

Augmentative and Alternative Communication

Some school-age children have significant disabilities that make it difficult for them to develop spoken language. Until recently, there was little that could be done for these children. They were often relegated to the back wards of institutions or employed in nonproductive sheltered workshop activities. Today new technologies offer hope for these individuals who previously lacked access to that most important human characteristic—communication. These new approaches are called augmentative and alternative communication (AAC).

This chapter examines the rapidly developing field of augmentative and alternative communication, describing a variety of approaches—from sign systems to sophisticated electronic devices. Most important, instructional methods that are designed to develop the functional use of AAC systems are discussed. The goal of this chapter is to help you become aware of the many options that are available for persons who do not speak and how to best use these procedures in classroom settings.

Learning Outcomes

After completing this chapter, you should be able to:

1. Describe the components of augmentative and alternative communication systems.
2. Describe effective methods and procedures for implementing augmentative and alternative communication and the outcomes associated with these methods.

Howard, a student with fragile X syndrome, has severe articulation problems that make his speech difficult to understand. He carries a communication wallet with pictures he shows others so they can understand what he is talking about. When he goes to McDonald's, he uses pictures from the wallet to help him order his meal.

Melissa, a 16-year-old girl with autism, rarely talks. She has learned to communicate with a Touch Talker. Now, she can respond to questions from her teacher by touching a symbol on her display, activating a voice output device that serves as her voice.

Tony, a 9-year-old student with cerebral palsy, attends a general education classroom. Because of his limited motor abilities, he uses a head pointer to touch an electronic keyboard to formulate written messages and produce a voice output.

Tanya, a student with Down syndrome, has learned a repertoire of eight signs that she uses to supplement her limited spoken output.

What all of these individuals have in common is that they are using some type of augmentative or alternative communication (AAC) procedure. For many, if not most, children with severe disorders of language and communication, AAC represents their best hope for the development of communication skills.

According to the American Speech-Language-Hearing Association (ASHA), more than two million people in the United States with significant language impairments use AAC devices. Although there are no nationwide data on the number of school-age children who use AAC devices, surveys within states have indicated that the percentage of preschool special education students who use AAC devices ranges from 12 percent in Pennsylvania (Binger & Light, 2006) to 30 percent in Connecticut (Worah, 2011). In the latter survey, it

was found that 3 percent of students who were identified as in need of special education were receiving AAC services.

Federal law in the United States has recognized the growing importance of AAC systems by including provisions regarding the use of AAC in the Americans with Disabilities Act and the Individuals with Disabilities Education Act (IDEA). IDEA regulations now require that assistive technology be considered as part of the planning for children with disabilities. If it is determined that an assistive technology such as AAC is required, the school must purchase the device and train staff in its use.

Components of Augmentative and Alternative Communication

Augmentative and alternative communication (AAC) systems are designed to supplement or replace the natural language and communication of persons with disabilities. The International Society for Augmentative and Alternative Communication (ISAAC) has defined augmentative and alternative communication as “a set of tools and strategies that an individual uses to solve everyday communicative challenges.” The ISAAC website includes information about and resources to increase understanding of AAC. AAC may include existing speech or vocalizations, gestures, manual signs, and aided communication (Sevcik & Ronski, 2007).



Watch this video about AAC. In what ways can AAC systems be used to support language and learning?

http://www.youtube.com/watch?v=r3m8_YmTDDM

AAC systems typically are thought of as consisting of four components: *communication aids* (or *devices*), *communication techniques*, *symbol systems*, and *communication strategies* (Sevcik & Ronski, 2007). Each of these components must be considered when an AAC procedure is being developed. Sometimes most attention is lavished on the communication device, especially if it is a particularly high-tech system. Teachers and speech-language specialists must be careful not to become so caught up in the technical sophistication of the device that they ignore the other components of AAC systems. After all, the device is of little use if the user cannot understand it or does not use it.

Techniques

There are two basic kinds of AAC techniques, aided and unaided. **Unaided augmentative communication techniques** do not require external support devices or procedures in order to operate. They include techniques such as sign language and gestural cueing systems. Unaided techniques have the obvious advantages of portability and speed of message preparation (Wilkinson & Hennig, 2007). There are no concerns about electrical outlets or battery packs. Of course, when a sign language is used as the mode of communication (e.g., American Sign Language or Signed English), there will be a more limited number of potential communication partners.

Aided augmentative communication techniques use communication means that may be as simple as a communication board or as complex as a computer with a synthetic speech output device. Low (or light) technology-aided systems include symbol boards, communication books, or picture systems such as the Picture Exchange Communication System (PECS) (Bondy & Frost, 2001). Wilkinson and Hennig (2007) point out that since light-technology methods require the communication partner to speak the words that the child selects, the result can be a highly

interactive communicative exchange. However, low-technology communication systems require that the communication partner be very familiar with the user's communication style and experiences.

