

## Chapter 2

# Strategies for Supporting Students with ASD

## Understanding ASD, Getting Qualified Support, and Using Technology

### 2.1 Introduction

Educators, parents/caregivers, and other professionals need effective strategies, procedures for positive behavior support, technologies, and evidence-based interventions that are useful for students with Autism Spectrum Disorders (ASD). Additionally, they need to understand the disability, locate qualified individuals to support and assist students, and investigate technology tools that may help students gain academic, social, and communications skills. All of these things can create more effective instruction, aid planning, impact the selection of materials, support teaching, and create a positive environment for students.

#### 2.1.1 Understanding ASD

*There are no visible signs of ASD—“He doesn’t need anything—you should see some of the other kids in his class. He looks just like the other kids, don’t worry.”*

Autism is a neurological disorder that impairs communication, social interaction, and behavior. A person in the spectrum may not have visible signs of a disability. One cannot see a neurological disorder, but it is still present (Durand 2005; Myles and Simpson 2002; Portway and Johnson 2005). The individual with ASD needs well trained personnel who have experience supporting a variety of individuals across the spectrum. Children and adults with ASD are as complex and individual as their neurotypical counterparts. The presence of ASD in an individual will manifest itself as communicative deficits, difficulty interacting with others, behavioral challenges, sensory, and social problems. The person with ASD may not appear to be

visibly different from others, but assistance is still needed. Realizing that individuals with ASD have no special physical marks is just the beginning. The individual may have perfectionist tendencies, self-stimulatory behaviors, delayed echolalia, meltdowns and problems interacting with others. In addition he or she may not comply with directives they are given.

### ***2.1.2 Perfectionist Tendencies***

***“But it’s not perfect! It has to be perfect!”***

The learner with ASD may have perfectionist tendencies. He or she may feel inadequate if his or her work is not perfect. Some children with ASD have to form the letters perfectly, work endlessly on a drawing, and erase the work again and again, if it is not ‘perfect.’ They will even tear their paper apart destroying their imperfect creation. They do not see the world in shades of gray like most people. Instead, things are black or white, right or wrong, yes or no. There is nothing in between. If their work is not perfectly correct, then it must be wrong, and they must try again. As they make additional attempts, they risk more frustration in their quest to ‘get it right’ or make it perfect.

These learners must be reminded that nothing is perfect, a good effort and a willingness to try are all that matters. Many students with ASD struggle with self-oriented perfectionism, and they display higher levels of anxiety, depression, and aggressive behavior than their neurotypical peers (Ashburner et al. 2010; Greenaway and Howlin 2010; Auger 2013). Cognitive inflexibility, impairments in reciprocal social interaction, and pragmatic language deficits may explain the dysfunctional and perfectionistic attitudes in students with ASD.

### ***2.1.3 Self-stimulatory Behavior***

Self-stimulatory behavior or stereotypy is repetitive body movement or the repetitive movement of objects that can involve one or more of an individual’s senses. These behaviors (known also as *stims* or *self-stimulatory behaviors*) have no functional effect on the environment; they do not appear to serve a purpose, and they may be inappropriate (Foxy and Azrin 1973; Mays et al. 2011). An individual with ASD may engage in *stims* that involve their senses: smell objects, stare at objects, move fingers in his or her line of sight, lick objects, shake, rock, flap hands, pick at skin or sores, bang his or her head, repeat noises, or do other things in order to get sensory stimulation. A person with ASD can be more prone to anxiety and stress from the environment, and they may have an overly active sensory system (hyper-sensitivity) that is highly reactive to noises, the presence of others, sights, and smells. Their reaction to the environment coupled with their deficits processing

and understanding the language and the actions of others can cause their stress level to rise, and when that happens, they engage in self-stimulatory behaviors to reduce tension or help them cope with a world they do not understand. The person may engage in self-stimulatory behaviors to calm themselves and prevent a sensory overload. An individual with a hyposensitive or underactive sensory system craves stimulation, and their self-stimulatory behaviors are thought to excite or arouse their nervous system.

