



Autism Spectrum Disorder and Assistive Technology

What Do We Know About Autism Spectrum Disorder (ASD) and Communication?

Development of communication skills among children with autism does not follow so-called typical patterns. Children with ASD appear to learn differently than other children and frequently have difficulty with spoken and written language expression. Children with ASD may not speak at all, they may speak just a few words, or they may speak but what they say doesn't make sense in the situation. Children with ASD may have difficulty understanding spoken language – even if their hearing is “fine”. They may also not be able to understand gestures, body language, and tone of voice that convey subtle differences in meaning. Children with ASD often demonstrate difficulties with overall motor planning. The motor planning involved in speaking – coordinating the mouth, lips, tongue and facial muscles – is extremely complex and requires sophisticated motor planning ability. Similarly, the motor planning involved in writing or using sign language is complex and can prove challenging for children with ASD. These factors complicate communication for children with ASD.

How Are Communication Barriers Addressed with Children With ASD?

Despite the communication challenges ASD can present, an assumption should never be made that nonspeaking children with autism don't or can't communicate, or that they will never “speak”. An array of Alternative and Augmentative Communication (AAC) approaches can be used to enhance, expand and develop communication skills. The three primary forms of AAC used with individuals with autism include unaided approaches (signs; gestures), “low tech” picture-based systems (for example, Picture Exchange Communication System -- PECS), communication books and boards and speech generating devices (SGDs). In addition, a variety of other assistive technology, such as portable word processors, can support effective written expression.

What Are Speech Generating Devices (SGDs)?

Speech Generating Device (SGD) is the term given to the hundreds of voice output devices commercially available that are designed to provide an effective means of verbal communication for individuals whose “natural speech” is not functional for them. Other terms sometimes used to describe these items are “voice output communication aids” (VOCA) or augmentative communication devices. SGDs range from simple, single message devices with less than a minute of speech output to highly complex, computer-based systems capable of storing or generating virtually unlimited numbers of messages. Some SGDs use recorded human speech (digitized). Others use computer-generated speech (synthesized) and some of those have text-to-speech capacity (as words are typed into the system, they are “spoken” by the device). Graphic symbols, most commonly in the form of line drawings, are used to represent messages, which are activated by finger, headstick or other method touching an area on the device that corresponds with the desired message. SGDs have either a static display where input for stored messages is fixed (like buttons or keys) or a dynamic display (like a touch computer screen) where the input can be changed quickly and often. For reasons unrelated to their effectiveness, utilization of SGDs lags far behind the use of other AAC systems (e.g. PECS and sign language) as an intervention option for students with ASD.

Do AAC systems deter speech development in children with ASD?

NO – It is erroneous to believe that if a child is given a communication device, in particular a SGD, it will hinder speech development. This seems to be based on the faulty assumption that using the AAC system is “easier” and the child will “give up” on the more difficult task of developing speech. Research and clinical experience indicate this is not true. Humans tend to use the most effective means of communication available to them to interact with others. It is usually much more efficient for a child to use speech and/or vocalizations if possible to communicate than to formulate a message using an augmentative communication system.

AAC will NOT interfere with speech development. AAC systems in general have been shown to not interfere with speech development for those individuals who have the capacity to develop natural speech, and there is evidence that AAC can facilitate speech development for some children. Research suggests that once an AAC system is introduced and an effective means of communication is available some children improve their language skills as well. In any case, appropriate AAC interventions will almost ALWAYS improve communication.

While research is inconclusive about how AAC actually supports speech development, some believe use of the AAC system reduces pressure on the child to develop speech as the sole communication mechanism and that results in greater speech production skill development. Others postulate the AAC system supports continued development of language skills and conversational skills, which translates into increased speech production.

Because of fears that AAC will impede speech development, there is a mistaken belief that AAC should be introduced only after giving up all hope on development of natural speech. This should not happen! By exposing a child to years of failed communication attempts, we increase the likelihood that other effective but unacceptable means of communicating will be used (e.g. excess “behavior” like throwing a chair to mean “I’m bored with sitting at this table”) or communication will decrease altogether. For children with ASD, AAC should not be viewed as a wholesale replacement for natural speech, but rather as a supplement or alternative means to provide functional communication access as natural speech development is pursued. The choice is NOT BETWEEN AAC or “natural” speech, but how to use AAC – including SGDs, unaided, and low tech approaches - to maximally support development of natural speech and effective communication.

Why Use SGDs ?

Although sign language and low –tech picture-based systems (including PECS) have established records of success with students with ASD, there are a variety of features that make SGDs compelling options as part of an AAC intervention for children with ASD. SGDs provide speech output, which is more readily understood and accepted by other communication partners (e.g. family members, community members, professionals, peers, etc.). Because the output is spoken, communication partners don’t need to learn special skills like how to interpret pictures or gestural messages. SGDs also provide the child with an auditory model of what the message sounds like when it is “spoken”. Speech output can transcend distance, e.g. can be used for telephone communication, or when the listener cannot make eye contact with the child (e.g. when mom is driving and the child is in the back seat).

High end, dynamic screen devices come pre-loaded with extensive symbol arrays that can be organized with little effort and in many instances new page sets can be developed on the fly. Low tech, static devices generally use overlays that can easily be changed and, increasingly, more and more companies are utilizing bar code technology that improves the ease of use. Many SGDs are designed to be portable and durable. Implementation and observation by speech language pathologists, special educators and other professionals has uncovered additional positives in support of SGDs including:

The “techie” nature of SGDs is appealing and motivating to children with ASD. Use of SGDs may be less stigmatizing than PECS and other AAC systems.

