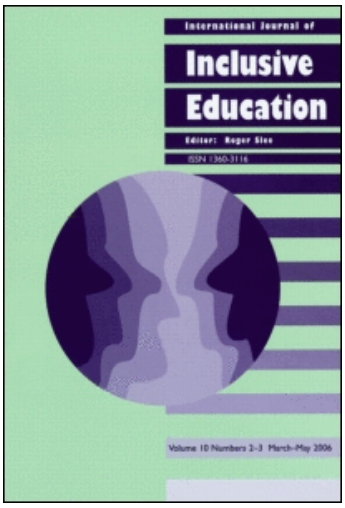

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Augmentative and alternative communication (AAC) and inclusive education for students with the most severe disabilities

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Augmentative and alternative communication (AAC) and inclusive education for students with the most severe disabilities

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This paper examines the role of augmentative and alternative communication (AAC) in fostering the successful inclusion of students with the most severe disabilities in general education. Best practices in AAC are identified and multiple examples of their implementation are presented. Particular emphasis is placed on the need to integrate AAC into daily school life as a means of fostering all students' access to and participation in the general education curriculum. A primary premise is that inclusion must be more than just a place; it must constitute a context in which meaningful learning occurs. It is demonstrated that when administered appropriately, interventions involving uses of AAC can foster students' access to the general education curriculum and acquisition of skills tailored to their individual and diverse needs.

Introduction

This paper begins with a discussion of theories of language/communication development and their respective implications for AAC instruction in relation to inclusive educational practices. Next, it examines the role of communication instruction, or more specifically augmentative and alternative communication (AAC), in fostering the successful inclusion of students with the most severe disabilities in general education. AAC refers to communication systems for individuals who are unable to use speech as an effective and/or primary method of communication, either temporarily or more permanently.

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AAC instruction and use are contextualized within the broader theme of providing necessary supports to students, their teachers and others. Best practices related to AAC instruction are discussed, emphasizing the use of integrated models of instruction in which AAC does not constitute a separate component of the curriculum but instead a means by which students can access the general education curriculum. Specific examples, including goals and objectives, are used to illustrate this model in which related services such as communication are incorporated within the general education curriculum. That curriculum includes not only the various subject areas of math, science, music and art but also the varied and intricate methods and styles of communication through which all students navigate their way through a typical school day, in and out of the classroom.

Theories of language/communication development

Before discussing recommended practices in AAC instruction, it may be useful to note the theoretical framework(s) from which they have spawned and continue to be explained today. These consist of four prevailing theories of language development: behavioural, psycholinguistic–syntactic, semantic–cognitive and social–pragmatic. Each is discussed below along with corresponding implications for speech–language specialists and other educators. The supporting research is based primarily on the role of parents, as opposed to teachers and other educators, since much of language has been acquired by the time a typical child enters school.

Behavioural model

The behavioural perspective (Skinner, 1957; Osgood, 1963) treats language as a learned behaviour that evolves from interactions with one's environment and reflects associations between stimuli and contingent responses. Parents and others are viewed as selectively reinforcing children's verbal behaviours, providing models that are subsequently imitated by their children, and affording opportunities for their children to practice new communication skills. The behavioural perspective has been criticized on several grounds. For example, parents have been found to reinforce the truthfulness of their children's utterances and not their syntactic correctness. Learning of the latter must then result from factors other than parents' selective responding and corrections. Secondly, a rather small percentage of children's utterances beyond two years of age are imitations. Finally, there is no evidence that children's acquisition of language reflects selective shaping by their parents (Chomsky, 1959; Owens, 2005).

