CONTINUING EDUCATION
for Speech-Language Pathologists

AUGMENTATIVE-ALTERNATIVE COMMUNICATION & SPECIAL POPULATIONS
Including Access Needs

PDH Academy Course #1807 | 3 CE HOURS

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This course is offered for .3 ASHA CEUs (Intermediate level, Professional area)

Course Abstract

This Intermediate level course describes alternate access options in Augmentative-Alternative Communication (AAC), and their relevance to individuals with cerebral palsy, Rett Syndrome, Cortical Vision Impairment, aphasia, Down syndrome, developmental apraxia of speech, and Autism Spectrum Disorder.

NOTE: Links provided within the course material are for informational purposes only. No endorsement of processes or products is intended or implied.

Learning Objectives

By the end of this course, learners will be able to:

- ❏ List at least four alternate access modes for individuals who cannot use direct selection
- ❏ Differentiate between the five major types of cerebral palsy, with attention to their impact on Augmentative-Alternative Communication (AAC) considerations
- ❏ Identify the population typically affected by Rett Syndrome, with attention to its impact on AAC considerations
- ❏ Differentiate between Cortical Vision Impairment (CVI) and ocular disorders, with attention to CVI's impact on AAC considerations
- ❏ List the different forms of aphasia, with attention to its impact on AAC considerations
- ❏ Recognize how AAC intervention can be useful to individuals with Down syndrome or developmental apraxia of speech
- ❏ Recall the benefits of using AAC with individuals with Autism Spectrum Disorder (ASD), with attention to evidence-based practices

Timed Topic Outline

I. Alternate Access (30 minutes)
II. Cerebral Palsy (15 minutes)
III. Rett Syndrome (10 minutes)
IV. Cortical Vision Impairment (20 minutes)
V. Aphasia (10 minutes)
VI. Down Syndrome (5 minutes)
VII. Developmental Apraxia of Speech (5 minutes)
VIII. Autism Spectrum Disorder (60 minutes)
IX. References, Additional Resources, and Exam (25 minutes)

Delivery Method

Correspondence/internet self-study with interactivity, including a provider-graded final exam. *To earn continuing education credit for this course, you must achieve a passing score of 80% on the final exam.*

Accessibility and/or Special Needs Concerns?

Contact customer service by phone at (888)564-9098 or email at support@pdhacademy.com

Course Author Bio & Disclosure

Susan Berkowitz received a B.A. in Psychology from Clark University, an M.S. in Speech-Pathology and Audiology from Tulane, and an M.Ed. in Education Administration from California State University at Fullerton. She also has extensive graduate background in Special Education and Applied Behavior Analysis, and has worked with children with autism for more than 40 years.

Susan has worked in a variety of settings as a SLP, a Director of Education, and a Chairperson of the Speech Pathology Department. Her career has taken her to public and private schools, developmental centers, group homes, and adult day programs. She currently runs her own private practice in San Diego, providing Independent Educational Evaluations in speech-language, AAC, and Assistive Technology, as well as consultation and staff training. She presents at a variety of national conferences and provides workshops in AAC, autism, and literacy.

DISCLOSURES: Financial -- Susan Berkowitz is the owner of, and a developer at, Language Learning Apps LLC; offers materials for purchase at TeachersPayTeachers.com; and received a stipend as the author of this course. Nonfinancial – No relevant nonfinancial relationship exists.

Alternate Access

The easiest way to access any AAC system is via direct selection, where the individual reaches out with a body part and touches the word/picture/button/screen.

A variety of alternate access options also exist, ranging from low to high tech, including:

Modified direct access:

Such as a head pointer, mouth stick pointer, eye gaze.

Eye gaze systems can range from no-tech to the ultimate high tech.

Initial training may use a clear acrylic frame, empty in the center, with items or pictures placed around it. When the individual looks at an object or picture on the frame, the person sitting opposite can see where he is looking. Musselwhite (2005) designed an eye gaze flip book system that allows students to participate with message construction using an 8-location eye gaze multi-page communication book. More complex systems utilize color, number, and/or letter coding to choose letters or symbols to construct a message sequentially. The MegaBee (AMDi) uses this type of coded system in conjunction with an electronic keyboard the partner uses to keep track of each letter of the message, allowing for voice output.

Coded access for eye gaze involves using colors to section the areas of the communication display. Coded access is available with the eye gaze PODD displays. There is a separate display that indicates columns by different colors and rows by different numbers. The user first indicates which section (quadrant) of the display has the desired symbol. Then the user indicates which color to tell the column, then which number to tell the row. When there are a large number of symbols on the display, this significantly speeds up the rate of communication.

Combined access is provided in the PODD templates for individuals who use a combination of eye gaze or pointing and partner assisted scanning. Symbols are clustered together, and the individual indicates which group using eye gaze or direct selection of the area. Then the partner scans the choices. This increases the size of vocabulary available to the user on a given page or board.

Head mouse, head tracker, joystick, mouse emulators:

Additional modifications on direct selection using infrared beams or computer access modes. The head tracker is more tolerant of head movement than eye gaze technology systems, but shows greater fatigue.

Use of key guards to count spaces as a tactile guide to the display:

Requires memorizing the displays and sequences.

Pick up and give or show:

Involves symbols being velcro'd to book pages. A second copy of the page is laminated, cut apart, and used for the images that are grasped. This is useful for individuals who do not have the ability to or do not understand the concept of a point, but can grasp and hold out the symbol.

(High contrast symbols are available for some symbols in the PCS set from Mayer-Johnson. Other symbols can often be created with high contrast by altering the button's background and/or border colors.)

The symbols are placed on a strip to construct a message of sequenced symbols for those individuals who can sequence symbols into phrases or sentences. Seeing the entire message aids with memory and formulation. This method can also be used with individuals with limited comprehension who have difficulty with visual tracking, as a way to provide aided input.

It is important to note that this system involves returning each symbol to exactly where it came from by matching it to the symbol on the page. This is **not** a system where you can return symbols anywhere on the page.

Limitations to this method of access include a significantly heavier and expanded book, due to the multiple layers of each page; the need for extra time to grasp and hold out the symbols; the need for fine motor skills to grab and hold the symbol(s); the additional time needed to replace the symbols in the book when the message is completed; the possible distraction from the engagement of the interaction caused by the physical activity of this method. Communication partners may limit the exchange due to the time and physical necessities. Conversational interactions may be cut short due to time constraints.

Partner assisted scanning (PAS):

Uses partners who have been specially trained for interacting. Partners show, point, and/or speak each item; the individual must be able to respond with a yes or no gesture of some sort with some reliability and consistency.

In visual scanning, the individual relies on recognition of the visual symbol. The partner shows each symbol by pointing with a finger or light, or taking off and showing. In auditory scanning, the partner reads each symbol label or name of the group of symbols. The individual must understand the names of items or categories; the partner needs to read the names, NOT ask questions such as, "Do you feel sick?" Visual - auditory scanning uses both visual and auditory input, so that the individual can rely on either visual recognition or auditory comprehension. This method helps individuals who know the spoken names but are just learning to recognize the symbols.

The individual can either respond only "yes" to accept the desired response, and do nothing otherwise; or use two different yes & no responses. The partner should give all of the choices first, then list them slowly. Watch for body cues. Don't give too many verbal prompts.

PAS provides consistency and structure to the "20 Questions" often played with individuals when trying to figure out what they want to say. It also provides predictable patterns for users to begin to build connections about where to find the vocabulary they want to use.

PAS also allows for the advantage of having a live, thinking person helping to interpret the message, solve problems to repair breakdowns, interpret movements and read cues. Partners can change the scanning timing, can read the individual's nonverbal cues, can make interpretations based on body language and context. Technology can't do any of these.

PAS is dependent upon the proficiency of the partner. Consistency is required because AAC users may have poor or slow reaction time, making it difficult to respond as soon as they see or hear what they want. If the individual does not know what is coming up next, the response lag could be even greater. When a partner repeats the same cycle of choices in the same order, with a pause between each, the AAC user can become comfortable with anticipating what is coming. The partner needs to decrease any extraneous speaking. The individual needs to focus on the AAC system and on organizing himself to make a response

PODD style communication books can organize vocabulary specifically for scanners; vocabulary in the book is organized to maximize efficiency. The page sets use predictive links and very consistent navigation and operational conventions so that scanners can become comfortable with the consistency of structure.

Scanning of symbols on the board/page can be linear, where each item is scanned in a row one at a time, either left to right (one row at a time) or top to bottom (one column at a time). Scanning can also be column/item, where the scanning starts with the first column and proceeds through each column until the user

selects one. Then the scanning goes from the top of that column down, until the user accepts the desired symbol. Scanning can also use sections of the display: symbols are grouped together and the user selects the group that contains the desired symbol, then the partner scans the columns in that section, then across the row that holds the indicated symbol.

Switch/scanning:

The slowest way to access an AAC system.

A device sequentially presents choices or groups of choices to the student. Input can be auditory, visual, or both.

Output can include using a single movement to accept or two movements with the same switch. Alternatively, two-switch scanning has one switch start the scan and the other accept a response, whereas inverse/hold involves the user holding the switch to maintain the movement of the scan, then releasing at the desired item.

Scanning patterns include:

- Linear – each item is scanned in order on the page, one at a time. This is relatively easy to learn but can be inefficient for large vocabularies.
- Row/column – each row is scanned in order. When a row is selected, then each item in the row is scanned across.
- Group – when there are a large number of buttons on a page, they may be scanned by groups to maximize efficiency (i.e. pronouns -> verbs -> descriptors -> keyboard -> noun folders). When a group is selected, then items in the group are scanned by row/column, as well.
- Circular – the least complicated; choices are arranged in a circle like a clock. It is visually demanding but cognitively easy.
- Step scanning – the most demanding motorically; each activation of the switch moves the cursor one item. The user stops activating the switch when the system arrives at the desired choice.

The specific motor impairments of the AAC user need to be assessed and catalogued. What are the effects of muscle strength, symmetry of body, disassociation, ATNR (asymmetrical tonic neck reflex), weight bearing and shifting, eye-hand coordination? Know whether shoulders are forward, elbows flexed or extended. Determine the ability to grasp a target or use vision. Know if there is increased response time. Determine the available movement pattern.

A variety of body parts can be used to activate switches. Head switches can include toggle-type switches, button-type (such as Jelly Bean and Buddy Button), head, chin, and tilt switches. The Sip 'n' Puff switch is used in the mouth. There are also foot switches and eye blink switches. Some very sensitive switches can be activated by very minimal muscle movement. For using the hand, beyond standard button switches, there are finger, thumb, and pinch switches, as well as switches that use hand grip.

For some users the size of the target area is crucial. Some individuals need a larger switch for consistent access, such as Jumbo and Saucer switches.

For other users the range of motion needed to find and hit the switch is of utmost importance. Switches that work well with individuals who have limited range of motion or limited fine motor skills include the Twitch, Finger, Compact, and Gumball switches.

For users who require sensory feedback from the switch there are switches that provide vibration, textured surfaces, lights, or music. For users with visual impairments there are switches that offer color, contrast, lights and vibration.

Consider the presence of sensory processing difficulties. The individual may have difficulty with motor planning that impacts his ability to use his hands. He may have difficulty with hand-eye coordination. He may have difficulty with either knowing the amount of pressure to exert or with being able to exert pressure. There are switches that respond to differential amounts of force, including switches that are more sensitive (such as the Gumball, Ultimate, Twitch, Finger, and Credit Card switches) and those that are durable for the user who exerts a great deal of force (including Gooshy, Gel, Senso Dot, and Ultimate switches, which soften the impact upon contact, but stand up to the force).