A qualified occupational therapist may help individuals who are hypersensitive or hyposensitive. Walking, swinging, rolling, running, and other forms of activity may help students who need vestibular stimulation. For students who need proprioceptive stimulation pressure, squeezing, and chewing may help. The use of fidgets, brushing, and the application of deep pressure may reduce stress. Self-stimulatory behavior can interfere with learning, attending, interacting, and communicating. In addition, it can be difficult to interrupt because of the strong reinforcement it supplies (Mays et al. 2011). Boyd et al. (2012) present a topography which describes stereotypy as low and high order repetitive behaviors. Interventions for both low and high order repetitive behaviors are described and recommended practices are presented. After performing a functional behavior assessment to determine the function of the behavior, low order stereotypies can be treated using Response Blocking, Response Cost Procedures, Differential Reinforcement, Functional Communication Training, Visual Cues, and other practices. Higher order repetitive behaviors are treated using visual schedules or video-based technologies, Cognitive Behavior Therapy/Exposure Response Prevention, Differential Reinforcement of Variability, and other interventions. Additional research is needed to understand the underlying causes and mechanisms of stereotyped behaviors in ASD and useful technologies (Hodgetts et al. 2011).

### ***2.1.4 Delayed Echolalia***

***After sliding a bottle of Sweet Leaf Tea across the checkout counter in a local grocery store, a young man with ASD told the cashier “whiskey please!”***

Echolalia is an automatic and unintentional behavior that is apparent in ASD. It is the repetition of someone else’s words and phrases in either an attempt to make social contact when language is beyond the individual’s level of competence, or parroting that does not fit the social context (Prizant and Rydell 1984). It is an imitative behavior that can occur immediately after the initial presentation of an utterance or a significant time after the utterance (Grossi et al. 2013). When the phrase is repeated a significant time after the utterance, it is called delayed echolalia. Echolalia is present in ASD and other neurological and psychiatric conditions. When echolalia is delayed, a student with ASD will know that they should respond, but find themselves at a loss for words. Sometimes the student may want to request an object or lodge a protest, but the words do not come. These are times

when a student will repeat language they have heard and memorized from a cartoon, a western, or a TV commercial. Phrases from westerns like “You’re a bad, bad, man!” “Hold it right there mister!” “Whiskey!” “No one can stop me, HA HA!” are examples of delayed echolalia or scripts used by a 10 year-old with ASD who has a fascination with westerns. Some researchers consider echolalia to be a part of normal language development, but others feel that it is a behavior that might interrupt the normal linguistic and cognitive development of a learner. Prizant and Rydell (1984) indicated that delayed echolalia served several functions that were interactive or non-interactive, appeared with or without comprehension, and contained varying degrees of relevance to situations and linguistic contexts. The categories of non-interactive delayed echolalia: non-focused (self-stimulatory), situation associations, rehearsal, self-directive, and non-interactive labeling. Interactive delayed echolalia fell into the following categories: turn-taking, verbal completion, labeling, imparting information, calling, affirming, requests, protests, and directives.

Hetzroni and Tannous (2004) created a computer-based simulation which allowed students to interact in three settings: play, food, and hygiene. Practice in the simulated settings had a positive impact on all students’ functional communication. Improvements in functional communication were documented, irrelevant speech, delayed, and immediate echolalia decreased, and more appropriate speech was observed in each of the intervention settings. Four of the five participants had a noticeable change in communicative initiations, and each participant preferred the interactive computer simulation. In addition, the researchers noticed generalization of correct functional language to the classroom setting.