High-technology systems use microcomputers or, increasingly, a handheld device and specialized software or applications to provide the user with a voice. As technology has changed, these devices have become more powerful and more portable. The use of high-technology systems such as speech-generating devices (SGDs) have been found to be very effective for increasing the communication of individuals with significant language and communication disorders (Rispoli, Franco, van der Meer, Lang, & Carmargo 2010; Schlosser, 2003). As powerful and useful as high-technology devices can be, they are not always the best choice for every individual. Concerns about cost, vulnerability to damage, voice quality, and speed of interaction continue to exist despite technological advances (Wilkinson & Hennig, 2007).

A relatively new development that has the potential to revolutionize the use of AAC is the development of communication apps for mobile devices. In Chapter 13, we reviewed a few of the apps that are available to teach language skills. Similarly, there has been a proliferation of apps to enhance communication. Perhaps the best known is Proloquo2Go (AssistiveWare). Although this and other communication apps may have limitations not found in the most advanced augmentative communication devices, they have the advantage of being relatively inexpensive and easy to use. However, at this time, there is no published research on their effectiveness.



One of the developers of Proloquo2Go is interviewed in this video. What does he describe as the advantage of this app over other kinds of AAC methods?

<https://www.youtube.com/watch?v=vomkNSluWW4>

Four features are common to all communication aids, electronic or not: output, selection technique, vocabulary capability, and portability.

Output refers to the appearance of the display and how it enhances communication with a listener. Communication boards typically consist of a flat surface on which drawn or written symbols are displayed. They can be placed on a wheelchair lap tray, bound in a book, or folded into a wallet-sized container. The output is a visual display that the user accesses by pointing. Electronic devices may use a visual display, a printed output, or a voice output. Visual displays allow listeners to check their understanding of the message and to even offer corrections or suggestions for extension of the communication. SGDs, also known as **voice output communication aids (VOCAs)**, have the advantage of being the closest approximation to natural speech and can be used at a distance.

There are two types of voice output devices currently in use: *synthesized speech* and *digitized speech*. Synthesized speech devices generate speech-like sounds by electronically combining speech sounds. They can be used in text-to-speech applications where typed text is converted to vocal output. Digitized voice output systems use real speech that is converted to a digital format that is then reconverted into speech output. Digitized speech output is superior to synthesized speech in producing the inflections of human speech and has been found to be more intelligible than synthesized speech in children as young as 3 to 5 years of age (Drager et al., 2006).

A second common feature of communication aids is the **selection technique** employed. Users of a communication aid must indicate to their communication partner which letter or symbol they wish to select. Individuals with intact motor skills may use *direct selection*. In this case, the "speaker" simply points to a selected item. For those who have little or no voluntary control of their arms, adaptations can be used to allow them to make direct selections. These might be a head pointer (a rod attached to a headband) or

an eye gaze system that identifies the selected item when the user looks at it for a period of time.

Direct selection is usually the fastest type of selection technique; however, some individuals with significant motor impairments need another type of selection method. *Scanning* is an alternative. Scanning involves making a selection from the presented choices. Rather than directly selecting the desired word or symbol, with scanning, choices are displayed for the individual. Typically, scanning is associated with electronic displays that present a blinking light (cursor) that moves from item to item on the display panel. The user selects an item by merely pressing a button (or a switch or pad) or making some other motor movement that stops the scanning. The cursor may move across the display in a linear motion, in up-and-down columns, or in any other preprogrammed way. Scanning devices can be coupled with various types of switches so that the individual who has any voluntary muscle control at all can operate a communication device.

Vocabulary capability varies with the type of system and the type of displays. Static displays include a limited number of vocabulary items that are presented in a fixed format so that the user always sees the items in the same presentation order. In order to present new vocabulary, the page is changed. Dynamic displays use linked pages and a branching structure to display vocabulary. Touching one symbol may take the user to related pages with multiple words. Although static displays can present only a limited number of items at a time, they may be useful for individuals who are learning new words. Dynamic displays provide greater flexibility but are also more complex.

Communication boards use static displays with overlays that can be changed for various settings and activities. Most electronic devices can be reprogrammed and the overlay changed to meet changing communicative needs. The ease with which such changes can be made and the number and usefulness of the items on the display are factors that should be considered in the design or selection of a communication aid.



This video explains how a communication board can be organized. How does the presenter suggest that the board be used to enhance communication?

<https://www.youtube.com/watch?v=UwxoJQvZkZY>



Watch this video to understand more about augmentative communication devices. What is the advantage of dynamic displays?

https://www.youtube.com/watch?v=OU_fj310t80

Portability is the final feature of communication aids. Portability is an important concern in an era when emphasis is on the integration of persons with disabilities into their schools and communities. As technology advances, the devices are becoming smaller and more powerful. Clearly, a communication device is of little help if it cannot be used in the settings where it is really needed. Therefore, it is essential that portability be considered when decisions about communication devices are being made.

There are advantages and limitations to the use of either aided or unaided procedures (see Table 15.1). Ideally, unaided communication techniques would be the choice for everyone. But there are many individuals who are unable to develop spoken language or understand and use nonverbal communication or sign language. For these persons, aided communication methods are the best alternative. When appropriately designed or selected, aided communication devices permit people with severe impairments in motor and/or cognitive abilities to communicate with others.