Consider the individual's language needs. The use of spelling offers the most flexibility in message construction but is slowest for scanners. Pre-stored sentences offer better speed, but with the least flexibility of message construction. Use of words is the most balanced compromise for most individuals. Pre-stored messages may be used for things that are repeated often, such as social exchanges, personal information, often-needed phrases in daily living. Also, be aware of the limitations of high tech: with PAS, the partner can construct more complete messages by recasting the user's message (saying it again but without errors or omissions); high tech cannot do this. Similarly, with auditory scanning on a dynamic display device, the message may not sound grammatically correct without a partner to co-construct it.

There are many different switch types in addition to those listed above. Knowing the capabilities that each offers, and the specific needs of the individual, will assist with making an effective choice. Always try multiple options, and always pay attention to the feedback give by the user. The list above is not comprehensive, although it seems long.

Consider the wide range of possibilities:

- Switches can be flat and may have or may not have tactile and auditory feedback when pushed. Flat switches can have a variety of surface area sizes. Flat switches can include Buddy Buttons, Big Buddy Buttons, Big and Little Red buttons, Jelly Bean switches, Spec switches.
- Micro Light switches require minimal movement to activate.
- There are switches that toggle (toggle switches) and some that you pull on (string and ribbon).
- Puff and Sip switches are used by individuals who have no control over a body part with which to activate a switch but can control respiration in order to activate a switch placed in the mouth.
- There is a switch that you grasp to activate.
- A pillow switch has a soft cover to avoid skin breakdown or irritation.

When assessing and beginning intervention for alternate access, it is beneficial to utilize specific software that helps to teach switch use in a game format, so that the user is not trying to learn to use the systems of switches and scanning simultaneously with communication. There is a variety of software available appropriate to different age groups for this purpose. There are also apps that teach and utilize scanning as well.

Adaptivation Co. has a variety of suggestions (see Figure 2) for building communication with low tech switches and limited message devices within games, show & tell activities, coloring, and reading. They offer a variety of ideas for switch use to promote participation. These can be useful in assessment sessions as a way to promote interaction and engagement with students who have had no other access mode and no AAC system.

Switches can be spliced into battery powered toys so that students can activate them independently. Switches can be placed in books to "read" a page or line, or pages can be programmed into a single message or sequencer button. Switches can be set up to a links system, so that the user can participate in a game or construction play activity by using different switches. Try placing flat switches, like Pal Pads, into empty fast food containers (such as french fry sleeves) for making requests or comments.

Pal Pads are wafer-thin, flat switches that can fit easily into books or onto game boards without

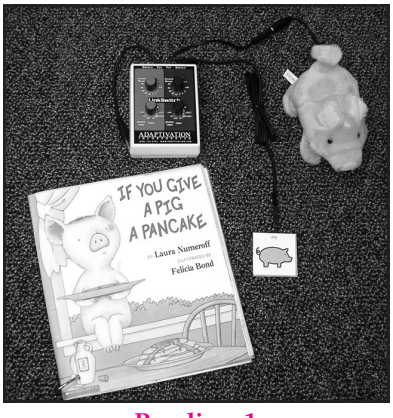
Figure 2

Games

Show & Tell

Coloring


Reading 2



Reading 1


Making Requests

Playtime

adding bulk. Adaptivation suggests "Pal Pads are easy to incorporate into books, because they are flat. For [a] book activity, we placed a Pal Pad on the back cover of the book. We plugged the Pal Pad into a Sequencer so that each time a page is pressed, a message plays. To make sure the messages played, we placed stickers in the book to show the user where to press. This is a great way to make books accessible to switch users!"

For individuals who face significant motor, visual, hearing, and/or other multiple challenges, or those for whom device use has not been successful secondary to access or consistency issues, flexibility of thought and knowledge of available options are required in order to determine appropriate access.

All communication relies on perception of sensory input and ability to make a physical response of some sort. When looking at an individual's ability to use AAC to develop communication we have to be aware of how he processes input (what type of atypical patterns are used), how the individual moves (what atypical patterns exist, what movements exist to use for responding), how stable those movement patterns are, and what the effects are of position stability, motivation, other impairments.

Many of these individuals are caught even more tightly by the "Catch 22" for individuals who require aided modes of communication:

- Aided language does not naturally exist in the environment
- The individual cannot spontaneously "uptake" something that is not there
- Professionals intervene based on their perception of what's possible
- The individual can only demonstrate what's possible based on what's been set up to use

Once again, aided language stimulation is a necessary ingredient in the individual's environment for him to be a successful communicator. As he responds to what's provided the assessment can continue. Dynamic assessment is necessary in AAC. We intervene -> observe -> intervene -> observe (Porter 1997).

Cerebral Palsy

Cerebral palsy is a disorder of muscle movements and coordination. It is caused by injury to the brain before or during birth or in infancy, in the area of the brain that controls body movement. Some people with cerebral palsy can have co-morbid conditions, such as seizures, vision impairment, and intellectual disability, but many do not.

The population of individuals with cerebral palsy is very heterogeneous and cannot be summed up in any one description.

There are many factors that need to be taken into consideration in the process of providing an AAC system to a user with CP. In general, access is often the factor of biggest concern and the "stumbling block" for AAC use. Because of the wide diversity of physical states, even within one individual, providing (a) mode(s) of access that give(s) the individual consistent access to communication can be difficult.

There are five major types of cerebral palsy: spastic, dyskinetic (including both athetoid and dystonic), ataxic, hypotonic, and mixed.

Spastic type, the most common, is caused by damage to the motor cortex and/or motor pathways. Individuals with spastic cerebral palsy usually have low underlying tone, but with increased and sustained tone in some muscle groups. The tightness of some muscle groups can cause scissoring of the legs, arms tucked in at the sides, walking on toes or with a staggering gait. Associated reactions are present along with abnormal reflexes. Individuals are slow to initiate movement, have limited range of motion (ROM), have contractors from shortening of some muscles. They have limited respiratory control for speech and breathing, and decreased oral ROM impacts speech and eating.

Dyskinetic type is cause by damage to the basal ganglia. There is underlying low tone, with involuntary fluctuating extraneous movement when voluntary movement is undertaken. Emotions can increase the involuntary movements, interfering with activities. Sitting still takes significant effort as the individual tries to maintain stability. Individuals are seen constantly moving one body part in an attempt to stabilize others. It is difficult for these individuals to focus their attention, their direction of reach, their grasp of items and subsequent release. There is considerable tongue movement, which is uncontrolled.

Athetoid type is characterized by the individual's body becoming either extremely stiff or extremely relaxed. Involuntary movements typically accompany these body states. Other characteristics and symptoms include noticeable involuntary muscle movements and involuntary lip and tongue movement, which affects speech, eating, and drinking.

Dystonic type is defined as a disorder, characterized by abnormal posture, that affects voluntary muscle movement. There are prolonged and repetitive movements that change from slow to rapid.

Ataxic type involves damage to the cerebellum and/or its pathways. Underlying tone is low, balance is impaired, and coordination is disordered. Fine motor movements are impacted; fine motor skills and coordination to hit a target is poor. Gait is unsteady.

Hypotonic type involves decreased resistance to passive manipulation of body parts and muscle and joint

weakness. Increased time is needed for voluntary movement initiation.

Mixed type is a combination of spasticity and athetoid movements. The individual will have the stiffness of the spasticity with the involuntary movements of athetoid CP. Often the spasticity is identified first.

Cotter, Carter, and Porter (2008) delineate some key issues for participating in learning for individuals with cerebral palsy, which apply to use of AAC:

Associated Reactions:
Those involuntary movements of head, mouth, neck, trunk, extremities that happen during voluntary movement which the individual needs to learn to disassociate

Symmetry:
Individuals with cerebral palsy almost always show a degree of asymmetry of the body; using both sides of the body is often must be learned

Weight-Bearing:
Opportunities to bear weight on arms or legs may be missing due to atypical tone to motor development, and as a result muscles, muscle strength, and joint strength are not fully developed. Opportunities for weight-bearing must be provided throughout the day

Weight Shift:
The ability to shift weight and maintain stability is necessary, for example, for moving their hand or using a switch

Gravity Effects:
Individuals with cerebral palsy may be unable to counteract the impact of gravity by using their muscles to maintain positions; they may fatigue easily due to the effort this takes

Stability:
Individuals with cerebral palsy may have difficulty with strengthening the head, trunk, neck, shoulders, and hips in order to move extremities to perform tasks, or with using opening and grasping of hands to stabilize the arms in order to move the body; this needs to be learned

Fatigue:
The effect on the body of maintaining stability, countering the impact of gravity, bearing and shifting weight, controlling associated reactions, and controlling movements. Fatigue happens much faster for individuals with cerebral palsy. Activities need to be paced, and to involve less concentrated effort by the afternoon. Individuals may shut down for periods to recuperate.

Effects of Muscle Disuse:
Muscles that are not used consistently will shorten, impacting joints, and may eventually require surgery. Individuals need to be kept active throughout the day.

Additionally, individuals with cerebral palsy often have associated sensory, cognition, communication, medical, and social issues that need to be considered when designing an AAC system and determining access.

Individuals with cerebral palsy may have difficulty with attention, memory, cognition (which is impossible to determine without communication). There are a variety of medical issues associated with cerebral palsy that can impact communication skills and access to AAC. Positioning is not just important for access to the AAC system, but the impact of poor positioning can negatively affect internal organs or muscles and joints, and increase interference with access.

Individuals with cerebral palsy may have atypical feedback from skin, muscles, and joints. They may dislike being helped with motor movements. Because the body does not receive accurate information, the individual may make inappropriate responses.

There may be issues with balance, with vision, and with hearing. Vision issues impact use of picture-based communication. Vestibular system disorders may cause the individual to have either no fear of falling or abnormally strong fear. There may be a strong need to move: to bang feet, jump, or rock. Once engaged in such movement they may have difficulty controlling themselves.

In using an AAC system, individuals may have difficulty with reaching, pointing, looking at, waving; those behaviors may be inconsistent. Looking at the communication system while reaching for it may also be difficult and inconsistent. Assessors may have difficulty identifying if the individual is being intentional.

The overflow of movement can impact the communication partner's interpretation of their response. Individuals with cerebral palsy experience significant dyspraxia – difficulty with planning and executing motor movements – as they attempt to control and organize body movements without consistent success. A single signaling gesture may need to be specifically taught to the individual to use to communicate to a partner who understands (a "smart partner"). Ability to look at the communication display and/or the partner while making a response with the hands may continue to be inconsistent and difficult.

In assessing an individual with cerebral palsy it is important to gather information about how he processes sensory input (from all senses) across environments and times, whether and how his responses are impacted by different sensory input, and whether response varies with type and/or intensity of various input. Does it take more or less input to generate a response? Does the individual have strong defensive responses to input? How long does it take to

establish attention and how long can it be maintained? How well can the individual see and hear? Cortical vision impairment (CVI, explained in more detail below) – involving damage to area(s) of the brain responsible for processing visual input – is often found in individuals with cerebral palsy.

What movement pattern(s) can be established for a "yes" and "no" response, or modified pointing responses with partner assisted scanning? What type of response can be used to activate a switch or joystick or head mouse to access a high tech device?

In teaching AAC to an individual with such significant motor issues, we are, in fact, often attempting to teach him to learn to do two difficult things simultaneously.

