Roles and Responsibilities of Speech-Language Pathologists With Respect to Augmentative and Alternative Communication: Technical Report

ASHA Special Interest Division 12: Augmentative and Alternative Communication (AAC)

The American Speech-Language-Hearing Association (ASHA) Special Interest Division 12: Augmentative and Alternative Communication (AAC) prepared this technical report. Members of the Working Group for Division 12 included Stephen Calculator (chair, document revisions committee), Amy Finch, Susan McCloskey, Ralf Schlosser, and Cassie Sementelli. Tracy Kovach and Rose Sevcik, members of the 2001 Working Group, provided input to an earlier draft of this document. Alex Johnson, 2000–2002 vice president for professional practices in speech-language pathology, and Celia Hooper, 2003–2005 served as monitoring vice presidents. Roseanne Clausen and Michele Ferketic, ex officio members of the committee, provided additional support.

Executive Summary

The technical report that follows is intended to complement the 2002 ASHA document summarizing knowledge and skills that are viewed as requisites to practice in AAC and the 2003 position statement. This report describes the background information related to AAC and sets the scientific foundation for this topic. The position statement states the rationale, role of the professionals involved, and scope for those professionals. The position statement represents ASHA's official position on AAC. It begins by defining AAC as an area of research, clinical, and educational practice. Next, situations that may call for the provision of AAC services are noted. The position statement concludes with a discussion of expectations of speech-language pathologists (SLPs) who are working in this area. Rationale, roles (of professionals involved), and scope of services are reviewed.

The technical report follows the position statement and presents a comprehensive summary of background information related to AAC. Contemporary research is reviewed to establish the scientific foundation for this topic. Problems as well as issues pertinent to AAC are discussed.

The technical report begins by defining AAC in relation to corresponding attempts to study and, when necessary, compensate for temporary or permanent restrictions of speech-language production and/or comprehension, including spoken as well as written modes of communication. Distinctions are made between speech, communication, and language. Speech is referred to as a method of communication that relies on vocal production and auditory comprehension; AAC is regarded as a method of communication. AAC is also discussed in relation to the linguistic rules by which symbols are selected and combined to transmit the various forms, contents, and uses of language. The report emphasizes that AAC systems are intended primarily to maximize individuals' abilities to communicate as effectively and efficiently as possible.

The technical report then describes the AAC population. Demographic studies indicate that approximately two million Americans are unable to use speech and/or handwriting to meet their daily communication needs. This represents between 0.8% and 1.2% of the U.S. population. In a 2002 survey of SLPs, 45% indicated they regularly serve individuals with AAC needs (ASHA, 2002).

The technical report recommends that AAC be thought of as a system, not just a single entity. AAC’s four primary components include symbols, aids, strategies, and techniques.
Symbols are examined in relation to their “guessability” or transparency to conversational partners. This document presents, and later challenges, a hierarchy of symbols ranging from actual objects to traditional orthography (e.g., printed words), based on ease of acquisition.

Aids refer to devices used to transmit or receive messages. These vary from relatively simple to complex technological systems. The authors discuss problems matching system specifications to individuals’ needs.

Strategies refer to ways in which symbols can be conveyed most effectively and efficiently. This document reviews a variety of strategies, including those designed to accelerate the rate of communication.

The technical report also discusses the various ways (i.e., techniques) in which messages can be transmitted. These fall into two main categories, direct selection and scanning. Several factors to consider when determining selection techniques are presented.

Next, the technical report distinguishes between temporary and permanent applications of AAC. For example, temporary systems may be useful in pre-operative and post-operative care of patients in an intensive care unit.

This is followed by a discussion of AAC as an augmentative versus an alternative communication system. Although AAC systems generally supplement existing methods of communication, in certain situations AAC systems may replace behaviors, such as challenging (socially inappropriate) behaviors. Regardless, SLPs are encouraged to look at communication as a multimodal system of options that vary from one individual to the next.

The technical report suggests using a “participation model” when discussing the purposes of AAC. In doing so, the primary role of AAC systems is to facilitate individuals’ active participation and engagement in meaningful events in their daily lives. As noted in the technical report, this model forces us to look beyond the individual who uses an AAC system to also consider the role of current and prospective conversational partners and the settings in which interactions occur.

All individuals are considered potential candidates for AAC. This is discussed in the technical report as a “zero exclusion” criterion. Rather than taking time to determine eligibility for services, it is recommended that SLPs and others consider where along the communication continuum an individual is operating and use this as a starting point in considering AAC options. Several cognitive, communication, and language skills, while they are not considered prerequi-
ment are presented. SLPs are encouraged to address individuals' present AAC needs as well as those anticipated in the future.

The technical report then moves on to discuss the efficacy of AAC. A review of research indicates the vast majority of AAC interventions have been either highly or fairly effective in terms of behavior change, generalization, and maintenance of skills. Research examining the impact of AAC on speech has found the former does not have a deleterious effect on the latter. To the contrary, AAC has been shown to facilitate speech in many cases.

The technical report concludes with a discussion of future research directions related to selection of subjects, predictors of AAC success, service delivery, acceptability of AAC, vocabulary selection, cultural and linguistic diversity, inclusion, literacy, impact of AAC on language acquisition, and issues in AAC intervention. SLPs are encouraged to rely on evidence-based practices when making clinical decisions.

Background

AAC refers to an area of research as well as a set of clinical and educational practices (ASHA, in press). The knowledge and skills that are viewed as minimal and necessary requisites for competent practice in this area have been published separately (ASHA, 2002a). This technical report includes a review of the scientific foundation for the knowledge and skills. Speech-language pathologists are encouraged to implement evidence-based practices, that is, to integrate best and necessary requisites for competent practice in this area have been published separately (ASHA, 2002a).

AAC involves attempts to study and, when necessary, temporarily or permanently compensate for the impairments, activity limitations, and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension. These may include spoken and written modes of communication (Beukelman & Mirenda, 1998a; Glennen & DeCoste, 1997; Lloyd, Fuller, & Arvidson, 1998).