Still, the behavioural perspective contributes to our understanding of how children with severe and complex communication challenges acquire language and, in the absence of sufficient development, methods that may be useful in enhancing children's communication skills. For example, parents, as well as educators, classmates and others can provide students with important models of language through their use of systematic modifications (e.g. decreased rate of speech, shorter utterance lengths, and increased frequency of repetitions) when interacting with these students. Relating

this to AAC, children can be exposed to peers and adults using similar AAC systems, or systems that might be considered for children further down the line. Parents and others can also incorporate AAC into their daily interactions with their children. For example, natural speech can be accompanied by modelling selections on an AAC device to generate digitized speech. The author has observed students whose AAC systems were shared with classmates. For example, the latter replied to their teachers' questions by activating messages on their peers' communication devices.

The behavioural theory would also suggest that students' acquisition and use of their AAC systems depend in part on others' responsiveness to their communicative attempts. Responsiveness has been found to foster children's intentional uses of communication (Yoder & Warren, 1998). That said, a review of the literature revealed a common pattern of adults experiencing difficulties interpreting and responding to the frequently ambiguous messages of their children with disabilities (Iacono, 2003).

Children need to learn to use symbols (objects, photographs, line drawings, and printed words) to influence people and events in their everyday living. The symbols themselves must be readily understood by the broadest possible range of conversational partners. Most importantly, symbols must be easily recognized by students' classmates. It is important to keep these things in mind in order to provide students with AAC systems that can be used across the broadest range of situations involving interactions with others.

Psycholinguistic model

The psycholinguistic–syntactic, or, nativist perspective and its successor, government-binding theory offer additional contributions to our understanding of how language develops and how it might be fostered in children experiencing difficulty with this skill (Chomsky, 1957, 1995). This theory posits that language learning involves a process of children inducing rules and regularities of language from the input they receive. This ability is viewed as an innate skill.

Like the behaviourist perspective, this theory has been criticized on several grounds. For example, the theory does not account for the role of cognition (Schlesinger, 1977), the importance of semantic and pragmatic development, the role of modifications in adults' verbal input, and lack of evidence that language learning is, indeed, an innate process. Owens (2005) also reminds us this theory is based on a model of adult language rather than child language.

Still, the psycholinguistic perspective offers implications for AAC development and instruction. For example, educators and classmates can model uses of students' AAC devices. When doing so, they may simplify syntax and semantics in order to enhance the likelihood their classmates will recognize and internalize syntactic and semantic features to which they are being exposed.

Language development involves an integration of form (e.g. syntax, morphology, and phonology), content (semantics) and use (pragmatics, or, the functional use of language in context) (Bloom & Lahey, 1978). AAC instruction might stress teaching

students to use a variety of syntactic structures to convey a broad range of meanings in order to serve various reasons or uses of language. For example, a child might be taught to point to two symbols (e.g. 'want milk') to convey a particular meaning (an action upon an object) where the purpose is to obtain a desired object.

Students who rely on AAC can only use syntactic structures to which their systems afford access (Sutton *et al.*, 2002). It is thus reasonable to argue that communication systems for all children should not only provide access to syntactic forms children are already using, such as one or two-word messages, but also more advanced forms they can be expected to use in the future. Otherwise learning of the structural aspects of language will depend almost exclusively on input from others and not practice using the various forms.

Semantic–cognitive model

The third theory, the semantic–cognitive, emphasizes the semantic aspect of language. Children have been found to use the same form to express multiple meanings (Bloom & Lahey, 1978). For example, the word 'book' may be an object to be acted upon, something possessed by a child, and/or a location (e.g. a pen can be found resting on a book). This theory emphasizes the role of cognition on language, viewing language as a process of mapping words onto non-verbal knowledge gained from experience.

This theory offers clear implications for AAC instruction in inclusive classrooms. Students must not only learn to use symbols to label existing objects. Instead, the classroom and other settings should be manipulated to provide opportunities for them to observe and use a particular symbol (e.g. a photograph of their best friend 'John') to name him, request an action by him, give an object to him, and indicate a particular object is his and not someone else's). Students with access to a limited number of symbols must learn to use them to convey the greatest possible number of meanings in order to optimize interactions in and out of the classroom. Dynamic uses of symbols can expand the range of topics, and depth to which they are discussed, by students.