Erickson has developed a plan for integrating academic, communication and motor programs for students with significant disabilities. She suggests identifying activities based on a color coded system where:

RED represents

- an activity that is cognitively and linguistically challenging
- communication that includes new vocabulary or symbols or access system
- motor positions or requirements that require work to maintain head and trunk control, whose physical demands interfere with the ability to communicate and/or participate

YELLOW represents

- an activity that is moderately challenging or review of material at the instructional level
- communication whose symbols or vocabulary have been introduced and used
- motor position where the child is not completely supported but can be maintained with effort, where the position does not completely interfere with the ability to participate

GREEN represents

- an activity at the child's independent level; limited cognitive challenge
- communication system that can be used with good success
- motor position that is fully supported and access is maximized; minimal physical effort needed to sustain position

Erickson suggests pairing a red cognitive task with green communication systems and positions; yellow cognitive and linguistic tasks with yellow or green communication systems and positions; green cognitive and linguistic tasks with red or yellow communication systems and positions.

This paradigm is crucial when developing an AAC system for an individual with cerebral palsy or other motor impairment and considering access. Remembering that AAC is a system of components will help with thinking about multiple modes of access that fit the red, yellow, and green parameters, and matching them to complementary modes of communication.

In intervention, it will be particularly important to think about which parts or components of the communication system are used when accessing familiar vocabulary versus new vocabulary, so that difficult modes of access are not used when learning new vocabulary in difficult activities, but can be in use when communicating in familiar and independent activities with known vocabulary.

Rett Syndrome

Rett syndrome is a neurodevelopmenal genetic disorder that affects girls almost exclusively. It is characterized by normal early growth and development followed by a slowing of development, usually at between 6-18 months of age, with loss of purposeful use of the hands, distinctive hand movements, slowed brain and head growth, problems with walking, seizures, and intellectual disability.

While there is a period of degeneration of skills, Rett is not a degenerative disorder. The period of regression can last for several years, but many individuals can regain skills or learn some new skills. Progress can be made in academic and communication skills after the period of regression has ended.

The course of Rett syndrome, including the age of onset and the severity of symptoms, varies from individual to individual. Before the symptoms begin, however, the child generally appears to grow and develop normally. There may often be subtle differences even in early infancy, such as loss of muscle tone (hypotonia), difficulty feeding, and jerkiness of movements of the extremities. Mental and physical symptoms appear gradually.

Rett syndrome is largely a disorder of apraxia – the inability to perform purposeful motor movements, to reliably connect an action to the thought of acting. As the syndrome progresses, the child loses purposeful use of her hands and the ability to speak. Other early symptoms may include problems crawling or walking and decreased eye contact.

The loss of functional use of the hands is followed by compulsive hand movements such as wringing and washing. These movements are not intentional and often uncontrollable. They may increase with fatigue and stress, anxiety, or pain. In order to establish reliable movements for accessing an AAC system, these movements must be overridden.

The onset of the period of regression is sometimes sudden. The apraxia interferes with all body movement, including speech and, sometimes, even eye gaze. Children with Rett syndrome may sometimes evidence autistic-like behaviors early on. Other symptoms may include walking on the toes, sleep problems, a wide-based gait, teeth grinding and difficulty chewing, seizures. There may be breathing difficulties while awake such as hyperventilation, apnea (breath holding), and air swallowing. These can cause the child to get too much or too little oxygen. Growth slows and cognitive disability increases.

After the period of losing skills, girls with Rett are often able to progress. Many maintain some walking and hand movement skills. Some movements, those that have been practiced and established for a long time, may be reestablished fairly easily. Unfamiliar movements – like those required to activate a communication system – may take much longer and require thousands of repeated opportunities and trials to become established.

Working with an individual with Rett syndrome requires patience. When looking for a response, wait time must be provided. Continued asking or prompting will actually elongate the period of waiting. The system is working to try to initiate an action. Providing the initial stimulus again merely reboots the system and makes it start over again. Remember, the harder she tries, the harder it becomes to respond.

Because eye movements are also impacted, the individual may look away from the partner or task, seeming to be uninterested, when, in fact, the movement is uncontrolled. Because these girls have difficulty with using eye gaze and gestures consistently, it is often assumed they aren't able to communicate or have sufficient cognitive skills for some activities.

Individuals with Rett often use proxemics – closeness or proximity to the communication partner – and body movements to communicate. They may lean on or toward a desired item or person, they may vocalize, laugh or cry. These behaviors may appear to be nonlinguistic; however, if responded to and acknowledged as communicative by a partner, they can be shaped into more meaningful responses.

These girls can learn – and most maintain active interest in socialization.

Establishing a consistent yes/no response is a good place to start. Asking yes/no questions does not usually require a picture communication system, simply the partner's participation and understanding of the individual's responses. Burkhart (2014) recommends using switches if needed to establish head movements. Placement of voice output switches near the individual's head that activate when the head movement is made (without necessarily needing to hit them) provides auditory feedback to establish the pattern. If needed, do have the user actually use the switches to also provide tactile feedback. Fade the switches so that yes and no responses can be made independent of them.

Eye gaze can be a strength for some girls with Rett, despite the pattern of eye movements, but may alternately be difficult for others. Newer eye gaze technology allows for better "reading" of the eyes despite these movements. Girls with Rett syndrome are often able to learn to use eye gaze as a communication access mode, either with high technology systems or with paper-based eye gaze books. Systems employing partner assisted scanning are also used. High tech eye gaze can allow for more independent communication for Rett girls. Choosing an eye gaze system that allows for extraneous head and eye movements is important. An extended trial period is always recommended, especially because the high tech systems differ greatly from one to the other.

A supplemental component to the system is also required when utilizing eye gaze, due to fatigue of eye muscles and intermittent difficulty with controlling the gaze. Using a partner assisted scanning system is recommended. When pointing is not enough to focus the individual's attention on the picture symbol, a pick-up-and-show system with verbal scanning (as described in Alternate Access) might be used.

Bartolotta suggests the following Best Practices in AAC intervention for Rett individuals:

- Begin by teaching a simple requesting response
- Ensure the targeted response is within the individual's physical abilities – consider nonstandard behaviors
- Consider a simple motor act rather than speech or gestures
  - Touch a switch
  - Hand movement
  - Natural gesture
  - Assess use of eye gaze
    - Offer choices
    - Develop consistency across two favored objects
    - Explore expanding set to three or more choices
    - Begin with no-tech; establish a consistent, valid level of response
    - However, allow for inconsistency (remember – apraxia can affect consistent motor responses)
    - Allow time to respond – many individuals with Rett have delayed responses – asses an individual and adjust your expectations
    - Move to low-tech or high-tech, depending upon:
      - Interest level
      - Skill
      - Resources
      - Contexts

Cortical Vision Impairment (CVI)

Vision, more than any other system, allows the individual to take in massive amounts of stimuli from the environment for the brain to act upon. In the process, the individual gazes at things, does so in specific sequences, and focuses on specific details in order for the brain to make decisions about what to do.

Vision develops as a process of neurological development and maturation. Our ability to process visual stimuli and attach meaning to them – called "seeing" – involves not only a healthy vision system, but also a healthy neurological system. When a child is born with a neurological disorder, it is likely that a visual impairment will exist. Development of the visual system, learning through interaction with the environment, is also impaired when a child has motor impairment: eyes do not tell the individual what to do, the brain's experiences do. Without these experiences, or when the experiences are impaired in some way, the brain cannot tell the individual how to act and react.

"The current leading cause of visual impairment among children is not a disease or condition of the eyes, but Cortical Vision Impairment (CVI) – also known as cerebral visual impairment – in which visual dysfunction is caused by damage or injury to the brain." (American Printing House)

There is a differentiation between ocular disorders where the pathology of the eyes is directly impacted and neurological disorders where there is impaired or reduced vision due to an impairment or injury to the brain. CVI is not related to visual acuity; it occurs due to brain damage.

CVI is a neurological visual disorder. It results in unique visual responses to objects and people in the environment. An eye exam usually yields normal results, but there is a history of neurological issues and the presence of defining characteristics of CVI (listed below). CVI may be seen in individuals who have suffered asphyxia, traumatic brain injury, infection of the brain or brain maldevelopment. The student's medical history will include neurological problems rather than problems with the ocular system. The student may be non-responsive visually and responsiveness will be inconsistent, but this is not due to a problem with the eyes.

Cortical vision impairment is the most common cause of vision impairment in children in the U.S. It is seen in children who are premature, who have a neurological disorder, or have had acquired brain injury. Given that 40%-80% of the brain is required to process vision, brain damage in almost any area can lead to CVI. The brain loses its ability to integrate and organize visual input received from the eyes.

Shaman (2009) offers this example of typical people trying to understand what CVI feels like: Imagine that you are looking at a blackboard full of complicated math equations, much higher than your level of math. You can see all the numbers and symbols but you cannot understand what you are seeing. Similarly, a child with CVI may see a world full of colors and shapes with perfect acuity, but he may not have any idea what he is seeing. The child may not make meaning from the visual images and may not know that the colors and shapes are a car, a hat, or his mother.

In infants, the vision will change in either direction, better or worse, but won't remain static. Cortical vision impairment responds to rehabilitation in infancy during the period of plasticity. If there is good environmental support and stability of the neurological system, then progress will be permanent.

In older students, progress may be slower; however, since the end of the period of plasticity is unknown, rehabilitation should continue. Intervention should be integrated into daily activities, not just be a separate time of isolated vision stimulation.

Students with CVI show:

Distinct color preferences – most often bright red or yellow, but may also be any color that is familiar to the child. Individuals with CVI might see colors without being able to identify them.

During activities, create a "negative" or neutral background by placing items on a black or grey background; especially communication systems with complex displays. Communication symbols should have red or yellow (or other preferred color as per assessment) backgrounds, or have red or yellow outlines and text on black backgrounds. Intervention may need to start by presenting preferred color objects. Individuals with CVI will often respond better to color than to black and white symbols.

Attraction to movement – a need for movement to elicit or sustain visual attention. The area of the brain that processes visual movement is deeper in the brain than the visual cortex, so is often unaffected. It is easier for the individual to see movement than isolated objects.

Shake objects or pictures to gain attention. Shake a flashlight around on the picture to focus attention. Place a preferred color film over the flashlight to create a colored light and move the light over the item to be focused on (broken balloons also work well for creating a colored light). Use objects with shiny or reflective surfaces (a pinwheel, Mylar pom-pom). Sometimes the child can see better when he is moving; such as in a rocking chair or when driving a power wheelchair.

Visual latency – a delayed response in looking at objects.

Wait for a response and notice the conditions under which a lag occurs. Latency can vary on context.

Visual field preferences – the presence of unusual field locations in addition to loss of visual field.

Present moving objects in the right, left, upper, and/or lower peripheral fields. Note which way the student turns his head to look at items. Sometimes the visual field loss is in the center. The differences in the student's visual field can change over time, as visual attention is practiced.

Difficulties with visual and environmental complexity – the student has difficulty when the object itself is a complex display, or the object is seen in an environment that is a complex display, or the item is being viewed at the same time as other stimuli competing for attention. Visual fields appear crowded.

Try presenting objects in the student's preferred color, then two and then three colors, then in a pattern.

Light gazing or visual stare – the individual might stare at a light source

Absent or atypical visual reflex responses – the reflex to blink in response to an approaching object is impaired.

Difficulties with visual novelty – prefers viewing familiar objects, lacks curiosity to view novel items.

Symbols in the AAC system need to maintain stability for the brain to develop pathways.