Speech, Communication, and Language. It is important to distinguish between the terms speech, communication, and language if we are to understand the concept of augmentative and alternative communication. Speech refers to a method of communication that relies on vocal production and auditory comprehension (ASHA, 2001). It relies on effective use and coordination of five primary subsystems: phonation, articulation, resonance, respiration, and prosody. Like speech, AAC systems constitute methods of communication in that they involve the transmission of meaningful information from one person to another.

Messages are often conveyed through the use of one or more different types of symbols that represent ideas, entities and events in the world. The selection and combination of symbols are governed by a set of rules, or, language. Rules correspond to three dimensions of language: form, content, and use.

Form refers primarily to phonologic, morphologic, and syntactic rules. It is thus concerned with the sequencing of sounds, or traditional orthography to create words and the sequencing of words to create phrases and sentences. Content refers to the use of language to convey meaning. Use corresponds to the pragmatic aspects of language and relates to the functional uses of language in context.

An AAC system includes rules for combining symbols to create messages that are maximally intelligible and comprehensible for the broadest audience of communication partners (i.e., form). It also relies on conventions relative to the selection and organization of vocabulary (i.e., content). AAC systems are foremost directed at maximizing individuals' abilities to communicate effectively and efficiently with as many persons, in as many circumstances, as is feasible (i.e., use).

AAC Population

Demographic studies in North America have indicated that an estimated two million Americans have severe communication impairments to the extent that they are unable to use speech and/or handwriting to meet their daily communication needs (ASHA, 1991; Burd, Hammes, Bornhoeft, & Fisher, 1988; Matas, Mathy-Laikko, Beukelman, & Legresley, 1985; NIDRR, 1992). The U. S. Census Bureau’s report (1996) indicated even higher prevalence, estimating that 2,521,000 Americans older than 15 years of age experience difficulty having their speech understood; this constitutes 1.3% of the population. Beukelman and Ansel (1995) reviewed existing demographic data and estimated that between 0.8% and 1.2% of the U.S. population have communication impairments severe enough to warrant AAC.

In Canada an estimated 234,000 Canadians (0.9% of the population) older than age 15 have difficulty speaking or being understood (Health and Welfare Canada, 1988). Outside North America, few survey data are available. In the United Kingdom approximately 800,000 individuals (1.4% of the population) have a severe communication disorder that makes it difficult for them to be understood (Enderby & Phillip, 1986). An Australian survey of the province of Victoria, which has about four million residents, indicated that 5,000 people were unable to speak (Bloomberg & Johnson, 1990).
Symbols can be unaided (e.g., signs, manual gestures, and facial expressions), when there is no need for any prosthetic support, or aided (e.g., actual objects, pictures, line drawings, and traditional orthography), when the individual must rely on supports beyond those which are available naturally. Some symbols (e.g., the manual sign for eat and a picture of a basketball) are highly iconic. Iconicity refers to the visual similarities, or the relationship, between a symbol and its referent as perceived by the individual. It is believed highly iconic pictures may facilitate symbol learning or use as well as interpretation by communication partners, particularly if no voice output is available (Wilkinson & McIvane, 2002). The term transparency refers to the “guessability” of a symbol without any need for additional prompting or cueing. Wilkinson and McIvane summarize literature indicating that more iconic symbols are more easily guessed and learned than less iconic representations.

Hierarchies for ease of acquisition of different aided symbols have been applied (for a review see Millikin, 1997). The actual object is generally viewed as the easiest and most transparent method of representation. Progressively more complex representations consist of color photographs, black and white photographs, miniature objects, black and white line drawings, Blissymbols, and traditional orthography. Although this hierarchy is often applied clinically, there are no data to confirm such a sequence persists in all cases for all symbols. To the contrary, as Millikin points out, there are ranges of difficulty of representation within each of these categories. Thus one black and white line drawing may be significantly more transparent than another. The reader is referred to Lloyd, Fuller, Loncke, and Bos (1997) for a more comprehensive listing of symbol sets and systems that are organized relative to (a) concreteness or abstractness of the referents the symbols represent; (b) cognitive and physical demands of the user; (c) iconicity; and (d) the extent to which the symbols are related to the language of the general community.

Aids. The term “aid” refers to a device, whether electronic or nonelectronic, that is used to transmit or receive messages. Aids can range from simple devices, such as a choice selection between two photographs affixed to a sheet of paper, or a single message recorded on a single switch-activated device, to relatively complex technologic presentations of numerous symbols that can be combined to convey an infinite variety of meanings.

There are a growing number of technological solutions being proposed for individuals with AAC needs. Still, empirical evidence that can be used by clinicians to match features of AAC systems to indi-


viduals’ characteristics remains lacking. Interdisciplinary teams must be knowledgeable of the features that characterize different AAC systems. This will foster teams’ abilities to match system features with individual needs (Beukelman & Mirenda, 1998a; Glennen, 1997).

**Strategies.** This term refers to the ways symbols can be conveyed most effectively and efficiently. Beukelman and Mirenda (1998d) identified three primary purposes of strategies: (a) to enhance message timing; (b) to assist grammatical formulation of messages, and (c) to enhance communication rates. Strategies include procedures that are designed to increase the rate of message transmission or retrieval, such as letter and word prediction, and semantic compaction (Baker, 1996; Nyberg, 1993). Semantic compaction is an encoding technique that involves sequencing icons to create an infinite number of messages.

Several investigators have examined the effectiveness of rate enhancement strategies (Higginbotham, 1992; Light & Lindsay, 1992; Szeto, Allen, & Littrell, 1993; Venkatagiri, 1993, 1999). For example, Venkatagiri (1999) demonstrated that selection methods (i.e., linear or row column scanning) and keyboard arrangements (i.e., letter frequency, alphabetical, and QWERTY, or, traditional keyboards) can result in significant differences in the rate at which messages can be produced with AAC. Despite their common usage, QWERTY arrangements were found to be significantly less efficient than the alternate strategies in relation to sequential scanning.

**Techniques.** This fourth component of an AAC system consists of the various ways in which messages can be transmitted. The two primary methods, indirect selection, or scanning and direct selection, require different means for individuals to access their communication aids.