Table 15.1

Advantages and Disadvantages of Aided and Unaided AAC Systems

	Advantages	Disadvantages
Unaided Systems	No external support devices needed Portable No cost (other than training)	Potential communication partners limited Relies on user's memory ability Signs may be difficult to learn
Aided Systems	Can produce message that is more complex than user's own language Can communicate at a distance (with VOCAs)	Electronic device may break or lose power Portability may be limited May be expensive

Symbol Systems

Unaided AAC systems use language—spoken or signed. Studies examining the acquisition of sign systems by individuals with disabilities have generally found that such persons can acquire at least a basic sign vocabulary (Tincani, 2004). Although a sign language system may be a useful form of communication for some students, for many students with disabilities, sign language is not an effective approach to the development of communication skills. With signing, there is the obvious problem of the limited number of potential communication partners available. If the goal for persons with disabilities is community inclusion, sign language may not be the most effective approach. Therefore, many of these students require some sort of alternative approach that might include an aided AAC system.

Any AAC device must have some sort of symbol system as the mode of communication. For individuals with severe motor disorders but good literacy skills, letters and words can be the symbolic mode. But many users of AAC systems either have not had the opportunity to acquire literacy skills or have cognitive disabilities that impair their acquisition of written language. A variety of symbol systems ranging from real objects to photographs to abstract-symbol systems have been developed to aid these persons in communicating with an AAC system.

Photographs have the advantage of clearly representing an item. Of course, the quality of the photograph will affect its usefulness. Photos that include a contextual background (a spoon that appears next to a plate) are more recognizable. Additionally, in general, color photographs are more easily recognized than black-and-white photos (Mirenda & Locke, 1989). An alternative to photos is line drawings. These usually are composed of black lines drawn on a white background.

A number of abstract-symbol systems are available, including *Picture Communication Symbols* (PCS) (Johnson, 1981), *Picsyms* (Carlson, 1984), *Sigsymbols* (Creagan, 1982), and *Blissymbols* (Bliss, 1965). All of these graphic symbol systems include pictorial representations of the items they name. In addition, *Sigsymbols* include ideographs (ideas represented through graphic symbols) and *Blissymbols* include both ideographs and arbitrary symbols (ideas assigned arbitrary configurations of lines). *Rebus* symbols are another form of line drawing used with AAC systems. Rebuses use pictures of objects to replace the word in a sentence. A number of rebus systems are commercially available (e.g., see the Widgit Software website).

Communication Skills

AAC procedures and devices present wonderful opportunities for nonspeaking persons to communicate with others. Yet, if the systems are not used or not used effectively, the intervention is of no use, no matter how high-tech the device.

Research on the use of AAC systems has found that users tend to be relatively passive communicative partners. They rely on their speaking listeners to direct the conversation,

rarely initiate interaction themselves, and often fail to respond to attempted conversational initiations from their peers (Chung, Carter, & Sisco, 2012; Mirenda & Iacono, 1990). One factor in this breakdown of communication may be the nature of the communicative opportunities provided by partners. Communicative partners have often been observed to provide instructions or make comments that do not encourage continued interaction (Chung et al., 2012; Reichle, 1991).

In addition to their rarely initiating conversation, AAC users have been found to have difficulty terminating conversations (Reichle, 1991). Some simply do not know how to do this. Others want to extend the conversation as long as possible, even if the interaction is no longer meaningful. Some AAC users have even been reported to make untrue statements simply to keep a conversation going (Reichle, 1991).



Check Your Understanding 15.1

Click here to gauge your understanding of the concepts in this section.

Implementing AAC Systems

Prerequisite Skills

One of the major issues in AAC involves prerequisites to its use. For many years, it was claimed that in order to be successful, potential users of AAC systems had to have achieved certain cognitive and language prerequisites. Sometimes called the *candidacy* model, this approach suggested that the potential AAC user should be able to demonstrate development to at least stage V (means-end relations) on Piaget's description of cognitive development and show evidence of intentional communication before being introduced to an AAC system (Cress & Marvin, 2003). The idea that AAC users needed these cognitive and language prerequisites was based on data from spoken language acquisition in normally developing children. These data indicated that specific cognitive and communicative behaviors preceded the emergence of spoken language. However, as Ronski and Sevcik (2005) have noted, the exact relationship between cognition and communication development and language acquisition has never been clearly defined. Moreover, research indicates that persons with disabilities can benefit from AAC systems even if they lack these cognitive and communicative prerequisites. For example, Reichle and Yoder (1985) were able to teach preschoolers who functioned at Stage IV on a Piagetian scale to label objects using graphic symbols. Although the preschoolers were unable to generalize this skill to functional communication, such as commenting and requesting, they were able to label. Ronski, Sevcik, and Pate (1988) taught young adults with severe intellectual disability to request foods and objects by using graphic symbols on a computer display panel, despite the subjects' lack of spoken language comprehension skills.