Absence of visually guided reach – the ability to look at and touch something at the same time is absent, and the two actions are performed separately. It is difficult for the individual to attend to looking at something and reaching for it simultaneously. The two actions require significant concentration and cognitive energy.

Consider Erickson's Red-Yellow-Green Light analogy discussed above. Again, stability of location of items is important. Look for differences if the background is plain vs. complex.

Difficulty with distance viewing – the child may only attend in near-space. This happens because the child is trying to suppress background information. Items at a distance become part of the larger, confusing background.

Any or all of these characteristics or visual behaviors lead to children being unable to use their vision in the usual way. These students may not look at or pay attention visually to things we expect them to. They may fix their attention on unusual items, such as moving ceiling fan blades.

In addition, the child with CVI may have difficulty with contrast, which impacts ability to read facial expressions; with multiple sensory input, which impacts ability to use vision and listening at the same time; with depth perception; with recognizing spatial relationships of objects in the room; with visually recognizing objects or persons.

Individuals with CVI have impaired social skills. They cannot read facial expressions and others may believe they are refusing to look at persons or objects. And, as a result, they have difficulty with interpersonal communication.

The individual's vision may appear to change from moment to moment. This is not actually happening; rather, changes in the environment are impacting the individual's ability to see a specific stimulus. This can require that the communication system be moved frequently. Communication partners need to constantly be assessing the location or position of the display when there are changes in the environment.

Improvement is both possible and likely with training. This requires discovering the CVI at an early age and providing direct intervention. (Roman-Lantzy, C., 2007) Children with CVI have the capacity to see more effectively and can learn effectively given an adequate plan and intervention.

From both neurological and education perspectives, brain plasticity is the mechanism for improved vision. Visual function improves by high frequency, repetitive, and consistent visual and visual-motor experiences embedded in familiar and meaningful routines and carefully designed to meet the unique needs of each child.(Edelman, et al., 2006; Lantzy-Roman, 2007)

There are 2 types of cortical vision impairment.

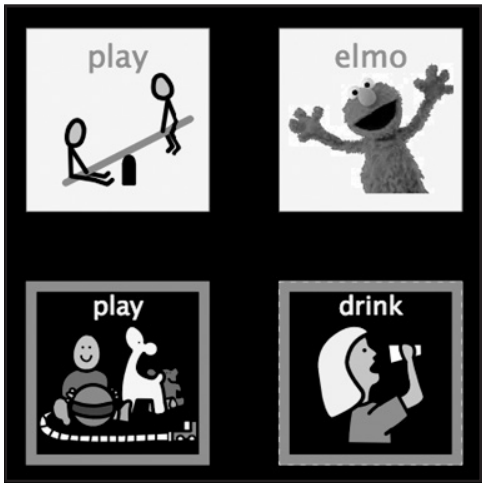
Lower Level CVI involves damage of the visual pathway up to and including the striate cortex, affecting the child's acuity, understanding of visual images, and ability to see parts of visual fields. The child may only notice specific objects.

Higher Level CVI, sometimes referred to as cognitive visual impairment, involves damage occurring beyond the striate cortex and disrupts specific vision functions (such as awareness of movement, shape, or color) but does not involve visual field or visual acuity. (Shaman 2009)

This distinction is important in understanding how the individual with CVI is seeing the visual field. Seeing involves taking in the visual scene, finding and recognizing parts of that visual scene, deciding what to focus on, and engaging in visually-directed movement. Our brain subconsciously decides what information is relevant and what is not. When areas of the brain decide, together, to select relevant information, the individual attends to it. This visual attention is often damaged in individuals with CVI.

In symbol-based communication systems, consider the color, size, and background of pictures, the visual

complexity of the system, and the child's visual field preferences. Use preferred colors in symbol backgrounds, or highlight the symbol outline and text in preferred color on a black or grey background. Control the amount or complexity of information presented visually; reduce how much information is on a page.



Simplifying the visual environment is crucial at all stages of developing a visual array. Line drawings are actually better than photos. Provide movement to focus the individual's attention on the communication display. Use shiny, reflective surfaces for gaining attention by surrounding or wrapping items in Mylar or a similar material. However, when laminating pages, use anti-glare, or matter, laminate. Put the communication device or book on a black background by laying a black paper or cloth over the desk or stand.

In general, individuals with CVI experience success with AAC systems that utilize partner assisted scanning; tactile systems with voice output; auditory scanning high tech voice output devices; and two-switch auditory step scanning where the user can control the speed of scanning for processing, that utilize visual tracking of a visual stimulus across the scan (such as a flashlight or finger or bright object).

Burkhart also suggests "using a communication device (BIGmack Communicator) using color coding. For example pair a 2D picture with a similar 3D object using bright colors. Have the communicator in the same color (i.e. Have a picture of a red cup, have a red cup and a red communicator that says, 'I want a drink,' when accessed."

Additional tips for AAC use with these students include:

- Use partner assisted scanning or use devices with auditory scanning. These modes of access allow for success by removing the need to visually attend to and shift from pictures the students can't see; there is now no need for communication success to be dependent upon symbol recognition.
- Abandon the kind of standard objectives you set for other AAC users. These students will have difficulty or lack of success with objectives to match objects to pictures, make requests using picture boards a specified number of times, or identify named pictures in arrays. Matching and identification tasks are largely nonfunctional, anyway.
- Avoid vocabulary that only relates to a single activity and then doesn't get used again; use of core vocabulary or high-frequency vocabulary is beneficial for these individuals.
- Avoid limited choices that don't allow engagement. This is true for many students. Multiple choice responses do not encourage language development or elaborate interactions.
- Provide social contact vocabulary so that the individual can maintain social interaction and engagement with others, even when unable to see what is going on.
- Provide vocabulary that is stable and can be added to as skills develop. This, again, encourages the use of core vocabulary, where words have multiple meaning uses with a limited number of visual distinctions.
- Provide vocabulary sets that are organized and stay the same each time. Stability of vocabulary becomes even more critical for users who cannot see the displays. In partner assisted scanning it becomes important for the vocabulary to come in the same order each time. Individuals learn to anticipate where vocabulary comes in the list, so as to make themselves ready to respond.
- Make changes slowly.
- Use consistent language for tasks, questions, etc.
- Incorporate function into all activity; look carefully at classroom tasks to make sure that they have a functional purpose for the individual. Don't make intervention for vision independent of functional activities and contextual routines. Similarly, keep communication intervention grounded in function.
- Make sure conversational or other communication interactions are important to the individual. Don't just talk to practice a specific skill or to address the classroom curriculum. While the child's participation may initially be limited to vocalizations, eye gaze or facial expressions, keeping his attention keeps him involved in learning. Expand the conversation to build the child's sense of anticipation, turn taking, and interacting. Add to the interaction one piece at a time, build up the constancy and routine, then expand again. It is recommended that partners use differently colored and textured gloves during interactions to build visual interest and routine.
- Integrate movement into activities to capture and maintain attention. Pay attention to what captures the child's attention and use it or incorporate it in other interactions and routines. Mylar often works

well with children with CVI because it both moves and reflects. Maintain specific colors into matching routines consistently. The child can begin to associate color to function; for example plates can always be red, cups can always be blue, in all environments (see Burkhart's suggestion above).

- Build repetition, constancy, and routine into activities for learning communication. Again, routines serve as a stepping stone to building language. Consistency in colors, background, items used, location of activities all build routine and patterns.
- Build in socialization. Individuals with CVI have limited opportunities to play and socialize. Engineer the play so that the child with CVI can participate. That may be just to laugh, or it can involve using a switch to communicate something. Keep the individual actively participating. Create a familiar routine out of the play, with a consistent beginning and end, so that the child learns the routine and, eventually, the language that goes with it.
- Consider building touch into the system. Most children with CVI can learn from touch and will probably have strong likes and dislikes. Consider the deepness of pressure, speed, pattern, and location of the touch. Build touch into routines as a cue to help define parts of the routine, or the beginning and end. Building texture into the visual system may also be beneficial.

Aphasia

Aphasia is a communication disorder caused by stroke or brain injury that affects a person's ability to process and formulate language. Adults with the acquired communication deficit of aphasia are a diverse group, with a wide array of linguistic skills represented by the different forms of aphasia.

Anomic Aphasia is the least severe form. Individuals are often unable to supply the correct word for what they want to say. Word retrieval difficulties is the prominent language impact.

Broca's Aphasia is also called expressive aphasia or confluent aphasia. Individuals with Broca's aphasia often know what they want to say, but cannot produce the words or sentences. Expressive language, including speaking and writing, is reduced. Individuals may use telegraphic speech or speech that omits all but the key words. Individuals with Broca's Aphasia may benefit from use of an AAC system.

Mixed Nonfluent Aphasia resembles Broca's Aphasia because speech is limited and difficult. However, this individual may also have limited comprehension of speech. Reading and writing, as well as listening, are impacted.

In *Wernicke's Aphasia*, individuals are not aware that what they are saying makes no sense. Individuals may have significant difficulties with comprehension and be unable to understand what is said to them. They can produce fluent speech, but it is largely unintelligible in terms of meaning.

Global Aphasia is a widespread impairment due to extensive damage to the brain's language areas. Individuals tend to lose all language function. They may be able to produce only a few words, may understand little of what is said to them, and be unable to read or write.

Primary Progressive Aphasia is very uncommon. It is a degenerative nervous system disorder that causes increased impact to speech and language skills. It is different from aphasia in that it is a progressive type of dementia rather than a result of specific brain event.

The type or degree of aphasia an individual experiences can change over time with intervention. Because both cognitive and linguistic skills may have been damaged, implementation of AAC can be difficult.

In an article summarizing the research on AAC use with individuals with aphasia, Purdy and Dietz (2008) report that approximately 50% of individuals with aphasia never recover sufficient speech and language skills for functional communication. AAC is often the path of last resort for adults with aphasia, and can involve use of no or low-tech communication books and boards, high tech dynamic display devices, use of low-tech static display devices, gestures and one-handed signs, and drawings.

Although researchers have shown that positive results are often developed in structured intervention settings, generalization appears to fail. The authors posit that this may be due to the interrelationship between cognition and language and the possibility that deficits in aphasia are due not only to the linguistic system, but also the cognitive system.

Research continues to show that language is supported by attention, memory, and executive function. Attention has been shown to impact the accuracy and efficiency of the linguistic system. This shows that aphasia may be a problem of performance rather than linguistic competency. Because linguistic tasks demand considerable management of attention to competing stimuli, individuals with aphasia may not be able to sustain and regulate attention for linguistic tasks.

Additionally, individuals with aphasia have reduced short-term or working memory. Given that working memory is where information and stimuli are held or stored and manipulated for use, deficits in this area lead to decreased capacity for reading and listening comprehension. Working memory has been shown to be an accurate predictor of language comprehension performance. Patients who have impaired working memory are impaired in their performance on

comprehension tasks.

Executive functioning skills are "integrated cognitive processes that determine goal-directed and purposeful behavior, including initiation, organization, flexibility and planning, which are critical for communication. Successful communicative interactions require individuals to generate a thought, internally formulate a message, and initiate the communicative act…. they must monitor their communicative attempts and judge." (Purdy and Dietz 2008). Deficits are seen in this area with individuals with aphasia.

This combination of cognitive deficits impacts functioning for operational competence, strategic competence, and linguistic competence.

The organizational system of the AAC devices or books that depend upon placement of symbols in a grid pattern strains the individual's cognitive capacity as they try to process the abstract symbols provided and combine them to create messages. Individuals with aphasia appear to be able to process visual scenes better than grid formats. A visual scene appears to generate quicker comprehension, and individuals with aphasia are more easily able to navigate visual scene displays, due to reduced cognitive demands required to process the information.