In scanning, each item is presented sequentially, either visually, auditorially, or tactually, to the client until the desired item appears and is selected. Conversely, in direct selection the client goes directly to the desired symbol, usually via a pointing gesture. Direct selection has a one-to-one relationship between the motor act and the resultant selection. Conversely, scanning or indirect selection (Cook & Hussey, 1995) involves one or more intermediary steps. Also, scanning is often time-dependent; direct selection is not. Summarizing the literature on selection techniques, direct selection techniques tend to be faster (depending on the individual’s motor control), and easier to learn and use, but have greater motor requirements than scanning techniques (Cook & Hussey, 1995; Dowden & Cook, 2002). Scanning requires the individual to attend to the auditory, visual, or tactile scanning array while simultaneously maintaining the thought or message that he/she wants to convey.

Dowden and Cook (2002) suggested there is a hierarchy of selection techniques, with direct selection preferable to scanning since it can potentially give the user greatest control. They proposed a hierarchy of control sites (i.e., locations on the body where an individual demonstrates purposeful movements that may be used to access a switch or make a direct selection), suggesting fingers and hands should be considered before head and feet. They indicated decisions must be based on actual trials with each individual. One cannot generalize results from a group to any specific individual who uses AAC. Dowden and Cook suggested initial trials with selection techniques should limit cognitive and linguistic demands. This enables the examiner to determine whether or not the individual has the necessary sensory and motor skills to use the access method in question. In later trials, the examiner is encouraged to gradually introduce cognitive and linguistic demands and assess their impact on individuals’ performance.

In summarizing the research on selection techniques and interfaces (e.g., switches), Dowden and Cook (2002) concluded there is too little empirical research in this area and replication of the research that is available is nonexistent. Although they propose four guidelines, cited above, for selecting access techniques, these investigators suggested caution applying them. In particular they point out the tremendous heterogeneity that exists across the population of individuals who use AAC as well as within specific individuals at different times of the day and in different situations.

**Temporary Versus Permanent Applications of AAC**

AAC involves attempts to compensate, temporarily or permanently, for the impairments, activity limitations, and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension. Costello (2000) discussed the role an AAC system might serve as a temporary means of compensating for a lack of speech and/or writing. He discussed the role of AAC in relation to pre-operative and post-operative care of patients in an intensive care unit who were temporarily unable to speak. Costello suggested introducing a variety of AAC options that are available to the patient on the ICU. It is assumed that the patient’s needs will change over the duration of time on the ICU and thus AAC systems must keep pace with such changes.

Whether a temporary or permanent phenomenon, all AAC systems begin by acknowledging and valu-
ing extant methods of communication demonstrated by individuals. It is presumed that all individuals communicate through some variety of means, whether intentionally or unconsciously. In some cases, their communication may be so subtle or ambiguous that others may fail to comprehend their messages. This often results in communication breakdowns.

**Augmentative or Alternative Communication**

A primary purpose of AAC is often viewed as supplementing or augmenting the effectiveness with which individuals communicate through their existing methods of communication (Romsiki & Sevcik, 1996). These methods may be efficient and effective with some communication partners in certain situations and thus may be retained as additional methods of communication are introduced. For example, an adult with cerebral palsy may produce speech that is easily understood by familiar partners but poses great difficulty for those who are less familiar with the person. The relative reliance on AAC as opposed to speech, gestures, and other methods of communication with these two types of listeners would vary.

For other individuals, the AAC system may serve an alternative function in that it becomes the primary and perhaps only means of communication. The role of AAC may vary for an individual depending on the course of the disorder (Beukelman & Mirenda, 1998b; Mathy, Yorkston, & Gutmann, 2000). For example, an individual in the early stages of ALS may need AAC to supplement communication skills that, from time to time, are insufficient to meet communication demands. Conversely, in the late stages of this disease the realm of extant methods of communication is diminished greatly, thus the individual may need to rely on AAC as an alternative to these lost skills.

**Multimodal Communication.** AAC does not refer to any one specific method of communication. Nor does it imply that an individual will adopt a single method of communication. Instead, it is preferential to talk about an AAC system composed of different modes of communication used in combination by individuals to meet daily communication demands and participate optimally in their communities (Beukelman & Mirenda, 1998a; Glennen & DeCoste, 1997; Lloyd, Fuller, & Arvidson, 1998). Any particular one or combination of AAC methods may be called for, depending on the circumstances.

**AAC and Challenging Behavior.** Some individuals may rely on nonconventional, socially inappropriate, and perhaps harmful (to self or others) behaviors, such as hitting, to make their needs known to others. In these cases, the role of AAC is once again to serve as an alternative method of communication. Reichle, Feeley, and Johnston (1993) cited several situations that might lead to exploring AAC as an alternative method of communication, such as when the existing behavior:

- Is socially unacceptable;
- Involves the controlled use of an undesired reflex or movement pattern;
- Is tiring for the individual;
- Is so idiosyncratic that a minimal number of conversational partners can interpret and respond correctly to the behavior;
- Is potentially harmful to the individual;
- Is relatively inefficient.

Several investigators (Carr & Durand, 1985; Dropic & Reichle, 2001; McEvoy & Neilson, 2001; Mirenda, 1997; Reichle & Wacker, 1993; Robinson & Owens, 1995; Wacker, Berg, & Harding, 2002) have reported a corresponding decrease in individuals’ uses of inappropriate and challenging behaviors with a concurrent increase in more conventional, socially acceptable behaviors after AAC is introduced. The keys appear to be identifying the impact of an individual’s present behavior(s) on the environment, determining the function of each behavior or what the individual hopes to happen as a result of the behavior, and then replacing the behavior with an AAC alternative that is functionally equivalent in terms of the consequences of its usage.

**Participation Model**

As indicated above, an AAC application may be intended as a temporary or permanent, supplemental or alternative, part of a broader communication system. The overarching purpose of all AAC interventions should be to maximize individuals’ abilities to communicate and thus actively participate in events occurring at home and throughout their communities.

