depth due to lack of literature or oversight by the researcher. The final limitation is that this literature review is merely a summation of previous research. No empirical research was conducted, which, in tern, does not add new information to the research topic.

Implication for Practice

Given the information regarding the effectiveness of using interventions that incorporate the use of visual supports, there are many implications for practice. The research available on the brain development and the culture of autism is profound. Teachers, parents, and professionals who work with young children who have autism should know and understand the research so they can be the interpreters for their students/children. After having the knowledge base of how

the brain works, teachers can more easily find the appropriate interventions and make adaptations and modifications to increase student's learning by decreasing the effects of the differences in thinking. Knowing the individual student is also important in choosing interventions. One implication for practice is that educators should get to know their students before they plan for instruction. Educators should investigate to find the interests, dislikes, strengths and weaknesses of their students. The literature review has found that incorporating visuals into students' learning can increase their understanding and motivation to learn. These visuals can be used in a variety of way: self-help skills, cooking, reading, instruction following, social skills, requesting, etc. Another implication for educators is during planning lessoning or writing goals and objectives for the students, they should be thinking about how the information or skills can be visually presented to increase understanding. Educators may want to make a rubric and evaluate the students to check for understanding, which will help indicate whether their teaching is effective or if more supports need to be added to increase understanding.

Conclusions and Recommendations

Further research on this topic is needed. Although there is evidence to support the effectiveness of interventions that incorporate visual supports, this evidence is minimal. According to Schwartz and Garfinkle, (1998), although there is a great deal of anecdotal clinical evidence about the PECS, there is little empirical information about its efficacy. The lack of empirical data is a common theme surrounding the use of visuals. Many special educators are familiar with visual supports and may use them occasionally or use parts of certain intervention strategies but do not have the research and data to back up the theories of why they are beneficial. Although there is widespread use of visual strategies by educators, only a minimal number of studies on using visual strategies with students with autism have been published. The

number of children being diagnosed with autism is increasing and does not appear to be slowing. Because these children have deficits in communication and social skills that make it difficult for them to learn without accommodations and modifications, more research regarding their development and how they learn is needed.

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