### ***2.1.5 Meltdowns and Their Meaning***

***“But I don’t want to do division! I want to do multiplication! I hate division!”***

The behavior of individuals with ASD can be challenging and explosive at times. Depending on the person, angry and aggressive outbursts can include kicking, hitting, and even fighting. Sometimes meltdowns can be averted, if the person’s triggers are known. The only way to discover the triggers is to observe the person, and take careful records of behavior prior to, during, and after the incident. If the individual is verbal and able to articulate his or her feelings, he or she may be able to explain why the angry outburst occurred. Parents or caregivers should be consulted to share their experiences, formulate a plan of action, and provide assistance. Since ASD is a spectrum of disorders, varying degrees of language impairment are present. Some individuals are non-verbal, and some struggle with pragmatic, expressive, and/or receptive language. The inability to communicate effectively can cause extreme frustration and anxiety that can cause a meltdown. Sometimes physical or psychological factors trigger a meltdown. Some of the more common signs of distress that may precede a meltdown are as follows: rubbing the eyes, using loud repetitive language, demonstrating confusion, tearing, picking the skin

on the body, crying, hitting, kicking, or disengaging in tasks. When the signs of a meltdown are present, it is necessary to simplify the task, reduce the demand, and help the individual complete the task. Allowing the individual to escape the task allows the person to make an incorrect association. If tactics to escape a non-preferred task are successful, the learner will repeat those actions each time he or she is confronted with a non-preferred task. Children in the spectrum are very observant, and they often recognize patterns and make associations which become their expectation. If these expectations are not confirmed, it makes them upset and fearful and they may have a meltdown.

Meltdowns can be caused by incorrect associations, hunger, fear, isolation, the memory an unpleasant event, over-stimulation, frustration, exhaustion, chemical imbalance, mistreatment, the inability to communicate, stress, unpredictable events and other things. Some meltdowns can be triggered by demands that push the individual beyond his or her level of competence and capability. In the introductory phrase, the child with Autism was having a meltdown because he had mastered multiplication facts, and he expected to continue with multiplication rather than learn something new—division. He was not comfortable with division or learning any other math skill. He preferred multiplication exercises because they were familiar, safe, predictable, and easy. Each time a math activity was presented that contained division, a meltdown ensued. Once the student understood that math time could be associated with other types of problems, and he realized that multiplication was the inverse of division, his comfort level increased, and he did a better job.

Novel situations and activities, crowded shelves, colorful material, opened doors and shelves, and noise can induce stress in individuals with ASD and trigger anxiety which may lead to a meltdown (Lytle and Todd 2009). Familiarity, multiple presentations of information and instructions, checks for student understanding, planned activities, routines, choice, and realistic expectations can reduce stress and anxiety. Instruction in social skills and language can also reduce problem behaviors (Macintosh and Dissanayake 2006; Mancil et al. 2009; Scattone et al. 2002).

If the meltdown cannot be diverted, it is better to calmly work through it with the student. Tip 14: Remain patient and keep a low to moderate tone of voice. Realize that the child is having a difficult time, and he or she is not trying to hurt or threaten anyone. Poor reactions on the part of all involved parties can extend and escalate rather than diffuse this difficult situation. Try to redirect the student to activities that take his or her mind off the meltdown, and prepare for it to ‘run its course.’ Meltdowns are not teachable moments; they are just times to endure with patience and resolve. It is ill advisable to try to teach content, reason with the student, or try punitive measures.

### ***2.1.6 Facilitating Positive Social Interaction***

***A note from one classmate to another—both have ASD: “Dear Friend, The teacher just stole my samurai helmet. That is a crime. So we should have a rebellion against the school and the teachers. Do you want to join? Circle Yes No From S.”***

This note between two friends is cute. Teachers should make it a point to recognize the social needs of the student with ASD and try to help them work with their peers. It is good to share both disappointments and triumphs with others. Social relationships are important; they help reduce stress and isolation, and they add meaningful interaction and a sense of connectedness. Social skills need to be explicitly taught to individuals in the Autism Spectrum. With the support of other students with ASD and neurotypical peers, students with ASD can learn to make eye contact, use appropriate gestures, behave well, and develop age-appropriate language. Rotating buddies can help alleviate stress, increase language skills, and support the student with Autism. Tip 15: Involve the child's peers in positive and consistent support. They can be a resource for the child and help the child manage in the classroom. Having the child's neurotypical peers compliment him and providing opportunities for peer mentoring, tutoring, and assistance may help the child with ASD feel like a valued member of the class, and these practices may lessen problem behavior. Applied Behavior Analysis (ABA) approaches for teaching social skills have been demonstrated to be very effective at teaching initiations and discrete social responses (Weiss 2013).