Beukelman and Mirenda (1998a) described the participation model as a systematic process for carrying out AAC assessments and interventions. In this model, the functional participation requirements of same-age peers without disabilities are weighed relative to participation patterns of the potential AAC user. Gaps between the two are identified and addressed along with opportunity and/or access barriers that may be contributing to this gap (Schlosser, et al., 2000).

Individuals who receive AAC interventions are often those whose existing, limited methods of communication restrict the quantity and quality of their interactions with others. As a result, the participation
patterns of these individuals in daily living are affected deleteriously. AAC systems are introduced to such individuals to enhance their abilities to participate in communication exchanges with a maximal number and variety of communication partners in a maximal number of different conversational settings. It is assumed that as interactants and settings change, so do the requisites for effective communication.

The participation model emphasizes the importance of communication partners as a source for program development as well as potential sources of barriers to communication. Communication partners can facilitate the successful implementation of AAC by providing individuals with emotional, conversational, and technological support.

Schlosser, et al. (2000) evaluated the effectiveness of teaching a school team how to limit barriers to communication while increasing a student’s participation along with his peers. The investigators used a multiple probe design across instructional formats to assess the effectiveness of the instructional procedures during literacy and math activities in an inclusive classroom. The instructional procedures were associated with fewer barriers and increased levels of participation. Social validation results from questionnaires and focus groups were in support of these conclusions.

As pointed out by Lasker and Bedrosian (2000), partners’ acceptance of AAC may result in new responsibilities with respect to the acquisition, maintenance, and programming of an AAC device. Partners’ acceptance of AAC is directly related to their attitudes about AAC and the individuals who rely on these forms of communication. Lasker and Bedrosian provided a review of this literature, as well as related information pertaining to perceptions of communication competence associated with the use of AAC devices.

AAC in the Social Context

A guiding principle in AAC is that communication is the essence of human life (ASHA, 1991) and all people have the right to communicate to the fullest extent possible. As such, practitioners and researchers are encouraged to view AAC in a social context in which the primary role is to enhance individuals’ levels of active participation in events that are both interesting and relevant to them. Light and Gulens (2000) pointed out, “… people cannot act as the primary causal agents in their lives without being able to communicate effectively with others to make their decisions and choices known and understood” (p. 138).

AAC interventions may target deficits in speech-language production and/or comprehension as expressed through spoken and/or written modes of communication. Expressive deficits are relatively easy to identify in individuals’ overt behaviors; comprehension problems are relatively covert though no less important to address in any AAC program (Romski, Sevcik, & Adamson, 1997). According to these authors, problems may be related to some of the following interrelated factors:

- Level of linguistic complexity an individual can process and act on;
- Ability to respond contingently to others’ discourse;
- Ways in which participation patterns change depending on partners’ uses of discourse modifications, such as reduced lengths of utterances, slowed rate of speech, repetitions, immediate and client-centered references, etc;
- Variability in comprehension depending on the combination of communication input modes (e.g., verbalizations, gestures, communication aids, and facial expressions) used by conversational partners.

Considering AAC

This document asserts that no individuals should be denied the right to communicate, regardless of the type and/or severity of communication, linguistic, social, cognitive, motor, sensory, perceptual, and/or other disabilities they may present. This perspective is consistent with that of the National Joint Committee (NJC) for the Communication Needs of Persons with Severe Disabilities, which proposed that all people, regardless of the severity of their disabilities, have a basic right to use communication as a means of affecting how they live. This point has been stated clearly and directly in the form of a Bill of Rights for people with severe disabilities (National Joint Committee for the Communication Needs of Persons with Severe Disabilities, 1992).

This NJC position is consistent with a zero exclusion policy with respect to determining individuals’ eligibility for AAC services (Kangas & Lloyd, 1988; NJC, 2002; Reiche & Karlan, 1985). As such, all individuals are viewed as potential candidates for AAC, so long as there is a discrepancy between communication needs and abilities (Zangari and Kangas, 1997). Romski, Sevcik, Hyatt, and Cheslock (2002) advocated devoting time to determine where along the communication continuum an individual is operating, rather than an individual’s eligibility for AAC services. This fosters efforts to develop the content of the AAC program as well as language and communication intervention outcomes.
Potential Predictors of Effective Uses of AAC

As indicated above, the content of an AAC program is certainly influenced by the abilities of an individual with respect to communication, social, and cognitive skills; however, no individual should be precluded from receiving AAC services based on deficits in one or more of these areas.

The NJC (2002) indicated that “despite recent policy revisions and clarifications, there is considerable anecdotal evidence that local school districts and service agencies continue to base access to communication services on a priori judgments.”

Current recommended practices acknowledge a relationship between cognition and language but do not see this as a unidirectional, causal relationship. As such, individuals’ communication skills may be viewed just as likely to affect cognitive skills as vice versa. The very existence of a causal relationship between these two factors has been questioned (ASHA, 1988; Cole, Dale, & Mills, 1990; Kangas & Lloyd, 1988).

McLean and McLean (1993) cited two factors they felt to be prognostic indicators of individuals’ abilities to communicate symbolically and use generative language. They felt individuals must exhibit some degree of speech comprehension and the use of distal gestures. Several other investigators have emphasized the importance of speech comprehension to the acquisition of sign language, among them Remington and Clarke (1983; 1993a, b). McLean and McLean suggested that the use of distal gestures, such as pointing, may be a better indicator of individuals’ readiness for more complex forms of AAC than contact gestures such as touching.

Romski, Sevcik, and Adamson (1997) cited intrinsic and extrinsic factors they felt were important in children acquiring language through augmentative means. Intrinsic factors included biological foundations such as neurological and neuromotor status, and psychological competencies such as cognitive, communication, and language skills. Like McLean and McLean (1993), Romski, Sevcik, and Adamson attached significance to speech comprehension in relation to language development with AAC. They postulated that speech comprehension provides a foundation for word understanding by enabling children to draw correspondences between symbols and meanings and to transfer this understanding to other modes of communication. Extrinsic factors cited by these authors include those associated with an individual’s language learning environment. These factors were also related to the communication modalities and characteristics of AAC devices.