Because of research such as that described earlier and the realization that research from normal language development is not always easily translated to individuals with disabilities, today most clinicians and researchers are suggesting a try-and-see, rather than a wait-and-see, model for potential AAC users (McGregor, Young, Gerak, Thomas, & Vogelsberg, 1992). As Cress and Marvin (2003) put it, the only prerequisites needed for use of an AAC system are, "natural actions and behaviors," that is, any behavior or actions that others interpret as communicative.

Preassessment

As with any kind of intervention, the development of an AAC system begins with assessment. The most useful kind of assessment is one that is ecological in nature, that is, one that surveys the communicative environments and communicative needs in which the

individual will function. McCormick and Wegner (2003) described a comprehensive assessment system for potential AAC users that includes the following elements:

- **The student:** They suggest that the assessment team ask questions such as the following:
 - How does the student communicate now and for what purposes?
 - What are the student's communication needs and goals?
 - Where and with whom does the student need to communicate?
 - What are the student's language, cognitive, sensory, and motor skills and capabilities?
 - What are the potential barriers to the student communicating in his or her natural environment?
- **Mobility assessment:** Including seating, positioning, and ambulation.
- **Motor assessment:** To what extent can the student use hands for signing, pointing, and typing? Can the student have control over head movement, eye gaze, or other motor movements to communicate?
- **Communication assessment:** Interviews with teachers and family members and direct observation can address questions such as the following:
 - How does the student currently communicate in different contexts?
 - What communicative modes and functions does the student use?
 - How effective are the student's present communication modes?
 - What does the student communicate about?
 - What motivational factors may have the potential to affect the student's communication?
- **Cognitive/linguistic assessment:** Including receptive language and cognitive development to determine the following:
 - How does the student currently understand the world?
 - How can communication be best facilitated within this understanding?
 - To what extent can the student meet the cognitive demands of various symbol sets and systems?
- **Sensory/perceptual assessment:** How does the student process incoming information? Which sensory systems are intact?
- **Literacy assessment:** Including print and phoneme recognition, word recognition, reading comprehension, and spelling.
- **The environment:** What curricular and social activities could the student access with the use of an AAC system? Assessment should include the following:
 - Communicative preferences and skills of potential partners
 - Potential barriers in the environment such as attitudes, skills, and knowledge of teachers, support staff, and peers
 - Opportunities to use AAC systems in natural environments



Watch this video to learn more about the implementation of AAC in schools. What procedures are used for conducting a preassessment?
<https://www.youtube.com/watch?v=BWy0hPggcBc>

Developing an AAC System

Using the results of assessment, the AAC development team needs to design a system that will help the user participate in academic, functional, and social activities in a variety of environments and improve the quality and quantity of the child's language and

communication skills. Decisions need to be made about the type of system to be used (aided or unaided), the nature of the symbol system (e.g., gestural, pictorial, symbolic), and the communication instruction required.

Deciding the type of system to be used—aided or unaided—is the first decision needed in designing an AAC system. The provider must weigh the advantages and limitations of each type of system in combination with information about the learner and the communicative environment. Characteristics of the learner, such as sensory and motor skills, may determine what kind of system is possible. Similarly, environmental demands and opportunities will also have an impact on this decision. If potential communication partners are not familiar with American Sign Language, this might be a poor choice for an AAC system.

In many cases, the choice of a communication system is not as critical as it might seem. Frequently, a combination of communication systems, including both aided and unaided, are preferable. For example, *Aided Language Stimulation* is a term for an AAC intervention strategy in which the interventionist highlights a symbol on the child's communication board while providing verbal stimuli (Goossens, 1989). The selection of a graphic symbol by the interventionist is always paired with a verbal model to show children that the symbols in front of them could be combined in new ways to exchange information. Keogh and Reichle (1985) suggested that a mixed mode, in which some vocabulary items are taught via one mode and others are taught in another, might be beneficial for some learners. Another alternative is to teach students to use two modes of communication. Depending on the situation, the student can choose the method that works best. For example, signing may work well in school with a teacher who knows sign language, but a communication wallet might be necessary when ordering at McDonald's (Reichle, Mirenda, Locke, Piche, & Johnston, 1992; Ronski, Sevcik, Robinson, & Bakeman, 1994).

Once a method of communication (or combination of methods) has been selected, the next decision involves selection of an appropriate symbol system. For an unaided communication procedure, the choice will be among the variety of gestural languages in existence. For aided systems, there are several factors that should be considered in selecting a symbol system, including guessability, learnability, and generalization. Symbols range in **guessability** from those that are *very transparent* (easily guessed) to those that are *translucent* (need additional information to decode) (Mustonen, Locke, Reichle, Solbrack, & Lindgren, 1991). The term *iconic* is also used to describe guessability. Iconic symbols are similar in appearance to the items that they represent. In general, Picsyms and Rebus symbols have been found to be easier to guess than the meanings of Blissymbols (Musselwhite & Ruscello, 1984). Research by Mirenda and Locke (1989) on subjects with mild to severe intellectual disability found the following order of guessability: real objects, color photographs, black-and-white photographs, miniature objects, black-and-white line symbols (Picsyms, Picture Communication Symbols) (Mayer-Johnson Co., 1986), Rebuses, Self-Talk symbols (Johnson, 1986), Blissymbols, and written words.