Mancil et al. (2009) examined the effects of a social story (intervention for improving social interaction by Carol Gray) presented in PowerPoint™ on the aberrant behaviors of three children with ASD during recess and transitions. They also examined the difference between social stories presented on paper versus those presented with PowerPoint™. The aberrant behaviors decreased, and the PowerPoint version of the social story (CASST) produced slightly better results than the paper version. The researchers suggest that the use of the computer's visual prompts to read and listen to the story and visuals may have provided additional support that helped maintain student attention. Additional research was suggested, because of the small sample size, but positive features of the intervention were as follows: easy implementation by teachers, preparation was not time-intensive, independent use by students, and the ability to embed the activities into the students' daily routines. Other forms of technology have also been used to teach social understanding, rules, and judgment. Results are promising for the use of virtual reality, interactive intelligent agents, and video modeling (Mitchell et al. 2007; Barakova et al. 2009).

### ***2.1.7 Securing Compliance***

***“Will you do this for me? No... I don't know how.”***

Individuals in the spectrum need to understand the expectations of others as well as acceptable rules and procedures. They need prerequisite skills, realistic expectations, and assistance that secures their cooperation. It is important that rapport is established before making demands on a student with ASD. It is necessary to

understand the person, their reinforcers, needs, preferences, and interaction patterns before demanding that they perform a specific task. Many individuals in the spectrum are very sensitive, and they may be trying to overcome negative experiences. They may need to work through negative feelings and associations before they can establish trust and participate cooperatively. Tip 16: Clearly explaining the task or activity and describing the steps involved, checking for understanding by asking questions and observing responses, and providing sufficient time for interpreting, processing and executing the request are helpful.

Cooperation on the part of the individual with ASD is very important. Personalized instruction based on high-interest areas, family involvement in educational planning, and the use of the high-preference strategy (presenting two to three preferred academic tasks before presenting a non-preferred academic task) may ensure student compliance (Banda and Kubina 2010).

## 2.2 Getting Qualified Support

***“You will have a classroom aide assigned next year. She is very good; we are lucky to have her. You should probably contact her over the summer break. She will probably work with you before school starts. In fact, I will touch bases with her, and then send you her number.”***

Experience and training are good prerequisites for working with a person diagnosed with ASD. Untrained paraprofessionals can impede social skill development and acceptance, create confusion, and promote overdependence (Zager and Shamow 2005). The experienced professional or paraprofessional should spend time with the child or adult and his/her family and learn as much as possible. Understanding the current reinforcers, non-preferred activities, language and level of academic skills is critical. The individual providing support should know how to collect performance data and modify the environment to ensure success. Paraprofessionals in this role must be well trained; they should be an advocate for the child, a coach when necessary, a mentor, and a helper. They should work with families and members of the school staff to facilitate the development of language skills and social relationships. At stressful points in the individual's school day (recess, lunch, transitions to and from special activities like music, art, and school sponsored events), the child's aide should provide a safety net of assistance, encouragement, and reassurance. The individual providing support should build confidence, promote independence, provide structure and routine, assist with difficult tasks, and reduce the anxiety and sensory overload of the individual with ASD. Strong systems of support neutralize the isolation, anxiety, and depression of those with ASD (Brewin and Renwick 2008; Marshall 2002; Muskat 2005, Rayner 2005).

### ***2.2.1 Voting People off the Island***

***“School should be like Total Drama Island, where I can vote people off. My teacher said it would be sad if people got voted off the island.”***

Teachers and others working with individuals in the spectrum should be aware of sensory issues, use direct language, use positive reinforcement, and gain the attention of the learner. Additionally, they should be aware of the theories of ASD, and the characteristics of the learner. Each of these was discussed in Chap. 1. Teachers want all students to be successful. Teachers want them to enjoy learning and appreciate the opportunity. Teachers do not want to leave anyone behind or vote anyone off the educational island, because knowledge is power and it liberates, promotes self-sufficiency and freedom. Knowledge makes the difference in life by providing the ability to change one’s status in life and make choices that are beneficial.