Lingraphica's speech generating devices, which have been focused on the aphasia market, have always displayed visual scenes. Visual scene displays are available in a variety of other high tech devices and, of course, can be made in communication books.

However, in spite of the use of visual context in these AAC systems, many users continue to have difficulty with becoming efficient communicators due to executive function deficits. Recognizing when a message has not been understood is necessary for developing a repair strategy. This strategic competence is vital to engagement with others. Individuals with aphasia routinely have difficulty generating language, especially for shifting topics and for shifting message types for increased partner comprehension.

In deciding upon an AAC system and strategy for individuals with aphasia it is necessary to gain understanding of their language strengths and weaknesses, and any strategies that have already developed which may be useful in and of themselves, or shaped into efficient AAC use. AAC users with aphasia continue to need to be able to store, represent, and retrieve messages, and may all do so differently.

Because of the expressive challenges (Goossens, and Porter's "Catch 22"), determining level of linguistic skill is difficult. Lasker (2008) enumerates the linguistic challenges of responding using a simple AAC display:

1. Understanding the question asked of him
2. Identifying the expressive mode to be used once he realizes he cannot speak
3. Attending to and discriminating the symbols on the display
4. Remembering the location of and accessing the correct response symbol at the right time in the exchange
5. Recognizing whether or not the partner understood him
6. Possibly determining how to extend the conversation by some mode

For a relatively simple exchange the individual with aphasia must utilize an array of linguistic systems, skills, and strategies. Individuals who were once able to use language without even thinking about it now must think through every step of the process and use an unfamiliar system to express themselves.

In determining an appropriate AAC system the individual's language skills need to be assessed – not just in isolation by various language tests, but also in discourse situations and with familiar and unfamiliar persons. Looking at real life situations, again, provides us with the best information about how an individual will perform with an AAC system.

The AAC-Aphasia Classification System has been developed and validated (Garrett and Lasker 2005), and defines two types of communicators with aphasia – partner-dependent and independent – by whether or not they rely upon their partner to manage communication demands and provide familiar choices in context.

Partner-dependent communicators rely on their communication partners to scaffold language interactions by providing choices, rephrasing questions, and supplementing auditory input with graphic symbols – in short, the way AAC is scaffolded for younger users as well.

Independent communicators have relatively well-preserved language and executive functioning, and usually comprehend much of what is said to them. They initiate communication and attempt a variety of communication strategies. They may have significant apraxia of speech but more moderate aphasia. These communicators can be good candidates for a high tech system. They require intervention to increase both unaided and aided language skills, including repair strategies.

When considering an AAC system for an individual with aphasia, attention again needs to be paid to the vocabulary organization of the system and the linguistic demands its use entails. Consider how messages are stored, combined, and retrieved, as well as what skills the user needs to access the system and whether this individual has – or can learn – those skills.

Letter and word boards require the user to spell by writing or typing, or to decode words sufficiently

to recognize them and then be able to use them combined in messages. Systems that have word prediction and abbreviation expansion capacity facilitate communication. Letter users have sufficient language skills to formulate via writing. Use of word prediction can allow the individual to provide only the first letter or two of the word to retrieve it.

When words rather than letters are used, the individual needs to understand the organization of groups of words within the system and how to navigate to them. Words can be pointed to in books or dragged to/touched into the message window on devices.

Phrase-based systems require the individual to find the key word or picture representing the phrase. These can be used for storytelling, especially, or other social interactions. The individual accesses the phrases in a specific order to tell about something. The user needs to understand how to sequence the phrases. Static displays with preprogrammed phrases are often used for individuals who cannot navigate dynamic display systems.

Theme-based systems include visual displays using photos or pictures that represent salient details. The context provides support to the individual, and text or symbol buttons can be placed around the scene in a logical order.

Down Syndrome

Down syndrome is not always regarded as a special population that requires AAC intervention.

Many individuals with Down syndrome develop verbal skills to varying degrees. However, often their verbal skills are not sufficient to meet all communication needs, and, even more often, their speech is highly unintelligible, even after receiving speech therapy as children. Research suggests that as many as 95% of parents often have difficulty understanding their child's speech.

Speech disorders with Down syndrome are usually related to oral motor weakness or anatomical differences. Specifically, problems include:

- Central nervous system structures that are atypical and result in difficulties with timing, accuracy, and sequencing of speech movements.
- Large tongue size relative to oral cavity size impacts tongue placement for articulation.
- Abnormal development of facial bones and relatively smaller skull size may result in a smaller oral cavity, with the same impact.
- Differentiation of the mid-facial muscles may be impacted, with a resulting impact on facial expression and oral movement.
- Hypotonia may cause a variety of difficulties with muscle coordination and movement. Speech requires the coordination of a large number of muscles for respiration, phonation, resonation and articulation, and hypotonia results in poor intelligibility. Both articulation and vocal quality can be affected.

Additionally, disorders of fluency affect between 45% - 55% of individuals with Down syndrome. Dysfluencies tend to increase with those individuals with better expressive language.

AAC interventions with Down syndrome do not generally impact speech production. However, for those individuals with Down syndrome who do not have effective expressive communication, it is important to introduce AAC at a young enough age to avoid development of frustration and avoidance behaviors, and to develop effective augmentative strategies.

Case in Point:

An adolescent with Down syndrome was referred for an AAC assessment.

This young man attended a public school, where he was in a special class where there was significant reverse mainstreaming: that is, almost as many typically-developing students came into the classroom most periods in order to work with, mentor, and help teach the special education students. This young man was also very involved with two of the high school's sports teams and socialized with the team members.

This young man had very little speech and his speech was largely unintelligible. He had not had previous exposure to picture based systems with any consistency.

His initial response was to push the symbols away. Gestures and questioning led to the conclusion that he considered them too "babyish," and would mark him as too different. He was frustrated by difficulties communicating with his typical peers, but not sufficiently to want to use something he had to carry around with him.

A hand-held sized iOS device was provided, with an AAC app. The iPod was the same type many of his friends had and didn't mark him as "different." His peers thought the AAC app was cool, and spent a significant amount of time in class with him communicating with it with him. Peer acceptance made the device acceptable to this student.

While this young man's speech did not improve in intelligibility with use of AAC, his expressive language did increase and he was better able to communicate with his teammates and school friends.

Developmental Apraxia of Speech

Developmental Apraxia of Speech (DAS), also called Childhood Apraxia of Speech (CAS), has historically been a controversial area of speech disorders.

There has been significant debate over whether the disorder exists, whether it should rightfully be called dyspraxia (rather than apraxia), and whether or how to remediate it. Definitions can differ, but include the central area of difficulty: the inability to or difficulty with production of volitional movements required for speech, in the absence of weakness or paralysis of muscles used in speech production.

Unlike other disorders, children with DAS usually appear to develop typically, only excepting the area of speech production. Children with this disorder may be sensitive to textures of certain food, or may dislike having their teeth brushed. There may be some other "soft" neurological signs, including overall clumsiness.

The motor planning deficits of DAS impact articulation and prosody of speech. Intelligibility of speech and functional use of communication may be severely reduced. The articulation skills of these children often show:

- Reduced consonant and vowel production
- Error patterns of omission and cluster reduction and assimilation predominate
- Vowels are especially disordered in production
- Inconsistent articulation errors
- Use of the simplest syllable sounds they are able, and decreased intelligibility as length of speech production increases; children may be relatively intelligible at the 1-2 syllable level, but intelligibility disappears in connected speech
- Apparent groping behaviors in speech

AAC intervention is sometimes resisted because children with this disorder have no obvious sign of disability. Parents often wish to wait and work on speech production. They may not want to "create" the look of a disability by providing an external speech device.

The impact of AAC intervention on speech production is not consistent in these children (as AAC does not provide the intervention in motor speech patterns), but the ability to effectively communicate has a tremendous impact in increasing engagement and interaction with others, and decreasing frustration and resulting behaviors.

Autism Spectrum Disorder

Not very long ago, children with autism spectrum disorder were not regarded as capable of leading any type of typical life, and not much was expected of them. Often, families were pressured to put their child into institutionalized care to avoid many difficult and "hopeless" years. As recently as the 1960's and 70's, autism was still considered Childhood Schizophrenia and an emotional/mental health disorder rather than a development or genetic disorder.

However, the outlook on autism has changed, diagnosis of the spectrum of individuals has improved, and treatment options have proliferated.

Autism is more recently considered a neurodevelopment disorder, resulting from disruption of the central nervous system. There continues to be ongoing research into the genetic aspects of autism, as well as a variety of other system disorders.

Under the Individuals with Disabilities Education Act 2004 (IDEA 2004) – the federal special education law – all types of autism are classified under one term, "Autism," which is defined as "a developmental disability significantly affecting verbal and nonverbal communication and social interaction, usually evident before age 3 that adversely affects a child's educational performance. Other characteristics often associated with ASD are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. The term does not apply if a child's educational performance is adversely affected because the child has an emotional disturbance." [34 C.F.R. 300.8(c)(1)]

Students with autism spectrum disorder (ASD) face a variety of challenges, including communication impairment (which leads often to behavior challenges), sensory processing challenges, and social interaction challenges.

Impairments in verbal and nonverbal communication are core features of children on the autism spectrum. Individuals with autism often fail to use communication for social purposes, to use standard communication gestures or expressions, or to process many of the auditory-verbal signals used in communication.

Individuals with autism may have difficulty with understanding why we communicate, what mode to use to communicate, and when and where to communicate effectively with others. Individuals with ASD use many behaviors to communicate, but also those that are not communicative. What often differentiates them is how their communication partners react and respond to them. Additionally, individuals with ASD do not always understand why to use appropriate communication modes. They may use some behaviors to communicate the messages that are most important to them, and not yet see the other reasons to communicate, which are often more socially directly or related. Individuals with ASD may not be aware that they need to get the attention of a partner before they can communicate; that when and where are dependent upon the context, particularly a context which involves another person.

Some sources estimate that between 40% and 50% of individuals with ASD are nonverbal, while others put the estimate slightly lower. According to the National

Autism Association about 40% of children with autism do not speak, while 25%–30% of children with autism have some words at 12 to 18 months of age and then lose them. Others might speak, but not until later in childhood.

Communication skills in children with ASD run the spectrum from nonverbal, gestural, use of single words, to use of sentences. Some children develop speech, and later lose it. Some have some speech, including echolalia, but it is not functional for communication. Perseveration (repetitive verbal behaviors) is common; jargon (vocalizations with speech-like patterns; may contain true words) less so. Children and adults with ASD show unique patterns of speech and language development, and because of some of the teaching strategies used they often only use communication for requesting and protesting.

Development of functional spontaneous communication is a key to increasing their quality of life and decreasing disruptive behaviors.

Most behaviors that we find "unacceptable" or "inappropriate" exhibited by students with ASD can be traced back to a communicative function. In those cases the interdisciplinary team's task is to identify that function, find a more functional communication response, and teach the use of it to replace the behavior.

Students who find sensory stimuli overwhelming or even painful benefit from being given the vocabulary to express their feelings and needs. Often the earliest communication targets that need to be taught are gaining attention, requesting escape from a task or situation, indicating the need for something or someone.

Over the past few decades several different AAC interventions have been used and studied with individuals with autism spectrum disorder. These include use of sign language and other formal gesture systems, use of graphic symbols (pictures), and use of speech generating devices.