The speech-language pathologist who is practicing in the area of AAC is encouraged to recognize and hold paramount the needs and interests of individuals who may benefit from AAC, and assist them to communicate in ways they desire. As such, the content of an AAC program should be drawn from and driven by clients’ present and anticipated needs as well as their present and anticipated desires. These variables must always be examined within a variety of social contexts that are meaningful to individuals and their conversation partners.

Self-Determination

Access to effective methods of AAC is seen as integral to individuals’ self-determination, or ability to participate actively in making decisions affecting their lives (Light & Gulens, 2000). Speech-language pathologists are encouraged to measure the impact of AAC programs relative to changes in individuals’ abilities to make choices and decisions, indicate preferences, express needs, and maintain social contact with others with whom they choose to interact. One way to ensure that individuals who use AAC participate in decision-making is to actively involve them, to the greatest extent possible, in this process.

Krogh and Lindsay (1999) discussed several ways of incorporating consumer perspectives into AAC research methodology. They encouraged researchers to involve people with disabilities in developing research questions, designing research methods, and analyzing data.

A recent investigation cast individuals who rely on AAC in the role of expert panelists. The study involved the use of focus group discussions among adults with cerebral palsy who were not only effective users of AAC but also successfully employed (McNaughton, Light, & Arnold, 2002). These participants communicated about their employment situations, what being employed meant to them, and the benefits and negative impacts of employment. They discussed barriers to employment as well as the types of support they found most helpful. They also generated suggestions for educators, technology developers, employers, and policy makers. The insights of these individuals proved invaluable in suggesting ways to prepare for, obtain, and maintain employment.

The McNaughton et al. investigation highlights the fact that consumers have valuable perspectives to share, especially when discussing situations of immediate importance and relevance to them. Similarly, O’Keefe, Brown and Schuler (1998) found that individuals who use AAC devices were more likely to rate features of a device as critically important than were
service providers, aid manufacturers, or individuals who were unfamiliar with communication aids. Individuals who used AAC devices, and their familiar partners, were more demanding of their devices than the other groups.

**Cultural and Linguistic Differences**

Part of acknowledging the importance consumers should play in all aspects of AAC assessment and intervention requires SLPs and others to be knowledgeable and respectful of cultural and linguistic differences presented by the SLPs themselves and other individuals and be aware of how such differences may influence interactions with individuals and families receiving their services (Hetzroni & Harris, 1996; Soto, Huer, & Taylor, 1997; Zangari & Kangas, 1997). Speech-language pathologists must be aware of their own cultural biases when helping consumers make AAC decisions. Soto et al. provide a comprehensive review of the role multicultural issues play in AAC assessment and intervention. They point out that different cultures have different views of disability, attitudes toward technology, and expectations of their children among many other factors. Cultural considerations must be paramount in the judicious use of standardized tests and identification of interaction patterns common to a given culture.

Speech-language pathologists should implement culturally and linguistically appropriate AAC programs that take into consideration the cultural and social communities and customs in which the AAC user participates, or hopes to participate (Parette, VanBiervliet, Reyna, Heisserer, 1999). This suggests the need for collaboration between clinicians/researchers, consumers, and significant others in the cultural community. Individuals need communication systems that allow them to engage in code switching (changing their communication patterns depending on their audience). An AAC system that is appropriate in one’s home community may not necessarily be so at school or on the job. Individuals should be able to vary the content and complexity of their communication depending on the needs, abilities, and identity of their listeners and the settings in which they are communicating. Content, form, and uses of language should respect cultural differences and permit individuals to engage in conversational interactions that are expected and appropriate in relation to the culture in which they are occurring.

**Role of the Speech-Language Pathologist**

In many cases, the SLP is asked to operate in the role of case manager or team leader because communication is frequently cited as a primary area of concern and one that influences all other aspects of daily living and life skills. Whether serving in this role or not, the SLP must be able to integrate information from multiple sources and disciplines in order to assist in designing an appropriate AAC program for an individual.

The SLP must acknowledge the need for expertise from other service providers who may include, but certainly not be limited to, physician, occupational therapist, physical therapist, vision specialist, rehabilitative engineer, teacher, psychologist, behavior consultant, and social worker. No less significant is input from parents, spouses, employers, and significant others. AAC is viewed as a means by which clients can promote or maintain a desirable quality of life. Such a vision should be pervasive in all AAC activities, regardless of the area of specialization of any particular professional.

The SLP is expected to be able to recognize the limits of his/her expertise and issue referrals to appropriate colleagues as necessary. It is strongly recommended that the AAC team be driven by the client and his/her family to the greatest extent possible. Part of the AAC program should be dedicated to finding and implementing ways in which the client can have maximal input regarding the disposition of the program.

**Service Delivery**

At this time, it is generally recognized that the most appropriate model for providing services to individuals in need of AAC relies on input from multiple disciplines that comprise a team. Swengel and Marquette (1997) define a team as a group of people who work together to reach a common goal, all of whom are dedicated to providing the supports an individual needs to become and remain a competent communicator. These authors advocate a collaborative team model to address three aspects they feel are critical to effective service delivery: (a) emphasize person- and family-centered services; (b) integrate supports from others, including teachers, employers, community members, professional staff, and friends; and (c) provide services in the natural environment. According to Swengel and Marquette, the collaborative model builds on features associated with a transdisciplinary model such as holistic goals, team members sharing information and skills, and role release.

**Assessment Considerations**

There is no standardized battery of tests that comprise an AAC evaluation, but several principles are
generally associated with current recommended practices in relation to AAC assessment (Beukelman & Mirenda, 1998a; Calculator, 2000; Glennen & Decoste, 1997; Jorgensen, 1994; Lloyd, Fuller, & Arvidson, 1998).

**Valid Assessment.** Speech-language pathologists are encouraged to use procedures that solicit valid, representative, and generalizable behaviors from individuals who are being evaluated. Results of assessment procedures must be applicable to everyday life to the greatest extent possible. Conversely, results obtained from decontextualized procedures, often carried out in artificial, therapeutic settings, may limit the generalizability of findings and impose constraints on the subsequent development of functional intervention procedures.