Also relevant to this topic is the notion of iconicity, or, the visual relationship between a symbol and its referent. Symbols used to represent objects, actions, and events are considered more iconic and more learnable, when there is a clear relationship between the symbol and that which it represents (Schlosser & Sigafoos, 2002).

A more contemporary application of semantic–cognitive theory introduces the notion of 'bootstrapping' (Morgan & Demuth, 1996; Chapman, 2007). Children are viewed as using symbols in a manner that reflects their current knowledge. As such their meanings may be overly restrictive or broad relative to adult meanings. Over time, through processes such as practice and observed results, children's meanings begin to approximate those of adults. Tentative applications of symbols become more adult-like with increasing exposure to and experience using symbols. This process is referred to as fast mapping (Cress & Marvin, 2003). An AAC application of this principle could include providing students with symbols they have not yet demonstrated

mastery of in terms of their knowledge of underlying meaning. Through the use of these symbols, students can become increasingly adept at grasping their 'true' meanings. A student sharing a narrative with her classmates might not only be excused for using words (symbols) inaccurately, but such experimenting with symbols might be encouraged by the classroom teacher.

Current AAC practices recognize the importance of cognition as a necessary but not sufficient prerequisite to language and communication development. This is often expressed in the form of a zero exclusion philosophy (Kangas & Lloyd, 1988; Calculator, 2007) which avails all non-speaking students access to AAC irrespective of their cognitive abilities. This practice reflects a body of research demonstrating that while cognition and language are related (i.e. correlated) one does not exert a causal effect on the other (Rowland & Schweigert, 2003). In fact, children without significant gaps in language and cognition have been able to demonstrate benefits from language instruction that are comparable to those displayed by children whose cognitive abilities exceed their language skills (Cole *et al.*, 1990). We are thus encouraged to implement AAC programs, and observe their effectiveness in a 'try and see', or dynamic assessment approach rather than restricting services to students whose communication skills lag behind their measured cognitive skills (Weitz *et al.*, 1997; Calculator, 2000; Cress, 2002).

We should also be mindful of the frequency with which students may be erroneously labelled as severely intellectually challenged based on their lack of access to effective methods of communication (e.g. Sienkiewicz-Mercer & Kaplan, 1989; Featherly, 2000; Fried-Oken & Bersani, 2000; Williams, 2000). Sienkiewicz-Mercer described her experiences at a state institution that housed individuals with various disabilities. When undergoing an initial medical examination on admission, she was unable to respond to any of the physician's questions due to her severe cerebral palsy. The doctor attributed her inability to communicate to an inability to think and labelled her an 'imbecile'. This tag of severe intellectual disability would haunt Ruth for years until a care provider at the facility recognized her subtle means of communication. Sienkiewicz-Mercer would go on to use AAC to co-author a book and be a popular 'speaker' at national conferences and media events.

Williams (2000) learned to use a highly complex AAC device to carry out his responsibilities as Deputy Assistant Secretary for the US Department of Health and Human Services. As a child he contended with a teacher who did not feel he would ever learn to read. Williams and many other individuals with severe physical disabilities have had similar experiences in which they may have been misdiagnosed and/or been the subject of low expectations and opportunities based on their lack of access to AAC methods to supplement their lack or absence of speech (Fried-Oken & Bersani, 2000).

In summary educators and others should be careful with respect to the emphasis they place on cognitive skills as a basis for methods or content of instruction in inclusive classes. In fact, some have proposed an inverse relationship between cognition and language, arguing AAC instruction can actually enhance children's cognitive skills (Calculator, 1997). Rather than teaching a skill such as means-ends in isolation,

a student might use her AAC system (means) to accomplish a desired ends (obtaining a pencil which is instrumental to the task of writing).