### ***2.2.2 Sensory Issues***

Learning situations can be difficult for students with ASD, because many have sensory integration dysfunction. The hypersensitive student may avoid touch and hear lights humming, coughing, other children talking, the A/C, the pencil sharpener, and the teacher talking simultaneously and have difficulty filtering these sounds. The smell of glue, play dough, markers, and lunch being prepared in the cafeteria might be enough to make the person with ASD uncomfortable, ill, or even unresponsive to instruction. The hyposensitive student may seek out stimulation by touching objects or spinning. Teachers must not ignore the sensory issues that hinder students with ASD from participating and behaving appropriately.

#### ***2.2.2.1 Case Example 1***

In one classroom, a child in the spectrum cringed and refused to write information displayed by an overhead projector. The child’s aide said “he can see that, his eyes are not as old as mine.” How can the aide know what that child can see? She cannot view the world through his eyes. She thought he was being obstinate. As it turned out, the child had visual issues that made it difficult for him to view and write projected information. Teachers must make an effort to be sensitive to this issue and consult with other professionals to find ways to make the student more comfortable.

### ***2.2.3 Using Direct Language***

The KISS Principle reminds people to keep things simple. In addition to an awareness of sensory issues, individuals working with students diagnosed with ASD

must communicate with the student in simple and direct terms. Slang, sarcasm, idioms, colloquialisms, and jokes are not well understood by individuals in the spectrum. It is better to use clear, direct language. Tip 17: Don't say, "Turn your completed assignment in." Instead say, "Put your papers in the orange box on my desk." Don't say, "Let's call it a day." Instead say, "We are finished." Short, simple statements are better than detailed instructions. After giving an instruction in clear language, give the student time to respond. Many students with ASD have auditory processing delays, and it may take them more time to comply with requests.

### ***2.2.4 Using Positive Reinforcement***

Individuals with ASD need to be rewarded for their efforts to behave appropriately, integrate, engage, and overcome their many challenges. Praise, checkmarks, stickers, and opportunities to engage in preferred activities are all examples of positive reinforcement. Pleasant and affirming rewards reinforce desired behavior and motivate students to repeat the desired behaviors. Tip 18: Reinforcers should not be overused; they should be changed as the student changes so that they will remain effective.

### ***2.2.5 Gaining the Learner's Attention***

It is necessary to get the student's attention before asking him/her to complete a task. Facing the student and telling him/her what is needed using simple and direct language is an effective practice. Following that with a check for understanding to make sure the student understands what is expected is helpful (Zager and Shamow 2005). It is critical to gain the student's attention, and give the student time to process requests. Tip 19: Time the student with ASD to see how long it takes for him or her to execute a directive. Many times, the students will not have difficulty executing, but they may need extra time to process the request. Language and the ability to understand it are critical keys for successful execution, and students with ASD have problems understanding language.

### ***2.2.6 Understanding the Theories that Attempt to Explain ASD***

*"He just won't leave her alone, and she told him to stop!"*

An angry guidance counselor aware that the male student had ASD did not understand ToM in the quote above.

### **2.2.6.1 Case Example 2**

A 3rd grade male with ASD kept bothering his classmate. ‘Bothering’ was the term the guidance counselor used, because the male student kept trying to get his classmate’s attention during class, even after being told to stop. The counselor did not understand that the male student was not purposefully trying to agitate or harm his classmate. He had no idea that his classmate had different desires, opinions, feelings, and interests from his own. He wanted to engage with his classmate by playing a game they played often; he simply did not understand that his classmate wanted to participate in the class activity by following the teacher’s directions. Individuals with ASD have deficits in their ability to understand the intentions of others. They have difficulty reciprocating socially and understanding the effects of their behavior on others. Simon Baron-Cohen proposed and documented deficits in ToM in children with Autism. He first used the term mind-blindness to explain why social interaction is challenging for individuals with ASD. Basically, individuals in the spectrum may not gather enough information (from social and environmental queues, emotions, gestures, facial features) to help them develop an awareness of what another person might think, feel, need or want. In addition, many individuals with ASD also have difficulty understanding their own feelings, motives, thoughts, and needs. The young man in Case Example 2 could not put himself in his classmate’s shoes or view the world from her eyes. His own lenses were the only vantage point he could use to assess the situation.