Sign language use with students with ASD was explored in the 1960-70's. The early research showed more benefit from use of signs with children who were nonverbal than those who used echoic speech (Lovaas 1997). In Nunes' (2008) review of the research she reports that signs were used because they were easy to generalize outside of treatments (Bonvillian, Nelson, & Rhyne, 1981), that they were more iconic than and easier to process than spoken language (Mirenda & Erickson, 2000), that signs were easily prompted and shaped in the absence of other social skills (Rotholz, Berkowitz, Burberry, 1989), and that use of visual-motor skills by-passed the auditory-vocal processing difficulties of individuals with ASD. While sign language skills are dependent upon fine motor skills which may be impacted in many children with autism spectrum disorder, advantages of sign language include its portability, its status as and characteristics of an actual language system, and the ability to communicate quickly.

Photographs and symbols have been used successfully with individuals with autism (NRC 2001). Individuals who are unable to sign (usually due to motor limitations or lack of motor imitation skills) are often able to use pictures or picture symbols. Use of visual images has also been found to be useful in individuals with ASD who have difficulty with processing and memory deficits. It has been hypothesized that use of visual graphic systems helps to promote joint attention, in that the individual is able to check back and forth between the picture symbol and the environment. Because pictures are static, they have the advantage of being longer-lasting and are able to prompt recognition, rather than relying on the ability to recall a word or motor sequence. Overall, many studies concluded that individuals with autism progressed better with non-transient systems of communication – that is, static picture systems – demonstrating reduced problem behaviors, increased vocabulary, and increased communication initiations and responses.

A variety of studies have looked at the impact of AAC interventions on the communication of children with ASD. Several have focused on use of visual cues in aiding with organization, management of tasks, usefulness in transitions, and similar non-expressive functions. Frost & Bondy (2002) investigated use of the Picture Exchange Communication System (PECS) with preschool children with ASD who were nonverbal or minimally (non-functionally) verbal and/or who avoided interactions with others. Other authors have since completed similar studies with the PECS and groups of students with ASD, all with positive results. Often in practice, however, when intervention fails to move on to a more robust system or when the system becomes too cumbersome or difficult for the student, they cease to use the system and are assumed to be regressing. What is, in fact, happening is that the students need a system that is faster and easier to navigate in order to maintain motivation for the communication interactions. They need expanded vocabulary for a variety of communication functions.

Evidence based practice (practice supported by external scientific evidence, clinical expert opinion, and client based opinion) with students with ASD is strongest and most consistent when using applied behavior analysis techniques. But ABA does not mean only massed discreet trial methods. ABA includes modified incidental teaching, Pivotal Response Treatment (PRT), and Natural Aided Language. Pivotal Response is evidence based and includes the features of good AAC intervention. Natural Aided Language also provides features of good AAC intervention with students with ASD.

A system developed by Romski and Sevcik (1996), called System for Augmenting Language (SAL), was used with students with moderate to severe intellectual disability who had not developed successful communication strategies. SAL included use of high tech voice output devices, use of symbols that represented objects, teaching through natural routines, use of speech generating devices by communication partners, and consistent monitoring. Students were successful in the understanding of, and some use of, symbols. The study concluded that language learning happened when aided input was used in the environment.

Similarly, Aided Language Stimulation (Goossens 1989) uses symbol use by communication partners to highlight key words while verbalizing in interactions with the child. This technique provides aided input in meaningful contexts and, it is argued, may obviate the use of direct "teaching" of symbol use. Other researchers have used Aided Language Stimulation with a variety of students in natural play, daily living, and storybook reading contexts, all with positive results.

Natural Aided Language Stimulation (NALS) is a program that introduced visual language into the daily natural environment (Cafiero, 1998), creating a "second language" for all communication partners to use in daily interactions with students with ASD. Results of use of environmentally specific communication boards in child-preferred interactions resulted in increased communication and decreased inappropriate behaviors. Other studies have shown similar results when pictures were used in the context of daily interactions with students with ASD.

The National Autism Center (NAC) and the National Professional Developmental Center on Autism Spectrum Disorders (NPDC-ASD) have since conducted research reviews of studies using AAC with children with autism spectrum disorder, and concluded that evidence based practice supports the use of AAC with individuals with ASD. (The NAC is a division of the May Institute. They promote use of evidence based practices by identifying established treatments. Their review took in 50 years of research with strict criteria for inclusion. The NPDC is a multi-university center that has identified 24 evidence based practices after reviewing 12 years' research. Their aim is to determine evidence based practices, rather than establish treatments.)

Early and consistent intervention with AAC has been correlated with increased communication – both aided and verbal – in individuals with ASD. Their strength in visual processing is positive for use of visual AAC strategies. Difficulties with motor movements are alleviated by use of an expressive mode that requires less motor involvement. And the high level of interest in technology and interactive objects found in individuals with autism makes a visual and technological solution a good fit.

Use of picture-augmented input and visual cues has consistently been found to be evidence based practice for students with ASD. Visual supports may help individuals with ASD to compensate for inattention, and aid in auditory processing, sequencing, and organizing information. Use of picture communication systems and voice output devices is also listed as evidence based practice by the NPDC-ASD. http://autismpdc.fpg.unc.edu/content/briefs

Speech generating devices (SGDs) have been involved in more limited research studies (Nunes, 2008). Use of synthesized speech rather than static symbols allows for communication with partners who are not immediately in visual range or are at greater distances. Improvements in expressive language as well as prelinguistic skills have been shown. Some individuals have also shown ability to use SGDs for communication repair strategies.

The Evidence-Based Practice and Autism in the Schools guide published by the collaboration of the National Autism Center/National Standards Project lists the following:

Established AAC treatments

Schedules
: including visual strategies to communicate a series of activities or steps for a specific activity

Story-based intervention package
: including written stories depicting specific situations or events, describing expected behaviors

Emerging AAC treatments

AAC devices
: including interventions with high tech and low tech strategies, such as pictures, photos or symbols to facilitate communication development

PECS
: a specific AAC strategy based on applied behavior analysis principles

Sign instruction
: direct instruction of signs to improve functional communication

Unestablished treatment

Facilitated communication
: providing physical support to assist an individual to point to pictures, word, letters

The National Professional Development Center on Autism Spectrum Disorders found six evidence based practices related to AAC:

1. Speech generating devices/voice output devices – low and high tech devices
2. Functional communication training – use of AAC strategies and tools to replace unexpected forms of communication

3. PECS
4. Social narratives where social situations are described, with behavioral expectations and/or routines embedded within a story using visual cues
5. Video modeling using video recording and display to model target behaviors
6. Visual supports, using visual tools to assist students in transitioning to and completing activities throughout the day

There is overlap between the two groups of findings (Corporale, 2013), and readers should note that the NAC/NSP reviews focused on evidence to support improvement of verbal communication (using SGD and PECS) while the NPDC focused on increased expressive communication and language using SGDs and functional communication using PECS.

Additionally, identified as important factors for successful implementation of AAC were use of motivating vocabulary, correct symbol and array sizes, encouraging communication throughout multiple appropriate opportunities, and training of communication partners.

Reviews of literature since the publication of those findings have identified common best practice strategies to include:

- Use of multimodal approach
- Close collaboration among staff
- Staff and peer training
- AAC implementation that includes relevant, meaningful activities
- Providing functional communication strategies across environments
- Involving the family in the AAC assessment and implementation process
- Involvement of the SLP in a primary role, with involvement of all other communication partners
- Consultative role of SLP is supported by other partners

It is obvious that these practices extend beyond use with individuals with ASD, across all populations learning to use AAC.

Embedding communication into routines helps students with ASD learn to communicate within those routines, just as it does with all AAC and language learners.

Pre-symbolic students can use objects during natural routines, to build language skills. Students can learn in natural contexts with natural objects to initiate communication. Use of object boards for choice making or insertion of communication into routines with associated objects fosters language and communication development.

Emergent communicators with ASD do well with choice making with visual supports of AAC. Symbols can be inserted into routines to show the steps of a task or activity. Use of gestures can be inserted into routines to signal intents or feelings to partners. Use of just the word "No," for early communicators can provide an outlet for the frustrations of not being able to deal with the environment and its demands.

Above all, use of aided input strategies not only provides models for expressive communication with pictures, but a bridge to comprehension of language by individuals with ASD.

Individuals who do not comprehend the language used by others – or those who can comprehend, but have it leave their memory so quickly that they may as well not have understood – live life in a heightened state of anxiety. Not understanding what has been said to you, what is going to happen next, what you need to do first, how the routine for the day is being changed, how much work you need to do, when the task will be over must be amazingly baffling.

Many individuals with ASD develop their own set of coping behaviors and routines. For them things need to be done the same way all of the time, arranged in the same way, or maintained in status quo to help them deal with an unpredictable and unintelligible world. They might perseverate on a behavior or phrase. They insist on sameness, because they do not understand the language others use to explain changes.

For these individuals, using aided picture communication provides communication comprehension, as well as a model for expression. Use of pictures that are not as transient as speech, that are stable and permanent, provides more sense of stability and understanding. Communication must be understood before it can be used.

Drager (2009) reviewed the literature on use of Aided Language Input with individuals with ASD. The variety of aided input strategies have the following features in common:

1. They are implemented in naturally occurring opportunities, with all communication partners.
2. They augment the input the individual receives.
3. They use modeling to expand vocabulary.
4. The intervention takes place in naturally occurring contexts and is embedded into functional and meaningful activities.

Because children with ASD have strengths in visual-spatial skills, use of Aided Language Stimulation should not only be effective in providing AAC modeling but also for supporting comprehension of verbal input. While available research is limited, it does show that providing Aided Language Stimulation increased

comprehension and use of AAC in the children with ASD studied.

Shane and Weiss-Kapp explored use of highly structured systems of visual input to establish seven basic communication functions: protesting and refusal, organization and transitions, requests, directives, comments, questions, and social pragmatics. While they note this group of functions is not meant to denote a developmental progression, they find that learners tend to acquire functions in this order. They also caution that it is important to remember that instruction of a single function should not be focused on to the exclusion of others. These functions should be addressed in parallel because success with some of them may facilitate the development of others.

The key features of the Visual Guided Language (VGL) system (another aided input system) are:

- Visuals are used for two-way communication. Mentors and learners use symbols to communicate with each other. This provides opportunities for aided language stimulation, and enhances comprehension of spoken language;
- Use of visuals is consistent and immersive. Individuals with ASD and their communication partners all use the same visual supports for comprehension and expression, whether at home, at school, or in the community. Thus, visuals are ubiquitous;
- Comprehension is targeted as a foundation for language expression. As learners become more proficient at understanding the meaning of the visual symbols presented in conjunction with spoken language, they can apply this knowledge in the generation of novel expressive statements;
- The nature of the communicative function and the level of symbolic representation that the individual is capable of understanding should dictate the delivery medium. Manual sign, gestural, or pictorial representations tend to be used when initiating a communication program to express protests and requests. However, the electronic presentation of visual supports is invaluable for capturing and maintaining a learner's attention and for teaching more abstract linguistic concepts (e.g., verbs, prepositions, descriptors) and syntactic relationships. (Shane and Weiss-Kapp)

Given the success of aided language input and visual communication with individuals with autism spectrum disorder, it is no wonder that studies show good success with use of the PODD communication book system with students with ASD. For these students, the PODD books offer a unique opportunity to access functional communication responses quickly and initially, with ability to determine and teach use of pragmatic intents of messages. Because the PODD system uses both structured visual input and visual aided expression it is a good fit for individuals with ASD.