Social–pragmatic model

Finally, the social–pragmatic perspective places the heaviest emphasis on the functional uses of language to accomplish specific purposes, or, intents (e.g. request information, clarification, actions and objects; comment; state; and provide information). Students who rely on AAC have been found to be more likely to display a limited variety of intents (Cress & Marvin, 2003). This poses an obstacle in the classroom environment, where competent communication requires adeptness using language to convey the broadest range of intents. Furthermore, some students who rely on AAC have been found to be unable to generalize their use of symbols from one communicative intent to another. Glennen and Calculator (1985) reported on two students who were taught to use an inventory of symbols to label a broad array of corresponding objects. Neither student spontaneously generalized use of these same symbols to request the very same objects, despite a desire to obtain them.

The social–pragmatic perspective views language development as an outgrowth of purposeful interactions between the child and others. Applying this theory to AAC instruction we might see attempts to model and encourage students' uses of the same symbol to convey a broad range of communicative functions, or, intents. We are also encouraged to take language training outside the therapy room and instead integrate it within daily, meaningful interactions the child engages in throughout the day. The classroom curriculum requires all students to use communication for multiple purposes. Students who are constrained in this regard will be at a disadvantage.

The social–pragmatic perspective also suggests AAC instruction can only be effective when students have sufficient reasons and opportunities to communicate. As such, children must be active learners, occupying not only a respondent, or, listener role but also an initiator role in conversations. Speech–language specialists can collaborate with classroom teachers to identify methods of modifying instruction in order to maximize all students' opportunities and reasons to communicate. Otherwise we might find our students settling in as passive spectators within the classroom.

Additional implications of language models for AAC instruction and inclusive education

As indicated in the preceding discussion various factors have been implicated to explain how language and communication develop. The author and others have extrapolated from these theories in applying linguistic principles to AAC practices in inclusive education. Speech–language specialists are encouraged to collaborate with classroom teachers in ways that encourage all students to be active learners. This may include the following practices that reflect a combination, or hybrid, of the four

theories discussed in this section: behavioural, psycholinguistic–syntactic, semantic–cognitive, and social–pragmatic.

- Instructional modifications are available to afford students opportunities to practice using their AAC systems and observe the corresponding impact on teachers and classmates.
- Teachers and classmates respond quickly and contingently to students' communicative attempts.
- AAC instruction targets communication behaviours that can be easily interpreted by others (highly iconic) and discourages the use of more ambiguous methods.
- Desired communication behaviours are modelled by teachers and classmates. This may include incorporating the use of students' AAC systems into their own teaching and learning.
- Teachers are encouraged to modify their input (speech, visual cues, etc.) in ways that enable students to extract rules and regularities of language.
- Students are encouraged to use their AAC systems, often containing a limited number of symbols, to express the broadest possible range of meanings and communicative intents. Once again this can be modelled by teachers and peers.
- When teaching new concepts, teachers are advised to simplify their syntax. This can be accomplished by tagging a simplified form to the end of a more general message targeted to the rest of the class (e.g. 'okay, I want everyone to put their papers away where they are supposed to be and get ready for music; *time for music*).
- Rather than expecting friendships to develop spontaneously, or in response to teaching students a discrete set of communication and related skills, it is important to recognize such outcomes must be engineered deliberately through curriculum modifications, alternative teaching pedagogies, and changes in beliefs and attitudes.

Role of the SLS. The speech–language specialist can play an important role in enhancing students' success in inclusive classrooms. Introducing new methods of communication to students will have repercussions on overall interaction patterns within the classroom. For example, teachers may need to allow the augmented communicator extra time to respond to their questions. They may find it helpful to work collaboratively with the speech–language specialist to ensure AAC systems include symbols that are relevant and sufficient to permit participation in the general education curriculum.

Typical students whose work groups include peers using AAC systems must be familiar with these systems if they are to collaborate effectively in their groups. In some cases, the student using an AAC system may contribute uniquely to classroom discourse through the introduction of visual symbols that support overall instruction.

SLSs can also work proactively to support the development of friendships within the classroom. This can take a variety of forms, including the following:

- Providing means by which students can use their AAC systems to engage in conversations on topics that are of interest to their peers.