One example of an assessment procedure that typifies the principle of valid assessment involves the use of an ecological inventory (Beukelman & Mirenda, 1998b; Calculator, 1994; Cipani, 1989; Mirenda & Calculator, 1993). The inventory might include a brief description of the setting, including who was present, and the extent to which the individual was afforded opportunities and reasons to communicate/participate. Many individuals who are candidates for, or are already using AAC, have fewer opportunities for communication than their speaking counterparts. Part of the assessment should delineate existing opportunities for communication and ways to enhance the quantity and quality of such opportunities so as to maximize the client’s participation in daily, meaningful activities (Beukelman & Mirenda, 1998b).

Beukelman and Mirenda (1998b) summarized the steps involved in completing an ecological inventory and subsequent discrepancy analysis. First, a peer (preferably a typical peer without disabilities) is observed in the particular setting, participating in the event of interest. Next, the examiner uses task analysis to list the various communication behaviors that were required in this activity. Then, the abilities of the individual being considered for AAC are measured against those demonstrated by the peer, possibly illuminating several discrepancies. Finally, the individual is taught the skills and/or provided the technological support that is necessary to participate in that particular activity.

As noted by Calculator (1994), the ecological inventory, or discrepancy analysis, can be used to identify contexts in which communication skills can be fostered and enhanced as part of a broader curriculum. As such, these procedures should be conducted in different settings in which the individual communicates with different partners. It is as important to assess communication needs with unfamiliar listeners as it is to examine interactions with partners who are familiar with individuals and their methods of communication.

**Capability Assessment.** The SLP must be able to collect and then integrate information about individuals’ cognitive, sensory, perceptual, social, motor, reading/literacy, writing, and linguistic capabilities (Beukelman & Mirenda, 1998c). This further supports the previously described need for input from multiple service providers. These skills can then be matched to corresponding operational requirements presented by different AAC options. They also have a bearing on necessary modifications of AAC systems as well as individuals’ needs, reasons, and opportunities for communication.

Valid assessments of communication and related areas, perhaps most notably literacy skills, rest on the evaluator’s abilities to modify assessment procedures as needed, breaking standardization when appropriate. This is especially critical when assessing language production and comprehension skills of individuals. Testing should examine content (i.e., semantics), form (i.e., phonology, morphology, syntax), and use of language (i.e., pragmatics).

**Feature Matching.** AAC devices are selected based on relationships between an individual’s strengths or, as described above, capabilities and communication needs in relation to various features of a device (Glennen, 1997; Quist & Lloyd, 1997). This procedure, referred to throughout the literature as feature matching, entails determining desired features of an AAC system based on an individual’s skills. It is understood that a client’s abilities will change over time. Such changes should prompt reconsideration of AAC system features.

Quist and Lloyd (1997) listed the following features of an ideal AAC system:

- Enables the individual to express a full range of communication functions.
- Compatible with other aspects of the individual’s life.
- Considers needs and communication patterns of conversation partners.
- Usable in all environments and physical positions.
- Does not restrict the topic or the scope of communication.
- Enhances the effectiveness of the individual’s communication.
- Allows and fosters continuous growth in the individual’s linguistic and related skills.
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- Acceptable and motivating for the individual and significant others.
- Affordable.
- Easily maintained and repaired.

In order to match a client’s abilities and needs to a proper AAC device, it is imperative that SLPs have knowledge about equipment that is currently available. When such information is lacking, it is the SLP’s obligation to refer the client to another professional who possesses expertise in this area. For example, an inexperienced clinician might waste valuable time teaching a client to use a particular switch to access an AAC device. A more experienced clinician might be aware of, and thus introduce, a different switch that significantly reduces instructional time.

Similarly, SLPs should be aware of the effectiveness with which different AAC systems can be used. Unfortunately, at this time there are no published data that compare the relative efficacy of different AAC devices for individuals who present different challenges and capabilities. Instead, decisions such as these rely more on clinical intuition and experience than hard data.

Identifying Barriers to Participation. Beukelman and Mirenda (1998a) discussed several possible barriers to communication, including those related to policies, practices, attitudes, knowledge, and skills. It is important not only to identify barriers but to then design interventions that address them.

Light (1997) provided a summary of literature that suggests the language learning environment of individuals who eventually use AAC, as well as those already using AAC, often differs from that of typical peers. Problems with independent mobility and functional manipulation skills may limit children’s access to their physical environments and thus limit the experiences on which language is mapped. Experiences are also limited with respect to the disproportionately greater (than typical peers) amounts of time these children spend in daily care routines as opposed to play and social activities.

Light also reported that young children who use AAC are rarely exposed to AAC models (some exceptions are reported by Creslock, Romski, Sevcik, & Adamson, 2001 and Romski & Sevcik, 1996) and even more rarely have opportunities to observe other augmented communicators who use AAC proficiently. Instead, the input they usually receive is transmitted by speech.

Intervention Considerations

Naturalistic, client- and family-centered approaches are strongly recommended when introducing AAC systems (Romski & Sevcik, 1996; Sigafoos, 1999). To the greatest extent possible and feasible, SLPs are encouraged to involve family members and significant others in all stages of the AAC program (Bjork-Akeson, Granlund, Light, & McNaughton, 2000; Blackson & Dowden, 2000). Individuals should be taught to use their systems functionally with different communication partners in different settings. Assessment information pertaining to their relative success is used as a basis for product redesign and/or modified teaching strategies. The latter include environmental approaches, such as modifying the discourse behavior of communication partners, and raising their expectations of individuals. Communication partners are often encouraged to provide individuals with a greater number of opportunities and reasons to communicate.

As indicated earlier, the impact of AAC systems should be evaluated in relation to changes in individuals’ quality of life. This suggests the need for continuous evaluation and re-evaluation of clients’ uses of AAC in multiple contexts. When communication systems are discarded by clients and/or their families, it is important to determine why this occurred and what needs to be done to ensure greater acceptance and value placed on AAC systems by stakeholders, especially the consumers themselves.

Fletcher (1997) summarized research examining adults’ abandonment or discontinuance of their AAC devices. The following pattern was identified:

- the individual obtains the device;
- the individual uses the device and finds that it doesn’t meet his or her needs;
- the individual either continues to use the device, though dissatisfied, until it is no longer usable, or discontinues use of the device.