PODD provides strategies to support the design, production, and implementation of communication systems that enable genuine communication for a variety of functions in all daily environments. PODD includes strategies to minimize some of the common difficulties associated with the use of multilevel communication books: the predictive links characteristic of PODD organization help students with ASD to organize their messages, while use of pragmatic branch starters help students with ASD process other people's messages (particularly for students who have difficulty with intonation, facial expression and gestures).

Specifically, PODD: (a) supports the individual who relies on AAC and his communication partners to move efficiently between pages to locate required vocabulary, (b) reduces the time required to access vocabulary to produce multi symbol messages, (c) provides a strategy for quick access to predictable messages, and (d) enables access to a broad range of vocabulary for spontaneous, unpredicted messages (Cafiero, Porter 2009).

Students with ASD can also work well with a core vocabulary based communication book or board. Students who learn using a combination of motor and visual modes can take advantage of the strengths of Language Acquisition through Motor Planning (LAMP) while continuing to use the visual aspects of the system to help with recall and formulation.

> Core vocabulary is the relatively small number of words that are used to communicate the majority of our messages. These are the words most used during interactions, and are typically pronouns, verbs, adjectives, adverbs and prepositions. Core vocabulary does not vary from person to person very often.
>
> Fringe vocabulary is where the nouns are contained, and will vary from individual to individual, depending upon interests, needs, and contexts. These words are used less often and are usually only used in (a) specific context(s).

Limiting the use of navigation through use of core vocabulary displays is useful for many users with ASD who do not consistently attend to navigation paths and who impulsively hit buttons without intent. LAMP was originally designed for students with Autism Spectrum Disorder who use speech generating devices to communicate, but it may also be useful with communication displays of any type, where vocabulary is stable. It is ideally suited to the core vocabulary based Unity/Minspeak system featured in Prentke Romich devices; however, the general principles of LAMP can apply to any word-based, generative language system of AAC.

Since LAMP is based on motor memory, symbol (picture, word) recognition is not as prominent as in many other systems. But, since repetition and motor memory are emphasized with LAMP rather than symbol recognition, students who exhibit position bias (i.e., a preference for choosing items on a certain side) or who have a tendency to use repetitive fine motor movement may possibly need additional prompting to use this system.

AAC systems for students with ASD that emphasize core vocabulary should also include fringe words, choose vocabulary that is important to the specific individual, and choose specific locations for vocabulary that don't change (even as display size increases) in order to maximize the motor plan.

Various recent research studies have demonstrated effectiveness of AAC with students with ASD, effectiveness of use of PODD books with students with ASD, effectiveness of PECS in establishing requesting behaviors in students with ASD, effectiveness of use of iPhone or iPod touch or iPad with the *Proloquo2Go* application for students with ASD.

In the past several years use of iOS apps for AAC has proliferated. One of the most used and most comprehensive AAC apps is *Proloquo2Go*, by Assistiveware.

Some of the advantages of using the *Proloquo2Go* app with students with ASD include the unique touch interface of the iOS devices, where pages are progressed through using a simple swipe (rather than having to navigate to a new page of similar items through linking), the automatic morphological/syntactic functions (verb conjugation, automatic creation of noun possessives and plurals), one-button addition of new vocabulary, and access to recently spoken items for the past 15 or 60 minutes.

A disadvantage to this system, unlike most other dynamic display systems, is that the touch panel is not very adjustable (although this has improved in the latest iOS update). This impacts students with ASD who have motor planning difficulties like motor delays, difficulty executing motor movements, or tremors. They may have difficulty initiating motor movements. These are exacerbated by stress and anxiety.

Picture cues are also noted to be useful with individuals with ASD (Hogdon 1994) for a variety of tasks, including to:

Establish Attention:
Looking helps students establish attention better than just listening. Once they have focused their attention, the rest of the communication message can get in.

Give Information
The individual needs to know how to get information to answer the who, what, why, where, when questions. Use of visual cues enhances their comprehension significantly.

Explain Social Situations
The world can be confusing to individuals who have difficulty with comprehension and expression. People and objects are constantly moving and changing. The environment is often unpredictable. Providing social information through written or other visual input as well as verbal input helps students process and understand. Visuals can tell what to do and what to say.

Give Choices
How do students know the available options? Individuals need to know what choices they have as well as options that are not available

Give Structure to the Day
Use visuals to tell what is happening or what is not happening. Providing this information about what is coming up tends to reduce anxiety. Visual schedules provide predictability, consistency, and stability. They increase independence and reduce anxiety, as well as decreasing the partners' needs to remind and nag. Schedules can cover a day, a segment of a day, and/or consist of in-activity and between-activity cues.

Teach Routines
Following multiple steps in a routine will be easier when the student can see the steps. They will learn a routine faster when they don't make a lot of mistakes trying to recall the next step(s).

Organize Materials in the Environment
Where are the things the individual needs? It needs to be clear where to put supplies away at the end of an activity

Organize the Space in the Environment
Can the student identify his own space to work, play or sit? Is it clear in the environment what areas are 'delegated' for what activities? Are there visual cues for where to find things or where to go?

Teach New Skills
Visual cues are extremely helpful for learning how to work with a new toy or piece of equipment, and with learning a new task or academic skill.

Support Transitions
Visual cues are very useful for assisting with stopping one activity to start another and with moving from one environment to another. Anything that involves a shift or change can be made easier to understand by using a visual cue.

Stay on Task
Visuals help the individual to remember what the current activity is and stay involved with it until it is completed. They also need to see what constitutes 'finished.'

Ignore Distractions
Help students consciously focus their attention on desired activities or interactions by the use of visual cues.

Manage Time
Individuals with autism spectrum disorder may not be able to tell time or to estimate lengths of time throughout the day. Tasks can seem endless. The time for a preferred activity may seem never to be coming. How long is five minutes or one hour? How much time is there before a transition in the schedule? Time is invisible. Timers and clocks turn time into something students can see, something concrete and visual. Visual markers can tell how much more of something needs to be done before it is over and the next activity comes.

Communicate Rules
Individuals with autism may not know the rules of a given situation or environment. Or they may have been told, but no longer remember. They may not understand the rules. Or they may get too impulsive or excited.

Assist Students in Handling Change
Visuals help prepare for something that is going to change. Preparing students for situations where something will be different from what they normally expect can prevent many problems from occurring.

Guide Self-Management
Students need to learn how to manage themselves when they get anxious or encounter a problem. Often a visual that reminds them of the strategies to use or how to calm themselves and count down their emotion are very helpful.

Aid Memory
Visuals help with remembering what to do and when to do it. They can help with remembering the name of an object or a person.

Speed Up Slow Thinking
Some individuals may have lots of information in their brains, but it takes them a very long time to access it. Visual cues can speed that process.

Support Language Retrieval
All individuals have times when they cannot recall the name of a person, place, or object. Students with language disorders experience this problem far more often. Individuals with autism spectrum disorder may have significant difficulties with remembering the names of things. Often once they see it they remember.

Provide Structure
Structure means being organized and predictable. Many students function better in environments where changes are minimal. Make the environment provide visual organization and information.

Learn Vocabulary
Create a personal dictionary with pictures and words of items important in the child's life: peoples' names, favorite toys or videos, activities or places. Students learn information better when they can access it over and over.

Communicate Emotions
Students demonstrate a variety of emotions with their actions. Translating those responses into pictures or written language gives an opportunity to explain, clarify or validate their experience.

Clarify Verbal Information
What I understood might not be what you meant. Making it visual helps clarify our conversation. It eliminates confusion.

Organize Life Information
Think of phone numbers, calendars, cooking instructions, shopping lists, social security numbers, appointments, etc.

Review & Remember
One of the greatest benefits of making something visual is that you can keep it. Verbal language flies away. It disappears. Keeping visual information to review over and over helps students remember and understand. Many of these individuals have limited memory skills, and in spite of understanding what's been said to them, they may not respond in an expected way, because they no longer remember what's been said to them.

Because social roles and demands are integral to communication, social skills through communication need to be taught to individuals with autism spectrum disorder.

The following social goals are recommended by the Ohio Dept. of Education:

- Imitation and joint attention (attending with others)
- Understanding personal space
- Acceptable environmental behaviors, such as not picking nose in public, bathroom etiquette, etc.
- Emotions of self and others
- Identification of emotions and where they occur
- How individual actions affect others
- Asking for help/assistance
- Slang, sarcasm, joking, teasing
- Initiating, maintaining and reciprocating social interactions
- Accepting rejection by peers
- Playing games, winning and losing graciously
- Turn-taking, waiting for turn

- The meaning of body language (includes facial and bodily gestures)
- Age appropriate behavior with the opposite sex, e.g., recognizing unwanted sexual advances and dealing with them appropriately, understanding appropriate sexual expression and seeking privacy for any sexual expression, finding appropriate ways of seeking and giving affection
- Typical peers' understanding and successful ways to interact and support the individual with ASD/PDD
- Appropriate workplace behavior as a part of the transition from school to work. This includes the use of vocational language, how to take work breaks, dealing with the public, and working with superiors, subordinates and work peers. In many cases, the degree to which a person with ASD/PDD "fits in" with, and is accepted by, their work peers will determine their long-term job success. The employer may require assistance with appropriately introducing the person with ASD to the workplace and educating the workers with how to have a meaningful work relation with that person. On the other hand, once acceptance is gained from work peers, the person with ASD often has a very strong, vocal support network that greatly enhances the probability of their long-term job retention and success.

In addition to providing AAC intervention, the following communication intervention strategies are recommended for individuals with ASD (Ohio Dept. Health):

- Decrease asking questions and increase use of comments and descriptions of activities, emotions, and environments that the individual experiences.
- The communicating partner needs to fully understand that situations, certain individuals, sensory issues and stress will affect the quality of communication and the communication intention.
- Modify the speaker's language and provide visual supports
- Allow time for auditory processing and formulation of information.
- Develop a protocol to gain the individual's attention. The protocol should include how to initiate joint focused attention.
- Encourage meaningful imitation. Since imitation is one of the precursors to the development of functional language, build in ample opportunities for activities to develop imitative skills.
- Help the individual focus attention on the speaker. This will maximize the impact of any direction, question, or information.
- Determine the communicative intent and other possible functions of non-verbal and verbal behaviors to establish their meaning.
- Integrate communication strategies into all daily activities. Teach communication strategies in a step-by-step approach, starting in an organized environment, and integrating into all environments.
- Use vocabulary and grammatical structure at the individual's comprehension level.
- Consider using rhythm and music.
- Teach turn-taking and joint attention.
- Provide the individual with multiple opportunities to initiate interactions, make choices, and have peer-to-peer contact on a daily basis across all environments.
- Support receptive communication as well as expressive communication through both nonverbal and verbal methods: visual supports (object boards, pictures, gestures, sign language) and voice output communication devices.
- Facilitate the initiation of conversation and provide opportunities to practice language rather than waiting for the individual to initiate contact.
- During transitions from classes, buildings, work: offer a summary of successful communication strategies to appropriate personnel.

Giving information to students with autism/ASD in a concrete visual form helps them handle the many happenings during a day that can cause confusion or frustration. It gives them the structure necessary to better handle situations that are difficult for them, and helps them participate more independently in their life activities.

Conclusion

It is evident from reviewing each of these groups of individuals who may need AAC systems and intervention that they are varied and heterogeneous. This underscores the importance of conducting a complete and dynamic assessment, and continuing to grow both your AAC knowledge and the AAC user's system.