- The above might involve scripting conversations, anticipating conversational turns students and their listeners may exchange on a particular topic, and programming AAC devices with content that corresponds to these anticipated messages.
- Teaching methods of communication that are easily understood and likely to elicit responses from teachers and classmates.
- Teaching students to not only respond to others' messages but to also initiate messages of their own. Sometimes this may include nothing more than topic setting. For example, the AAC user might activate a speech-generating device to issue a message such as, 'Let's talk about the science fair'. Having predetermined the topic, the child's communication system must then provide a means of sustaining a resulting conversation beyond one turn.
- Making certain the AAC system and other methods of communication (e.g. vocalizations and gestures) that students use are aligned with, and thus instrumental to, engaging in the general education curriculum. Thus, when the classroom topic is history, the student must have access to historical data and the symbols necessary to convey them.
- Teaching students and their classmates to use AAC systems to learn about one another, exploring one another's interests, preferences, and strengths.
- Collaborating with teachers and classmates to provide ample opportunities and reasons for interaction. This could include teaching classmates how to assist students in programming messages on their AAC devices.

Barriers to effective AAC usage in inclusive classrooms

In the truly inclusive classroom all students should have access to communication technology that enables them to participate fully in the educational process. We may see situations in which students are more likely to have access to sophisticated AAC devices in self-contained than in inclusive classrooms. This can result from a variety of factors, including the comfort level and training received by teachers in these respective settings. Speech–language specialists, with their corresponding students' assent, must not only assume primary responsibility for introducing AAC systems but also imparting to teachers the knowledge and skills necessary to use them functionally (Sonnenmeier *et al.*, 2005).

In the absence of necessary supports from speech–language specialists and others, inclusive education may be a lofty and elusive construct with limited applicability. Vlachoe (2004) noted the education of many students with severe disabilities is inferior to that provided other children. She found it rare that not only socio-cultural but also academic excellence was taken seriously in 'inclusive' classrooms. Other investigators have found teachers of students using AAC systems reporting limited education gains, social exclusion outside school, unequal status relationships and disruptions in the learning of their classmates (Kent-Walsh & Light, 2003). Negative impressions appeared to be linked to teachers' experiencing a lack of sufficient preparation and ongoing supports to meet the needs of their students who were using various forms of AAC. Given the lack of appropriate supports one might interpret these

results cautiously as they may not reflect true inclusion and thus not be representative of inclusive practices.

Effective inclusive education implies all students derive not only social but also educational benefits in the general education classroom (Hughes *et al.*, 2002). Put another way, placing a student in a general education classroom is a necessary but not sufficient component of inclusion (Beukelman & Mirenda, 2005).

Opportunities presented by inclusive classrooms in relation to AAC

Students with the most severe disabilities often require high levels of support from educators and others in order to participate actively in the general education curriculum. Their successes in inclusive programmes depend in part on their access to effective methods of AAC (Calculator & Jorgensen, 1994; Soto *et al.*, 2001; Kent-Walsh & Light, 2003; Downing, 2005).

Educators report multiple benefits associated with the inclusion of students who rely on AAC as their primary means of communication. These include increased access to the general education curriculum; better instructional objectives; improved uses of AAC in the classroom; increased social participation—frequency of interaction with classmates, and; higher academic expectations. Classmates have been found to be more aware and accepting of students with special needs, viewing them as more capable and 'normal' (Soto *et al.*, 2001; Kent-Walsh & Light, 2003). Additional benefits of inclusive classrooms, and possible associated roles of speech–language specialists (appearing in parentheses) are presented in Table 1.

Inclusive practices involving AAC

Communication pervades all aspects of the general education curriculum. Whether we are 'doing' math, science, reading or writing, information is exchanged through various methods of communication. Communication is necessary to indicate needs for assistance and clarification; requesting and providing information, objects, and actions; establishing and maintaining social closeness with others; and a variety of other purposes. Students equipped with effective means of communication are thus better prepared to participate actively in inclusive classrooms.