Learnability refers to the ease or difficulty of learning a particular symbol set. Generally, studies with nondisabled children have found that learnability is related to iconicity (guessability). Symbols that are more iconic (similar to the object being named) are more easily learned. Rebus symbols are easier to learn than Blissymbols, which are in turn easier to learn than Non-SLIP chips or words (Carrier & Peak, 1975; Clark, 1981). Research on persons with disabilities has found that, for them, matching photographs with objects is easier than matching line drawings with objects (Sevcik & Ronski, 1986) and that Rebus symbols are also more easily learned than Blissymbols (Hurlbut, Iwata, & Green, 1982).

According to Mustonen and colleagues (1991), iconic symbols facilitate the acquisition, generalization, and maintenance of graphic communication systems. The researchers acknowledge, on the other hand, that for students who can acquire higher-order symbolic information, iconic symbols may not be necessary. Another consideration is

determining the ease with which symbols can be combined to make sentences. Lexigrams and Blissymbols are readily combined into sentences.

When graphic symbols are selected for use with an AAC system, Reichle (1991) suggests that four questions should guide their selection:

- *What types of symbols should be used?* Choices include photographs, line drawings, abstract symbols, and the like. The selection should be made based on what works for a particular learner.
- *How large will the symbols be?* Learners with poor visual acuity will require larger displays.
- *How will the learner select the symbols?* Direct selection, scanning, or a combination of these could be used.
- *How will the symbols be displayed?* A board (electronic or nonelectronic), wallet, or book could be used to display the symbols.

In the end, symbol selection should be guided by the abilities and needs of the user and his or her potential communication partners.

Regardless of which communication system is selected, a decision must be made about which vocabulary items to include. Unfortunately, decisions about vocabulary are often based on what the teacher or clinician *thinks* the student needs to know rather than on what the environment demands (Reichle et al., 1992). In fact, when Reichle (1983) asked interventionists how they made decisions about vocabulary selection, he got the following responses (in order of frequency): (1) selected vocabulary that the interventionist thought would be important; (2) selected vocabulary from the first 50 word developmental data; (3) selected vocabulary from word lists obtained from surveying service providers; and (4) selected vocabulary from word lists derived from vocabulary used by learners with developmental disabilities. A better strategy would be to select vocabulary demanded by the learner's environment. This vocabulary could be derived from the results of the preassessment ecological inventory.

Enhancing Communication

As with most decisions involving AAC, the decision about which symbol system to use must include considerations of the abilities and needs of the individual student—the student's literacy skills, cognitive abilities, and potential communicative partners. However, the most important decisions may regard the instructional strategies for enhancing communicative competence rather than the mode of communication employed.

Earlier in this chapter, we reviewed some of the research on the communication difficulties encountered by users of AAC and found that AAC users often lack opportunities to communicate. When they do communicate, they have been reported to have difficulty communicating effectively with others and are, therefore, relatively passive communicators who rarely initiate interactions.

Natural environments have proven to be the best place to teach conversation skills (Carter, 2003). When instruction is designed so that students have opportunities to talk about real situations with conversational partners who actually exist in those settings, not only does interaction increase, but there is also a greater chance for generalization of the skill as well. In addition to being provided with opportunities for interaction in natural environments, AAC users should be taught to use their systems for functional purposes—that is, to accomplish some real task in the environment rather than one contrived for instructional purposes.

Spiegel, Benjamin, and Spiegel (1993) give an example of the integration of functional communication within natural environments. They taught a 19-year-old male with cerebral palsy and moderate intellectual disability to increase his use of an AAC device (Touch Talker) (Prentke-Romich). Although the student had learned to use the Touch Talker, he used it infrequently for interaction with others. He learned to respond

to conversational prompts that used sentences he had previously learned. For example, the student learned to produce the sentence *I need to go to the bank*. After demonstrating that he could produce this sentence, he was given the following prompt: *You just received your S.S.I. check in the mail. You want to put it in your savings account, and Ruby can drive you to the bank. Now, here comes Ruby to talk to you.* The student was then expected to type his previously learned sentence. Using this procedure, the student not only learned to respond to the vignettes appropriately, but also increased his spontaneous use of his AAC device.