The latter may lead to the introduction of another AAC device. Factors related to system abandonment or discontinuance include poor performance of the device, lack of significant differences in the individual’s functional performance with and without the device, difficulty operating the device, high cost, and limited availability of service and repair.

Fletcher (1997) summarized several ways in which device abandonment or discontinuance can be mitigated. These included comprehensive training of professionals (who recommend the devices) and consumers about the equipment they will be using;
rental options; and constantly evaluating consumer satisfaction.

With respect to rentals, it is very important that individuals have a sufficiently lengthy trial with a device in order to make an informed decision about its usefulness. This may require several months, not the 4–6 week trials that are often more characteristic. When field testing a device, the individual should have ample opportunities to use the device in a variety of settings with a variety of people. The team should agree on a set of functional goals to use to assess the impact of the AAC device over time.

It is important to base intervention decisions on what is occurring “today” as well as what is anticipated for “tomorrow.” Today, decisions focus on individuals’ immediate communication needs and match capabilities and constraints to AAC system features. Decisions pertaining to tomorrow are based on future opportunities for communication, needs, and constraints as well as capabilities resulting from instruction (Beukelman & Mirenda, 1998a).

**Efficacy of AAC**

Efficacy has been used as an umbrella term including effectiveness, efficiency, and effects in communication disorders and related fields. Schlosser and Lee (2000) conducted a meta-analysis of efficacy studies using single-subject experimental designs that were published in English between 1976 and 1995. The purpose of this synthesis was to identify strategies that effectively induce generalization and/or maintenance, in addition to behavior change, in AAC. For an investigation to be included, its objectives needed to pertain to AAC instruction. For a complete list of inclusion and exclusion criteria please consult the original source.

In terms of effect size, the percentage of nonoverlapping data (PND) was calculated. The PND is a measure of nonoverlap between baseline and intervention phases, and ranges from 0% to 100%, higher percentages indicate greater magnitudes of an effect. A high PND suggests that the individual’s performance during/after the intervention was better than baseline most of the time. Thus, a PND of 100% indicates no overlap between the baseline and the intervention phase and suggests the individual’s performance during/after intervention was consistently better than that observed during the baseline condition.

Low levels of PND indicate the individual’s performance was only better than baseline in a few sessions, suggesting that the intervention was not very effective. Thus, a PND of 0% indicates that the data points between baseline and intervention are completely overlapping.

The criteria established by Scruggs, Mastropieri, Cook, and Escobar (1986) were used to interpret effectiveness of mean PND data: a mean PND greater than 90% is considered highly effective, a PND between 70% and 90% is considered fairly effective, a PND between 50% and 70% is considered of questionable effectiveness, and a PND below 50% reflects unreliable treatments.

Accordingly, 44.8% of AAC interventions were highly effective, and 42.7% of AAC interventions were fairly effective in terms of behavior change; 12.6% of interventions were questionable or unreliable. In terms of generalization, 73.5% and 11.1% of interventions were highly or fairly effective, respectively; 15.4% of interventions were questionable or unreliable. For maintenance, 29.3% of AAC interventions were highly effective and 17.1% were fairly effective; 53.7% of interventions were questionable or unreliable. Thus, AAC interventions reviewed by the investigators were found to be effective in terms of behavior change, generalization and, to a lesser degree, maintenance.

Applying the same interpretation guidelines to the best-evidence data, which met predefined stringent quality indicators, revealed that 28.4% and 70.4% of interventions, respectively, were highly effective or fairly effective in terms of behavior change. The sample of generalization data (n = 7) and maintenance data (n = 1) meeting best-evidence criteria were too small to permit interpretations of overall effectiveness.

In summary, this synthesis indicated that AAC interventions are effective in terms of behavior change, generalization, and to a lesser degree, maintenance. This represents an important finding considering these times of increased accountability and scarce resources. When predetermined quality indicators were applied to yield a more restricted data set, interventions remained effective in changing behavior. Generalization and maintenance data could not be interpreted due to small sample size.

The lack of sufficient best-evidence data along with the prominence of “train and hope” approaches suggests a need for teaching clinical researchers and clinicians the breadth of available strategies and how they may be incorporated into treatment procedures. The methodological issues raised and the research gaps identified offer empirically based directions for future intervention research in AAC. Clearly, more care needs to be taken in selecting appropriate designs for evaluating generalization and maintenance effectiveness while considering the range of available strategies for promoting generalization and maintenance.
AAC and Speech. Zangari and Kangas (1997) reviewed literature regarding the effects of AAC on subsequent uses of speech. Based on their review they concluded that the provision of AAC does not have a deleterious effect on speech development. To the contrary, AAC has been shown to facilitate speech in individuals representing a broad array of etiologies to their disabilities.

Research Directions

Higginbotham and Bedrosian (1995) pointed out challenges in AAC research related to subject selection. They indicated that individuals who use AAC represent a heterogeneous population. When attempting to generate a representative sample for research purposes, the only factors that subjects may have in common are the presence of communication difficulty and their use of some type of communication technology. This presents a major challenge to the investigator who, for research purposes, is seeking a homogeneous sample of individuals who use AAC. It may also help explain why a large proportion of research to date has relied on case studies and single subject experimental designs.

Future research on AAC may take numerous directions. Those that follow are in no way meant to constitute an exhaustive list.

Decision to Use AAC. As was indicated earlier, it is generally recommended that practitioners apply a zero-exclusion criterion when attempting to identify individuals’ candidacy for AAC. However, zero exclusion should not be interpreted to mean that all individuals receive the same level and frequency of services. It would be useful to gather information about characteristics, skills, and abilities of individuals in relation to the rate at which they acquire AAC skills. Perhaps there are communication, language and related behaviors that emerge early and can serve as strong prognostic indicators of an individual’s subsequent acquisition of AAC skills. Other variables may predict individuals’ plateauing with respect to communication skills. Similarly, investigations that uncover factors most often associated with lack of progress in AAC programs and device abandonment are warranted at this time.