AAC proficiency has been conceptualized as a means rather than an end, or a 'system' as opposed to a 'thing' (Calculator, 2000). If administered properly, an AAC programme should not only enhance a child's communication skills but all skills dependent on effective communication. In order to do so, we might identify several recommended practices underlying the delivery of AAC programmes in inclusive settings (Table 2).

Instructional matrices

Instructional matrices can provide an effective way of implementing skill clusters and other procedures cited in Table 2 since they offer systematic means of targeting goals

Table 1. Opportunities for communication/educational growth in inclusive classrooms (and related role of the speech–language specialist (SLS))

• Opportunities for communication are pervasive throughout a typical curriculum (SLS collaborates with classroom teacher to encourage methods of instruction that are accessible to all students, including those relying on AAC. SLS also take a lead in ensuring students have access to messages that correspond to the curriculum).
• Students using AAC have access to responsive listeners (SLS provides instructional support to teachers and classmates on how they, in turn, can optimally recognize, respond to, and support students' communication attempts).
• Interactions in their neighbourhood schools are with the same children they are likely to encounter in their home communities (SLS encourages student interactions, particularly with peers; SLS may also collaborate with families to identify community programs, such as athletic clubs, in which students can gain additional practice using their AAC skills in support of active participation in these activities).
• The curriculum affords reasons to communicate one on one as well as in groups depending on classroom tasks and teaching pedagogy (SLS ensures the AAC system provides access to an effective means of communication across a broad range of situations; these are identified via collaborations with teachers and classroom observations).
• Exposure to a systematic and sequential curriculum (SLS can ensure symbols, vocabulary and other aspects of AAC systems correspond with past, immediate, and future classroom tasks and topics).
• Increased likelihood students' AAC goals and objectives are aligned with the general education curriculum (SLS collaborates with teachers and others to identify how the inclusive classroom can provide a context in which all students are exposed to the same content, yet the individualized needs of specific students are addressed).
• Higher expectations by classmates and teachers (Students with stronger communication skills are likely to be perceived more positively. The SLS and student explore AAC systems that not only match the latter's abilities but also anticipate growth of communication skills over time).
• Communication skills do not develop in isolation but, rather, in the context of meaningful activities at school (SLS provides classroom support (modelling for and direct instruction to teacher and classmates) on methods of engaging all students in formal as well as informal discourse in the classroom and elsewhere).

and objectives within the general education curriculum (Giangreco *et al.*, 1993; Jorgensen, 1994; Cushing *et al.*, 2005). Table 3 provides an example of a matrix developed for Tara, a third grader with Angelman syndrome, a genetic disorder usually resulting from a deletion on the long arm of the 15th chromosome (Williams *et al.*, 1995).

Each week the special education teacher collaborates with the general education teacher to understand what the latter will be doing in each class and materials, such as textbooks, worksheets, and illustrations that will be used to support students' learning. An '×' in the matrix signifies a particular period of instruction, such as art, language arts, and science, which will be the context in which Tara's objectives will be targeted.

Next, the special educator receives input from the SLS regarding which periods necessitate communication skills that have been targeted for instruction. Goals are listed along the vertical axis of the matrix whereas periods of instruction appear

Table 2. Special AAC considerations for students with the most severe disabilities in inclusive classrooms