Merely teaching an individual to use an AAC device is not enough to ensure that the person will use it. The results of the study by Spiegel and colleagues (1993) suggest this. Johnston, Reichle, and Evans (2004) identified three major problems with the use of AAC systems:

- Students who do not use their systems
- Communication partners who do not participate fully with a person using an AAC system
- Students who use socially or contextually inappropriate strategies for communication

Not only the AAC user, but also the listener, requires training. Often, listeners have to be very patient as AAC users formulate their messages. But patience alone may not be enough. Researchers have found that instruction in understanding the speech produced by voice output communication devices can increase the responsiveness of listeners to AAC messages (Rounsefell, Zucker, & Roberts, 1993). Communication between AAC users and their conversational partners can also benefit from instruction given to the listener on how to elicit communication from others (Hunt, Alwell, & Goetz, 1991). For example, Chung and Carter (2013) trained paraprofessionals and peers to enhance the communicative interaction of two children with intellectual disabilities who used speech-generating devices for communication (target students). The paraprofessionals were taught to use seven strategies to enhance interaction:

- **Increasing proximity to peers:** Helping the target student orient toward peers; including the student in class activities.
- **Increasing access to the device:** Ensuring that the device was present and working properly and contained items that could be used in the classroom.
- **Creating opportunities for use of the device:** Encouraging students to work with each other; using questions to promote peer interaction.
- **Monitoring interaction:** Using continuous monitoring to determine if additional prompts and interventions were needed to increase interaction.
- **Encouraging students:** Providing feedback to students on their interaction attempts.
- **Reducing support:** Fading prompts and questions once interaction was established.
- **Scoring interactions:** Using observations to determine if interactions were increasing.

Training for peers included strategies for getting the attention of the target student (such as using their name); using a variety of methods to communicate, including gestures and signs as well as the AAC device; asking questions; waiting for a response; helping the target student find a response on his or her device, if necessary; and learning how to respond when they did not understand what the target student was trying to say. The results showed that the target students significantly increased their interactions with peers and that these interactions persisted over time. A review of research on the use of peers to increase the interactions of AAC users found that the use of such methods can significantly increase interaction (Therrien, Light, & Pope, 2016).

There is increasing evidence that users of AAC can be helped to be effective communicators. It seems clear, however, that general instruction in the use of an AAC system is

not sufficient. Rather, AAC users and their communicative partners have to be taught specifically how to use the system in effective communication interactions.

To summarize, the process of planning an AAC instructional program consists of five steps:

1. **Preassessment**, including an ecological inventory and assessment of the learner
2. **Development of goals** that should enhance the child's ability to participate in all environments
3. **Selection of a mode of communication**, either aided, unaided, or a combination
4. **Selection of a symbol system**, gestural or graphic
5. **Selection of methods to enhance communication** for both the AAC user and communication partners

There is evidence from research that with careful planning and the use of effective instructional techniques, nonspeaking individuals can develop effective communication skills.

Integrating AAC Use into General Education Classrooms

As more and more students with significant disabilities, including students with severe communication disabilities, are included in general education settings, it becomes increasingly important for teachers—both general and special education—to be aware of methods that will help these students become more fully integrated. For students who use AAC systems, there are many challenges. Not only may teachers and students be unfamiliar with AAC devices, but also many AAC users require a significant amount of help with their own communication skills.

Although most students with disabilities who use AAC systems can benefit from being included in general education classrooms, they will not all be able to participate equally. Beukelman and Mirenda (2005) describe three levels of participation to show how AAC users can participate in the general education classroom:

Competitive Educational Participation: Students with disabilities participate in the same educational activities as their peers and are expected to meet the same academic standards, although they may not complete the same amount of work in the same amount of time (and with the same independence) as their peers. AAC users may require more time to complete assignments and tests.

Active Educational Participation: Students with disabilities participate in the same educational activities as their peers. However, the expected outcome is not the same as that of their peers. Their progress is evaluated according to individualized goals. Active students may receive supplementary instruction in specific skill areas. They usually benefit from adaptations or modifications to instruction.

Involved Educational Participation: Students with disabilities participate in the same educational activities as their peers, but they are expected to learn in cross-curricular areas such as communication, social, and motor skills. Their progress is evaluated according to individualized goals. Such students may require extensive adaptations in order to participate with their peers (see Box 15.1).

The goal is for all students with disabilities to participate to the maximum extent possible with typically developing peers in the general education curriculum. Unfortunately, the academic and social outcomes for students with disabilities, especially those with more significant disabilities, are not as positive as we would hope. That is what Kent-Walsh and Light (2003) found when they interviewed teachers of students with significant disabilities who were AAC users. While finding that teachers reported increased interaction between the AAC users and their peers and greater acceptance by their peers, the researchers also reported somewhat disappointing results for academic and social skill development in the AAC users. Based on input from the teachers themselves, Kent-Walsh

Box 15.1 Examples of Levels of Participation in the General Education Classroom

CORAN: A COMPETITIVE STUDENT

Coran is a student with cerebral palsy who uses a computer with a word prediction program to write. Coran is expected to meet the same educational goals as her peers. For example, on a social studies assignment, Coran is expected to read independently. She answers the assigned questions using her computer. When she takes a test, she receives additional time to complete the test.

TIM: AN ACTIVE STUDENT

Tim is a student with autism who uses a communication book based on the Picture Exchange Communication System (PECS) model. Tim participates in the same instructional activities as his classmates but with adaptations and modifications to instruction. For example, for a social studies reading assignment, Tim is assigned to read with a peer. The peer reads the selection aloud while Tim follows along with a partially completed outline. Tim and his

classmate then complete the outline together. A classroom aide assesses Tim's knowledge of the reading by asking questions that Tim can answer by constructing picture "sentences."