### ***2.2.7 Learning to Handle Non-preferred Activities***

All persons have non-preferred activities, and students in the spectrum are no different. A student in the spectrum may be cognitively inflexible, and it may be more difficult for him or her to attempt non-preferred activities. This situation takes a great deal of patience, positive reinforcement, and encouragement. The student’s refusal may have roots in insecurity, fear, or a lack of knowledge. It is important to address these areas first. If the student is not psychologically safe, he or she will be unwilling to try a non-preferred activity. Tip 20: Do not automatically lower expectations for students with ASD; assume average intelligence, unless documentation is present indicating otherwise. Provide support and ‘think outside the box.’ Using manipulatives, breaking processes into smaller steps, and demonstrating requirements are beneficial practices. Having students work on small steps and gradually increasing the complexity is necessary along with extrinsic rewards and encouragement during the learning process. Using things that reinforce the child in order to secure compliance and determining whether or not the student’s refusal is due to a sensory issue are important.

### 2.2.7.1 Case Example 3

During a classroom visit, a 2nd grader was observed who refused to do art activities - art was definitely a non-preferred activity. After talking with the teacher and visiting the classroom several times, it was apparent that the smells, sounds, and textures of the medium were problematic. When the children did drawings, perfectionist tendencies surfaced in this student. His drawings were not like those he saw his peers create and submit. His behavior became negative, and he became angry and unwilling to do any of the activities in art. After talking with the art teacher, other activities were created and substituted to help the child become successful in the art class: dot-to-dot drawings, numeric picture puzzles, step-by-step drawings, stencil creations, models, and activities using tracing paper. A little creativity and patience changed the art experience from a negative to a positive for this student. After a six-week period, the student's unsatisfactory marks and behavior in art became satisfactory, and art became more tolerable.

## 2.3 Applications of Technology

Technology is sometimes called a great equalizer—that can be true for individuals with the ability to afford and access tools that meet their needs. Computerized tools can liberate users from drudgery, connect users with expertise, permit access to vast amounts of data, and facilitate online learning. Many learners individuals with ASD gravitate toward technology (Barakova et al. 2009; Mancil et al. 2009). The visual appeal and locus of control are some of the factors that make technology appealing for individuals with ASD. There are many applications of technology in Autism Research: systems for data collection, video for monitoring behavior and developing social skills, electronic data transmission to professionals, apps on tablets, smartphones, and other personal devices, Computer-Assisted Training (Instruction), virtual reality, intelligent agents, and more. Goodwin (2008) discusses a variety of technology applications that can assist individuals with Autism, practitioners, and researchers. Personal records of behavior can be video-taped, and the observations can be sent to a behavior analyst to help determine triggers and situations that cause inappropriate or difficult behavior in an individual with ASD. Computerized tools such as apps, video, and PDAs may help individuals with ASD learn to recognize emotions, generalize skills, communicate, grasp academic content, and organize information.

The IAN Community, an online research and implementation site (<https://www.ianresearch.org/>) is another example of the use of technology that fosters worldwide collaboration and research for persons with ASD and their families. IAN supports researchers by linking their research questions and instruments with families willing to provide data and answer queries. IAN maintains

a comprehensive online library of the latest research, and serves as a place for meeting, sharing, and examining issues and solutions. Another application of technology in ASD is speech-to-text programs. These tools allow users with ASD to transform speech into text; speech recognition software can be valuable for note taking, preparing reports and written compositions. Synthesis and voice transformation research creates diagnostic, remedial, and assistive methods for the production of speech by individuals with ASD who are non-verbal or have limited language ability.