- Academic skills and activities require all students to integrate a variety of communication, social, motor, sensory and other skills. A particular skill might be addressed in any aspect of the curriculum in which it will enhance students' active participation. The general education curriculum includes didactic subjects such as math and science as well as other activities making up a typical school day such as lunch, recess, and school clubs (Ryndak & Billingsley, 2004). Students need effective methods of communication with a broad range of communication partners in these various situations.
- Possessing the necessary skill clusters (Guess & Helmstetter, 1986) permits full participation in corresponding activities (e.g. groups of students collaborating on a laboratory assignment). A child might be subjected to being brought to a separate area of the classroom to work on a skill such as choice making. Doing so would mean isolating the child from his classmates and withdrawing him from the classroom curriculum A better alternative would be for the speech–language specialist to consult with the teacher, assistant and classmates to identify situations in which this student's ability to make choices will enhance his level of participation in a given activity:
  - The student might benefit from opportunities to choose: (1) the child next to whom he wishes to be seated during language arts; (2) the classmate he wishes to read to him during silent reading; and (3) snacks traded with classmates at snack time.
  - Success in the school cafeteria might be fostered by collaborative consultations with classmates and teaching assistants from the physical therapist (standing in line for an extended period of time, transporting a tray from the line to a table, and transferring from a standing to sitting position once he reaches the table; the occupational therapist (experimenting with a broader range of food choices and use of utensils) and the speech–language specialist (making sure the student has things to communicate about, e.g. interesting things that happened to him over the weekend and questions about how classmates spent their weekends).
- AAC objectives are only relevant to the extent they foster students' participation in the general education curriculum. Speech–language specialists can foster this by taking a lead role in developing AAC systems which students can use to communicate with classmates and others who are and are not familiar with them and their methods of communication.
- Examine and, when appropriate, collaborate with teachers and others in modifying curriculum to provide increased reasons and opportunities for all students to communicate.
- Teach AAC skills that will foster life goals by implementing the criterion of ultimate functioning (Brown *et al.*, 1976). For example, if a student lacks a means of responding to a question directed to her, the question will likely be answered by the person who posed the question, perhaps a teacher or classmate, or someone else acting on the student's behalf:
  - Teach AAC skills that will continue to be necessary and useful to all students as they matriculate through school and into higher education and/or the work world.
- Teach AAC skills that foster membership in the school community. Ferguson (1992) stated: 'The purpose of all of our interventions, programmes, indeed schooling in general is to enable all students to actively participate in their communities so that others care enough about what happens to them to look for ways to include them as part of that community' (p. 9):
  - The development and maintenance of friendships often require additional and ongoing active interventions on behalf of students and directed not only to students but also their peers. Still, in the absence of effective communication skills it is unlikely relationships will be established and maintained.
- Utilize natural supports (Jorgensen, 1992) whenever possible. Participants in need of consultation from the SLS (only if necessary) include the same individuals all other classmates are turning to in these same situations. Ideally, students are taught to use their AAC systems to solicit their own natural supports when necessary:

Table 2. *(continued)*

- Samantha directs requests for assistance to peers out on the playground. When questions arise, Jason often addresses them to his general education teacher rather than his special education aide. Alyssa has a circle of friends whom, with support from the aide, are responsible for helping her to program her device each day. Sharissa has several friends who have been taught to troubleshoot common malfunctions of her AAC device.
- Relying on natural supports may be associated with increased frequency of reinforcement; and more immediate and valued consequences of one's actions. When students have meaningful and purposeful access to responsive typical peers and general educators, along with more efficient means of communicating, we might expect increased AAC usage and fewer instances of students abandoning their systems prematurely (Johnston *et al.*, 2004).

• Teach AAC skills that foster self-determination (i.e. students' abilities to exercise maximum control over their lives and well-being). Teach AAC skills students will need to function as independently as possible later in school and as they move on to the work world:
  - Students can be taught to use their AAC systems to direct the actions (where and how they are positioned, who feeds them, who assists them in the bathroom, etc.) of assistants in charge of their personal care. They can also use AAC to indicate leisure preferences, invite friends to their home, and for other purposes that promote feelings of control over their own lives.