HEATHER: AN INVOLVED STUDENT

Heather is a student with significant intellectual disabilities who communicates primarily through vocalizations and by use of a simple voice output device. During social studies class, Heather participates in many of the same activities as her peers, but her learning goals focus primarily on communication. For example, while the rest of the class is reading the assignment, Heather watches a brief video from an online social studies website, then answers "yes/no" questions posed by her instructional aide by using her communication device. Heather is evaluated on her level of participation in the activity and the number of times she correctly responds to the questions.

and Light (2003) made the following suggestions to facilitate the inclusion of AAC users in the general education classroom:

- Communicate capabilities and limitations with respect to the inclusion process honestly.
- Develop competencies with AAC system operation.
- Request additional planning time.
- Remember students' humanity at all times.
- Include students in all classroom activities.
- Carefully match assistive technology to individual activity demands.
- Provide classmates with information related to the inclusion of students using AAC.
- Maintain effective team collaboration.
- Provide adequate training for team members.
- Provide the general education teacher with supports from individual team members (e.g., speech-language pathologist, paraprofessional).
- Implement effective transition planning.
- Select an AAC system with functions appropriate for the individual student.

As team members responsible for working with students using AAC systems, special educators may be called on to perform a variety of functions. A survey conducted by Locke and Miranda (1992) found that many of these functions are traditional teacher-related responsibilities: adapting the curriculum, preparing and maintaining documentation, and writing goals and objectives for AAC users. However, some of the responsibilities are less traditional: identifying vocabulary, determining students' motivation and attitudes toward AAC techniques, and determining the communication needs of students. Two of the major concerns expressed by the teachers in this survey were the need for more training in AAC and the need for more time to work as a team.

Beukelman and Mirenda (2005) reviewed research that has identified a number of factors that contribute to the successful inclusion of AAC users with disabilities. These factors include the following:

- Administrative support for and commitment to inclusion of all learners
- Availability of an AAC system with functions that are appropriate to meet individual student needs
- Attitudes among AAC team members that include creativity, flexibility, and open-mindedness
- Willingness of the general education teacher to develop skills in both the use of AAC systems and inclusion
- A team whose members have a working knowledge of the general education curriculum as well as strategies for adapting/modifying the curriculum
- A team with expertise in assistive technology and other learning technologies
- A team with expertise in how to use inclusive educational practices
- A clear understanding of the roles and responsibilities of each AAC team member
- Sufficient time for AAC team members to meet generally, in collaboration with parents



Watch as this student uses an iPad to participate in the classroom. How did the teachers in the video prompt the students to use their devices?

https://www.youtube.com/watch?v=U_cwZxC6bPc

Literacy and AAC

As we have noted throughout this book, one of the key issues for all students is the development of literacy skills. Appropriate use of AAC systems in the classroom (and in the home) can enhance literacy skills. Unfortunately, many AAC users have limited access to and instruction in literacy skills. A review of the research on the literacy skills of AAC users showed that between 50 and 90 percent cannot read at all or read below age expectations (Koppenhaver & Yoder, 1992).

In addition to physical limitations, children who use AAC systems typically have reduced literacy-learning opportunities (Beukelman, Mirenda, & Sturm, 2005). Parents of children with severe speech and language impairments read aloud less often to their child. When they do read, they ask their child for fewer labels and make fewer requests for their child to point to pictures. Many parents of children with disabilities place more value on physical needs and on basic communication, rather than on the development of literacy skills (Light & Kelford Smith, 1993). In school, AAC users have been found to have more limited literacy-learning opportunities than their peers (Beukelman et al., 2005).

What can be done to provide children who use AAC systems with more and better opportunities for the development of reading and writing skills? Students with significant disabilities have been found to benefit from literacy instruction that includes the following components:

- Creation of a well-stocked, accessible library that includes both familiar and predictable books (those that include repeated passages and/or themes)
- Daily storybook readings in which children choose the book to be read
- Opportunities for children to write about functional and meaningful events
- Provision of a wide variety of reading and writing tools as well as time to explore use of those tools
- Adult scaffolding during storybook reading that draws attention to the form, content, and use of written language

- Routine integration of text into classroom routines
- Individual and small-group activities that expose children to new reading and writing activities (Koppenhaver & Erickson, 2003)

The reading skills of AAC users can be enhanced by the use of communication tools that support their participation during reading. For example, communicative devices can be programmed to include symbols from a story. Students can comment on their reading by having access to multiple choice responses to questions (e.g., "I thought the book was:" funny/sad). Additionally, communication devices need to be designed to include letters and words that students are likely to encounter frequently. After reviewing research on reading and its application to students with disabilities, Wilkins and Ratajczak (2009) developed some specific suggestions for literacy activities for AAC users, including using theme pages on the device to sort vocabulary words into groups, using picture keys to help the student activate his or her knowledge before reading a passage, and using peers to help the AAC user construct syntactically correct sentences from words and phrases produced by the user.