Service Delivery. Preliminary research supports the use of a collaborative teaming model of service delivery within inclusive classrooms (e.g., Hunt, Soto, Maier, Muller, & Goetz, 2002). However, the impact of this model relative to alternative models of service delivery, in other settings, merits further examination. In particular there is little information about the applicability of collaborative, transdisciplinary models of service delivery for adults who use AAC.

Acceptability of AAC. Research should continue to examine factors that influence the acceptability of AAC systems by individuals who use these methods of communication and by their present and potential communication partners. Ratcliff, Coughlin, and Lehman (2002) found that synthesized speech produced at a more rapid rate, and with fewer pauses, was perceived by others to be more natural than speech produced at a slower rate and with added pauses. It might be useful to examine how ratings of naturalness correspond to ratings of acceptability.

There is also a need for continued research examining factors that influence communication partners’ and outside observers’ perceptions of communication competence in individuals who use AAC (Bedrosian, Hoag, Calculator, & Molineux, 1992; Bedrosian, Hoag, Johnson, & Calculator, 1998; Light & Gulens, 2000). It would be helpful to identify those target behaviors that, if enhanced, could have the greatest impact on impressions of communication competence. Communication partners’ perceptions of communication competence may influence their styles of interaction with individuals who use AAC systems.

Vocabulary Selection. The extent to which individuals are able to use AAC to meet communication needs and demands is certainly related to the vocabulary that is accessible on their respective AAC systems (Balandin & Iacono, 1999). Evidence-based strategies related to vocabulary selection would be helpful at this time. In particular, ways to enhance the exhaustiveness and efficiency of the vocabulary selection process would be useful.

Cultural and Linguistic Diversity. As demographics continue to change throughout the United States, considerations of cultural and linguistic diversity become an increasingly pressing issue. Information about ways to meet the needs of different populations and social groups would be useful at this time. It would also be helpful to identify cultural differences with respect to individuals’ (and their families’) acceptance and use of AAC. Angelo (1997) presents a more comprehensive discussion of issues pertaining to cultural diversity.

Inclusion. As inclusive educational practices become more the rule than the exception, an increasing number of children with AAC needs are being educated in general education classrooms. Similarly, sheltered workshops and other isolated work settings for adults continue to be replaced by supported employment and other innovative models of service delivery that enable individuals with severe disabilities to work
in mainstream jobs. The role of AAC in fostering participation and inclusion in such job settings needs to be examined.

**Literacy.** The same disabilities that prevent individuals from speaking may prevent them from demonstrating skills in reading and writing (DeCoste, 1997; Koppenhaver & Yoder, 1992). Such individuals need alternative ways of learning to read and write, and to demonstrate these competencies to others. The use of AAC systems to enhance early and subsequent literacy experiences needs to be explored. Also, protocols for assessing literacy skills would be very useful at this time.

Furthermore, assessment and intervention issues related to phonological awareness and phonemic awareness are essential. Phonological awareness may involve a variety of different types of tasks such as segmentation and deletion. However, most of these tasks require some type of oral response. Many children using AAC systems are unable to provide this oral response except through the use of speech-generating devices. Therefore modifications to the phonological awareness tasks and/or alternative tasks must be developed for these individuals. Some of the alternative tasks and modifications have included judgment tasks and the use of graphic and text symbols (Smith & Blischak, 1998; Vandervelden & Siegel, 1999, 2001). Also, protocols for assessing literacy skills are critical because many tasks used in reading and phonological awareness skills require a verbal response (Beukelman, Mirenda, & Sturm, 1998; Dahlberg Sandberg, 2001; Smith & Blischak, 1998).

**Impact of AAC on Language Acquisition.** Also needed are methods for evaluating the linguistic competencies of individuals being considered for, or already using, AAC. In particular, there is a need for objective means of assessing individuals’ language comprehension skills and how they are affected by the use of AAC.

Paul (1997) proposed a variety of ways in which our understanding of language development in typical, speaking children can serve as a basis for determining the content of AAC intervention programs. She provided examples of patterns observed in normal language development and then conjectured how such information might be applied to individuals who use AAC. Research validating such practices would be helpful at this time. For example, a young girl with Downs syndrome was found to use a greater number of spontaneous and responsive words when she used a combination of signs and an electronic communication aid than when she relied on signs alone (Iacono & Duncum, 1995).

**Issues in AAC Intervention.** Additional information is needed to guide clinical/educational decisions made throughout the AAC intervention process. In particular, data are needed pertaining to the effective matching of AAC tools, strategies, and intervention methods to the AAC needs of individuals. This is applicable both to the development of specific communication behaviors as well as overall communication effectiveness. Light, Parsons, and Drager (2002), for example, apply this concept to skill building with respect to social closeness in interactions.

Efficacy data and results of comparative studies are also critically needed and will allow stakeholders to make reasoned choices and chart an empirically based path to communication competence. These data must be applicable to a wide range of users of AAC who constitute an extremely heterogeneous population. Stakeholders also need information about various dimensions of AAC intervention to guide implementation of the most efficacious course of treatment. For example, Romski, Sevcik, Hyatt, and Cheslock (2002) noted that little is known about the role of peers and families in AAC learning. Research along these lines will lead to intervention guidelines, flowcharts, and decision trees that will help practitioners establish protocols and procedures leading to optimal outcomes.

**Concluding Comments**

This technical report, together with the associated position statement and knowledge and skills document (ASHA 2002a), is intended to complete a family of documents that provide background information, including a scientific foundation, for service delivery related to augmentative and alternative communication. AAC is an area of practice that has undergone significant and rapid growth over the past 10 years. In all likelihood this pattern will continue as new technologies and instructional practices emerge.

Speech-language pathologists who are practitioners in this area are encouraged to rely on evidence-based practices when making clinical decisions. They are also encouraged to contribute to the knowledge base in AAC by forging collaborations with the research community. Universities are encouraged to take a leadership role in both pre-service and in-service instruction about AAC. Those that do not already require one or more AAC courses should consider doing so, given the prevalence of individuals who rely on these methods of communication and the growing body of literature related to this topic.
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