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www.aacinstitute.org
Core vocabulary information

www.aacintervention.com
Lots of information about AAC from where to start with literature-based boards to tips and tricks. Musselwhite, C.

www.adaptivationinc.com
Catalogue of devices, switches, and more

www.aren.scps.k12.fl.us/training/Flyers/ECT%20Intro.pdf Environmental Control Teaching manual

www.asha.org/docs
ASHA's site contains position documents, and documents outlining their stand on the knowledge and skills, roles and responsibilities of SLPs regarding AAC

http://autismpdc.fpg.unc.edu
Lists all evidence based practices for autism spectrum disorder, including overview, intervention steps, and check sheets

www.candlelightstories.com
Some ebooks are free; full access costs about $10

www.creativecommunicating.com
Patti King-Debaun's website offers materials for teaching literacy to AAC users

www.enchantedlearning.com/Rhymes.html
$20 membership required for full site, but symbol-adapted nursery rhymes are free

www.lindaburkhart.com
Offers a multitude of free handouts on intervention in AAC with students with complex communication needs, cortical vision impairment, Rett syndrome, PODD communication books, and more, as well as how-to handouts for building switches and mounts

http://www.novita.org.au/Content.aspx?p=683
PODD information and workshops

www.paulakluth.com/articles
Ideas for adapting books, including students in general ed classrooms

www.pdictionary.com/
Internet picture dictionary provides symbols with English and Spanish words for use in adapted books or communication displays

www.prentrom.com
Look for AAC Language Lab for step-by-step intervention targets, IEP objectives, and plans. This is also the source for the Pixon Project Kit by G. Van Tatenhove

www.storyplace.org
Charlotte & Mecklenburg County public library has preschool stories with text, dialogue is highlighted, accompanying games

http://trainland.tripod.com/pecs.htm
Links to many Boardmaker overlays

www.vantatenhove.com
Gail has many handouts here on using core vocabulary, descriptive teaching, teaching Unity/ Minspeak, and samples of the Pixon boards

AUGMENTATIVE-ALTERNATIVE COMMUNICATION & SPECIAL POPULATIONS Including Access Needs Final Exam (3 CE HOURS)

1. **Combined access is provided in _____ for individuals who use a combination of eye gaze or pointing and partner assisted scanning.**
   a. The PODD templates
   b. Musselwhite's flip book system
   c. The MegaBee
   d. A clear acrylic frame

2. **Limitations to the "pick up and give or show" method of access include _____.**
   a. A significantly lighter book with few to no layers
   b. The lack of physical activity required by this method
   c. The additional time needed to replace the symbols in the book when the message is completed
   d. Memorizing the displays and sequences

3. **Partner assisted scanning (PAS) allows for the advantage of having a live, thinking person _____.**
   a. Asking questions such as, "Do you feel sick?"
   b. Helping to interpret the message.
   c. Both a. and b.
   d. Neither a. nor b.

4. **Switches that work well with individuals who have limited range of motion or limited fine motor skills include the _____ switches.**
   a. Jumbo and Saucer
   b. Twitch, Finger, Compact, and Gumball
   c. Gooshy, Gel, Senso Dot, and Ultimate
   d. Pal Pad

5. **When looking at an individual's ability to use AAC to develop communication we have to be aware of _____.**
   a. How he processes input (what type of atypical patterns are used)
   b. How the individual moves (what atypical patterns exist, what movements exist to use for responding)
   c. What are the effects are of position stability, motivation, other impairments
   d. All of the above

6. **_____ of cerebral palsy involves damage to the cerebellum and/or its pathways.**
   a. Hypotonic type
   b. Mixed type
   c. Ataxic type
   d. Dyskinetic type

7. **Cotter, Carter, and Porter (2008) delineate some key issues for participating in learning for individuals with cerebral palsy, which apply to use of AAC. Among them are Weight Shift: _____.**
   a. The ability to shift weight and maintain stability is necessary, for example, for moving their hand or using a switch
   b. Those involuntary movements of head, mouth, neck, trunk, extremities that happen during voluntary movement which the individual needs to learn to disassociate
   c. Individuals with cerebral palsy almost always show a degree of asymmetry of the body; using both sides of the body is often must be learned
   d. Opportunities to bear weight on arms or legs may be missing due to atypical tone to motor development

8. **Erickson suggests identifying activities based on a color coded system where: _____.**
   a. RED represents an activity at the child's independent level; limited cognitive challenge
   b. GREEN represents communication whose symbols or vocabulary have been introduced and used
   c. YELLOW represents motor position that is fully supported and access is maximized; minimal physical effort needed to sustain position
   d. RED represents an activity that is cognitively and linguistically challenging

9. **Rett syndrome is characterized by normal early growth and development followed by a slowing of development, usually at between _____ months of age, with loss of purposeful use of the hands, distinctive hand movements, slowed brain and head growth, problems with walking, seizures, and intellectual disability.**
   a. 6-12
   b. 6-18
   c.12-18
   d.12-24

10. **When working with an individual with Rett syndrome, continued asking or prompting will _____.**
    a. Elongate the period of waiting
    b. Quickly initiate an action
    c. Provide a helpful auditory stimulus
    d. Restore hand and movement skills

11. **Eye gaze can be a strength for some girls with Rett syndrome, but choosing an eye gaze system that allows for _____ is important.**
    a. Proxemics
    b. Degeneration
    c. Compulsive hand movements
    d. Extraneous head and eye movements

12. **In an individual with CVI, an eye exam usually yields _____.**
    a. Evidence of an ocular disorder
    b. Evidence of injury to the eye
    c. Normal results
    d. Conflicting results

13. **Students with CVI show _____.**
    a. Lack of interest in color
    b. Attraction to movement
    c. Difficulty with near-space viewing
    d. Acute visual reflex responses

14. **Tips for AAC use with students with CVI include:**
    a. Avoid use of core vocabulary or high-frequency vocabulary
    b. Abandon the kind of standard objectives you set for other AAC users
    c. Talk solely to practice a specific skill or to address the classroom curriculum
    d. Incorporate changes rapidly

15. **In _____, individuals are not aware that what they are saying makes no sense.**
    a. Wernicke's Aphasia
    b. Global Aphasia
    c. Broca's Aphasia
    d. Anomic Aphasia

16. **The AAC-Aphasia Classification System has been developed and validated (Garrett and Lasker 2005), and defines two types of communicators with aphasia: _____.**
    a. Phrase-based and theme-based
    b. Letter boards and word boards
    c. Visual and auditory
    d. Partner-dependent and independent

17. **Speech disorders with Down syndrome are usually related to oral motor weakness or anatomical differences. Specifically, problems include: _____.**
    a. Abnormal development of facial bones and relatively large skull size may result in a larger oral cavity
    b. Hypertonia may cause a variety of difficulties with muscle coordination and movement
    c. Differentiation of the mid-facial muscles may be impacted, with a resulting impact on facial expression and oral movement
    d. Small tongue size relative to oral cavity size impacts tongue placement for articulation

18. **The articulation skills of children with Developmental Apraxia of Speech (DAS) often show: _____.**
    a. Consonants are especially disordered in production
    b. Apparent groping behaviors in speech
    c. Consistent articulation errors
    d. Significantly decreased intelligibility at the 1-2 syllable level

19. **Autism is more recently considered _____, resulting from disruption of the central nervous system.**
    a. Childhood Schizophrenia
    b. An emotional disorder
    c. A mental health disorder
    d. A neurodevelopment disorder

20. **Most behaviors that we find "unacceptable" or "inappropriate" exhibited by students with ASD can be traced back to _____.**
    a. A communicative function
    b. Sign language
    c. Use of graphic symbols
    d. Use of speech generating devices

21. **Evidence based practice (practice supported by external scientific evidence, clinical expert opinion, and client based opinion) with students with ASD is strongest and most consistent when using _____.**
    a. Visual cues
    b. Requesting and protesting
    c. Applied behavior analysis techniques
    d. Sign language

22. **The Evidence-Based Practice and Autism in the Schools guide published by the collaboration of the National Autism Center/National Standards Project lists the following: _____.**
    a. Established AAC treatments including Facilitated communication
    b. Unestablished treatment including Schedules
    c. Emerging AAC treatments including PECS
    d. Established AAC treatments including Sign instruction

23. **Drager (2009) reviewed the literature on use of Aided Language Input with individuals with ASD. The variety of aided input strategies have the following features in common: _____.**
    a. They are implemented in extremity, with highly trained communication partners
    b. They augment the input the individual receives
    c. They use keyboard input to expand vocabulary
    d. The intervention is embedded into specialized activities

24. **Some of the disadvantages of using the *Proloquo2Go* app with students with ASD include _____.**
    a. The automatic morphological/syntactic functions
    b. One-button addition of new vocabulary
    c. Access to recently spoken items for the past 15 or 60 minutes
    d. The touch panel is not very adjustable

25. **In addition to providing AAC intervention, the following communication intervention strategies are recommended for individuals with ASD (Ohio Dept. Health): _____.**
    a. Allow time for auditory processing and formulation of information
    b. Increase asking questions; decrease use of comments
    c. Distract the individual from the speaker
    d. Wait for the individual to initiate contact

ANSWER SHEET

First Name: _____ Last Name: _____ Date: _____

Address: _____ City: _____

State: _____ ZIP: _____ Country _____

Phone: _____ Email: _____

ASHA membership # _____

Other: License/certification # and issuing state/organization _____

Clinical Fellow: Supervisor name and ASHA membership # _____

Graduate Student: University name and expected graduation date _____

** See instructions on the cover page to submit your exams and pay for your course.

By submitting this final exam for grading, I hereby certify that I have spent the required time to study this course material and that I have personally completed each module/session of instruction.

AUGMENTATIVE-ALTERNATIVE COMMUNICATION & SPECIAL POPULATIONS Including Access Needs Final Exam

1. Ⓐ Ⓑ Ⓒ Ⓓ	6. Ⓐ Ⓑ Ⓒ Ⓓ	11. Ⓐ Ⓑ Ⓒ Ⓓ	16. Ⓐ Ⓑ Ⓒ Ⓓ	21. Ⓐ Ⓑ Ⓒ Ⓓ
2. Ⓐ Ⓑ Ⓒ Ⓓ	7. Ⓐ Ⓑ Ⓒ Ⓓ	12. Ⓐ Ⓑ Ⓒ Ⓓ	17. Ⓐ Ⓑ Ⓒ Ⓓ	22. Ⓐ Ⓑ Ⓒ Ⓓ
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AUGMENTATIVE-ALTERNATIVE COMMUNICATION & SPECIAL POPULATIONS

Including Access Needs

(3 CE HOURS)

COURSE EVALUATION

Learner Name: _____

	Disagree				Agree	
Orientation was thorough and clear	1	2	3	4	5	
Instructional personnel disclosures were readily available and clearly stated	1	2	3	4	5	
Learning objectives were clearly stated	1	2	3	4	5	
Completion requirements were clearly stated	1	2	3	4	5	
Content was well-organized	1	2	3	4	5	
Content was informative	1	2	3	4	5	
Content reflected stated learning objectives	1	2	3	4	5	
Exam assessed stated learning objectives	1	2	3	4	5	
Exam was graded promptly	1	2	3	4	5	
Satisfied with learning experience	1	2	3	4	5	
Satisfied with customer service (if applicable)	1	2	3	4	5	n/a

What suggestions do you have to improve this program, if any?

_____

_____

What educational needs do you currently have?

_____

_____

What other courses or topics are of interest to you?

_____

_____