In addition to reading, the writing skills of AAC users should also be a focus of instruction. Bedrosian, Lasker, Speidel, and Politsch (2003) described a program to enhance the writing of a 14-year-old student with autism who used an AAC device (Lightwriter/Zygo) to communicate. At the beginning of the study, the student had limited written language skills. The authors paired the student with autism with a typically developing peer. They used an additional AAC device (Alphatalker/Prentke-Romich) that was programmed with phrases designed to enhance communication between the students. In addition, they used a computer with story-writing software ("My Words"/Hartley-Jostens Learning) to facilitate written language production. The students were taught to use these devices as well as story grammar maps and storyboards to plan and execute their writing. Using these techniques, the AAC user significantly improved his writing. The student took an active, even dominant, role in planning the stories. He learned to use a story map effectively to plan and write his stories. The typically developing peer reported that he enjoyed writing the stories with his disabled peer and would do so again.

Using techniques such as those described above, students who use AAC systems can more fully develop their literacy skills. Blischak (1995) described the case of Thomas, a 9-year-old boy with cerebral palsy and vision impairments. Thomas received early intervention for speech and language disabilities that included the development of an AAC system. In school, Thomas used an AAC device called a "Talking Screen," which enabled him to use his limited movement and vision skills to scan an array and produce a voice output. This system enabled Thomas to more fully participate in literacy activities. Using this device, Thomas was able to initiate interactions, answer questions, spell words, and write stories. For example, after listening to a story, questions were recorded by the teacher. Thomas was required to listen to the passage and use his Talking Screen to select and print answers. A project at Pennsylvania State University directed by Dr. Janice Light is focused on enhancing the literacy skills of children with disabilities who use AAC. You can find out more about this project and watch some of their students in action at the project website (search for "AAC Literacy PSU").

Outcomes of AAC System Usage

How effective is AAC? Answering this question requires examining answers to three other questions. First, has the student increased his or her communication ability? Second, what, if any, effects are there on other areas of functioning? And third, how is the AAC user accepted by others? All of these questions could be used in determining the success or failure of an AAC system.

The first question is, without a doubt, the most important one. After all, the primary reason for using an AAC system is to improve the communication skills of the student. There is considerable evidence from both research and clinical practice that AAC, when properly instituted, can enhance the communication skills of nonspeaking individuals.

A review of research on the use of speech-generating devices with individuals with developmental disabilities (Rispoli et al., 2010) found that most of the studies (86%) reported positive outcomes for improving communication, although they expressed concern about the design of some of the studies. Similarly, a review of single-subject research on the effectiveness of AAC on individuals with autism (Ganz et al., 2012) found that both speech-generating devices and the Picture Exchange Communication System (PECS) were effective for enhancing communication skills. In addition, there was some evidence for reduction of challenging behaviors and improvements in social and academic skills.

There is also evidence that individuals who use AAC devices and systems can increase their production of spoken language. Many parents and professionals are concerned that using AAC systems with individuals who speak may reduce their spoken language, but a review of research on the speech production of AAC users found that, in nearly 90 percent of the studies, AAC users increased their speech production (Millar, Light, & Schlosser, 2006). Moreover, there were no decreases in speech in subjects in any of the studies. This is powerful evidence that not only does AAC use not decrease spoken language, but also in most cases, it actually increases speech production.

The third area of consideration in evaluating the AAC system is acceptance by peers. If students with disabilities are to be fully included in school settings, it is essential that they become accepted by their peers. If speaking peers have negative attitudes toward them, nonspeaking AAC users may shy away from interacting with peers. Although there is little research on this issue, there is evidence that improved ability to communicate is associated with improved peer acceptance (Guralnick, 1986). When Blockenberger, Armstrong, O'Connor, and Freeman (1993) compared the attitudes of fourth-grade children toward a child using an alphabet board, an electronic device, and signing, they found that there was little difference in the children's reactions. Their research suggests that children are not heavily influenced by the type of AAC system used by another child. Although there is clearly a need for more research in this area, teachers often report that children are more accepting of peers with disabilities than adults would expect.



Check Your Understanding 15.2

[Click here to gauge your understanding of the concepts in this section.](#)

Summary

Every child can communicate. Physical and cognitive limitations are no longer impenetrable roadblocks to the development of communication skills. The rapid development of AAC procedures means that there are now a variety of options available to help nonspeaking persons develop communication skills.

Despite the rapid proliferation of AAC techniques, there are still many nonspeaking persons who do not have access to communication aids. This may be due to factors such as lack of funding or lack of knowledge about AAC on the part of teachers and clinicians. Whatever the reasons, to deny an individual access to effective means of communication is to deny that person the right to be part of the community. Therefore, it is incumbent upon teachers and clinicians to educate themselves about AAC and to advocate for the right of their students/clients to have access to AAC systems.

For those who need help getting started with AAC, many states have an AAC resource center. If no center is listed for your state, you might try contacting a university medical center to see if they have someone with expertise in AAC systems.