The development, dissemination, and use of technology is encouraged by Autism Speaks' Innovative Technology for Autism (ITA) initiative. ITA is at the forefront of development, advocacy, mentoring, treatment, and knowledge of ASD. The organization also supports technology use by researchers, developers, teachers, clinicians, and families in an effort to improve the educational, social, communicative, and functional outcomes for individuals in the autism spectrum. The url for the ITA is [http://www.autismspeaks.org/science/research/initiatives/ita\\_initiative.php](http://www.autismspeaks.org/science/research/initiatives/ita_initiative.php).

The popularity, affordability, and portability of technology has increased interest in its use as an intervention tool in Autism. The earliest use of computers with individuals with ASD occurred in the 1970s, and even then, positive results were reported. Since that time, technology has become more widespread and more affordable, so the use of Computer-Assisted Training or Computer-Assisted Instruction (CAT/CAI) and other forms of technology for intervention planning in ASD has increased. In the 1970s only one or two studies were published in peer-reviewed journals, but by 2010 that number had grown to about 40 (Ploog et al. 2013). Parental blogs reporting anecdotal benefits from computers used to teach individuals with ASD also added to the interest in formally assessing technology tools to determine their value for individuals with ASD (Ploog et al. 2013). Two critical questions are often asked in research on technology interventions in ASD—most studies are investigating whether or not the technology intervention is effective, and some studies are comparing technology interventions to traditional teaching and training methods.

Many of the studies have positive reports that are promising, but technology in ASD is considered a new frontier and a young science that requires cautious interpretation and rigorous ongoing research. Most studies utilize small sample sizes, do not present operational definitions of the independent and dependent variables, and only take a first step in the form of an exploratory or descriptive analysis to set the stage for more rigorous investigations. As a result, many researchers are not yet ready to consider CAT an evidence-based intervention for individuals with ASD (Bölte et al. 2010; Clark and Choi 2005; Pennington 2010; Wainer and Ingersoll 2011). Follow-up studies are needed with control conditions, comparisons of the effects of different treatment approaches, matching participants across conditions, and comparisons with traditional training methods (Ploog et al. 2013).

Some additional applications of technology include the following: listening centers, video modeling, reading software, e-books, the creation of comic strip conversations, electronic tools for reading, writing, typing, mathematics

instruction, and vocabulary acquisition, talking calculators, talking photo albums (steps in a process, recognition of facts, places, people, emotions), software for emotional recognition, instructional software for academic enrichment, distance learning courses, augmentative communication devices, card readers and recorders, personal digital assistants (PDAs), mobile phones, customizable overlays for computerized input, Nintendo DS (math and reading games), virtual reality (Reaction Grid and Second Life for older learners), tablet applications, AAC, and others. When technology tools are well aligned with desired learning outcomes, they can effectively support teaching and learning in engaging and interesting ways. Different forms of technology can support learners in the spectrum, and make it possible for them to learn in more visually appealing and more entertaining formats.

## 2.4 Summary

It is a mistake to judge a student with ASD based on his or her appearance. Thorough evaluations by groups of professionals should be undertaken along with careful observations across multiple settings. In addition, parental information can provide additional information to help explain the student with ASD. It is important to understand the student's challenges and preferences in order to select instructional materials and computerized tools and provide appropriate support which targets the student's individual needs. Individuals with ASD need varying degrees of communicative, social, academic, and behavioral support in order to succeed. They may have perfectionist tendencies, demonstrate self-stimulatory behaviors, have problems complying with directives, demonstrate challenges understanding others, and have problems dealing with non-preferred activities. Computerized tools can be used to provide academic, language, and social skills support.

## 2.5 Discussion Points

These discussion questions are a form of self-check, review, and reflection. Answer the questions to examine your knowledge and your perception of learners with ASD. Review the Case Examples and determine the course of action you would have taken.

1. Explain why individuals with ASD may demonstrate challenging behavior.
2. Are there strengths that individuals with ASD demonstrate?
3. What learning strategies might be effective for learners with ASD?



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