Children with ASD frequently prefer visual stimuli. SGDs use a visual medium, frequently a dynamic visual interface, making them effective for children with ASD.

Most SGDs require only simple motor movements to operate, bypassing the motor planning difficulties that some children with ASD evidence.

SGDs often can serve to preempt difficult behaviors since they provide a quick, consistent means to express needs and wants.

When Should AAC Be Considered For Use With A Child With ASD?

As soon as readily possible! All children with ASD deserve access to an effective and efficient communication system including a full range of AAC options that can be used to support positive cognitive, social, emotional and behavioral development. That includes consideration of SGDs. Simple SGDs such as the single message BIGmacks can be used at roughly the same time that non-disabled children begin to speak. More advanced devices can be introduced as appropriate based on the child’s development. The first years of a child’s life are critical to language and speech development and children with ASD need the same opportunities available to non-disabled children -- language rich environments and encouragement to express their thoughts and needs.

Are There Any Cognitive Prerequisites A Child Must Have To Use SGDs?

There are no cognitive prerequisites for using an SGD. It is extremely difficult to assess the cognitive ability of some children with ASD. Thus, it is important to assume cognitive and communication potential. An SGD provides a framework for the development of language and as a result, regardless of the current cognitive/language level at which a child with ASD functions, an SGD can support and expand that existing language. When a child with ASD is able to communicate, his or her cognitive abilities can become more evident. This can change the perception of parents, peers, teachers and the child himself.

Are There Any Specific SGDs For Use With Children With ASD?

Any SGD can serve as a first step in exploring communication with children who have ASD. Evaluation usually proceeds through the identification of device features that will “match” the needs of the child. Features include the number of messages that can be stored, the system for retrieving messages, the approach to combining units of meaning (e.g. to generate new messages), the system used to represent vocabulary, the potential of the device to “grow” as the child’s language develops, the flexibility of the device (e.g. to run other software programs), etc.

How Are AAC Companies Addressing the Unique Needs Of Children With ASD?

Visual Scene Displays, Built-In Digital Cameras and hardware design are some of the recent trends that companies have been introducing to assist children with ASD communicate. Several digitized and synthesized devices now provide visual scene displays. Traditionally, SGDs have utilized a grid screen approach that divides the screen or page into various target areas. Visual scene displays portray events, people, actions and objects against the backdrops in which they occur or exist, helping to provide context and meaning. Active areas, or hot spots, within the scene provide links to specific words, phrases and messages for communication.

A second recent development is the provision of built-in digital cameras. The traditional text and symbols used to represent language can sometimes be a barrier to acquiring effective communication. Digital photos and video clips provide concrete representation and eliminate the need to learn new symbols. They also simplify and make the communication process more natural. The ability to take digital images and quickly embed them into new communication pages shows significant promise to help children develop new language skills, prepare them for new situations and help add context to their world.

What other assistive technology (AT) can be used to support children with ASD?

Children with ASD can benefit from a variety of assistive technologies in addition to AAC such as:

Assistive Technology	Description	Used To Address
Portable Word Processor	Keyboard with small LED screen	Poor fine motor or motor planning skills for writing
Talking Word Processor	Writing software programs that provide speech feedback	Poor fine motor, motor planning, cognitive, or combination
Text To Speech Software	Program used to convert text from print to audio formats	Poor reading comprehension, decoding, fluency, etc.
Visual Assistants Electronic/Non-Electronic Organizers	Graphic symbols sequentially laying out events/activities (may also have auditory cues)	Behavior issues and develop task completion/focus and language/communication skills
Headphones	Earphones that cancel extraneous environmental noise	Auditory overstimulation issues
Assistive Listening Systems	Speaker worn transmitter and listener worn receiver or near placed speakers	Deficits in attention and listening comprehension and auditory overstimulation issues

How are good decisions made about assistive technology for children with ASD?

Making decisions about assistive technology (AT) is similar to making decisions about other services for children with any disability. A team approach is necessary with members knowledgeable about the child, his/her strengths and limitations, the activities, tasks, and environments in which he/she function, and the range and scope of potential AT options to address specific needs. The team should have access to AT to use in structured device trials in the environment(s) in which the child will be using the technology (e.g. home, school, community, etc.) This allows for device trial data to be comparatively analyzed; in particular different device features and functions can be compared to determine which best addresses the child's functional needs. Using this analysis, the team can make cogent decisions about AT acquisition. Teams and professional providers conducting device trials can borrow a full range of AT from ETC, a short-term device loan program operated by Missouri Assistive Technology (MoAT). Additional information about borrowing can be found on the MoAT website, www.at.mo.gov or by contacting MoAT at 800/647-8557 or etcdevice loan@swbell.net.

Professionals who specialize in AT can provide teams with valuable support in decision-making. For some types of AT, funding sources require evaluations by specific providers (e.g. Missouri Medicaid requires approved sites provide the evaluation and recommendation for AAC funding; Medicare requires a licensed speech-language pathologist evaluation/recommendation for AAC funding; and many private insurance plans require a physician prescription for certain types of AT funding.) Teams should be familiar with and access specialty resources as necessary to support decision-making and to secure AT funding as required by specific sources. See the MoAT website for more information about evaluation sites and funding sources for assistive technology.