• Introduce AAC systems that may challenge students in relation to their apparent capabilities, maintaining the highest expectations of students as is feasible:
  - If we are wrong in our expectations, it is typically less damaging to err on the side of expecting too much, rather than too little, of our students. This is consistent with the concept of the 'Least Dangerous Assumption' (Donnellan, 1984):
    - Provide access to AAC systems that consider skills expected to develop well into the future, rather than systems designed strictly with assumed current abilities in mind.
    - Do not limit technology to students who have already shown capacities to benefit. Access to AAC and other forms of technology may result in unexpected development of new skills not thought to be possible.

along the horizontal axis. The SLS and special education teacher not only identify instructional goals but also the specific tasks by which goals can be targeted. These take the form of instructional objectives. Examples of goals listed on the matrix and corresponding integrated objectives for two different periods, recess and music, are cited below.

Recess: *Goal*: Making choices.
Objective: Given a peer presents Tara a choice of two apparatuses out on the playground with which she will provide assistance, Tara will use her AAC device to select one.

Goal: Requesting continuation of a pleasurable activity.
Objective: Given a peer is pushing her on the swing and the activity is temporarily ceased, Tara will communicate her desire to continue being pushed.

Music: *Goal*: Making choices.
Objective: Given a choice of two percussion instruments, Tara will select the one she wishes to use during band practice.
Objective: Tara will use photographs to select the child next to whom she wishes to be seated.

Table 3. Matrix including instructional goals, classroom schedule, and levels of support (F, full; P, partial; S, spontaneous) needed to foster student success over multiple trials

Student: _____

Date: _____

CODE F = Full assistance P = Partial S = Spontaneous GOALS	Morning meeting	Art (1)	Math	Music	Lunch	Recess	Art (2)	Health	Science
Making choices				×		×			
				PSP		PPS			
Initiate interaction with peers and adults	×				×				
	FPF				PPS				
Stay seated without a rocking motion					×				×
					SPS				PSS
Request a continuation of a pleasurable activity						×			
						PFP			
Decrease hand-to-mouth behaviour	×						×		
	FFP						PPP		
Maintain eye contact	×							×	
	SSS							PPS	
Demonstrate joint attention to communicate wants and needs			×				×		
			PPS				SPS		
Use an AAC device to complement or comment on a peer's work or actions		×							×
		PPF							PPP
Enhance independent mobility						×			
						SSP			
Reject unwanted objects and actions introduced by others			×					×	
			PSP					SSS	
Maintain a good posture		×		×					
		SSS		PSS					
Use an AAC device to indicate a want or need				×				×	
				PPP				PPS	
Independently don and doff coat	×					×			
	P					PS			

> *Goal*: Requesting continuation of a pleasurable activity.
> *Objective*: Given her peer temporarily ceases assisting her with a drum, Tara will use her AAC device to request continued assistance.

It is very important to point out goals such as making choices and requesting continuation of a pleasurable activity are not relevant in and of themselves. They only take on meaning to the extent that their demonstration enhances the student's levels of active and meaningful participation in a broader activity.

When using a matrix such as that depicted in Table 3, it is also helpful to note the level of assistance: none, or, spontaneous; partial; or full, necessary for students to be successful. Each and every trial can result in a success (i.e. errorless learning), using the least intrusive level of assistance (Sigafoos *et al.*, 1996).

The team may elect to rotate goals and objectives throughout the various instructional periods. This can be done daily or weekly based on scheduling and feasibility. For example, whereas choice making was targeted for Tara during recess and art one day, it might be addressed in two different contexts, language and science, another. By doing so we can ensure any particular goal is targeted in a variety of contexts.

Additional examples of goals and corresponding objectives that emphasize participation and inclusion of students with the most severe disabilities using AAC can be found in Table 4. Specific AAC applications appear in parentheses within this table.

One might wonder how objectives such as those presented in Tables 3 and 4 are derived. One particularly useful procedure involves the use of discrepancy analyses (Brown *et al.*, 1984; Cipani, 1989; Calculator, 1994). We begin by identifying a specific setting or activity in which communication challenges are limiting or precluding the student's active participation. Next, communication behaviours performed by typical classmates in this activity are defined. We then identify those behaviours exhibited by classmates, and associated with successful participation, that our student is lacking. These inequities constitute discrepancies that can be resolved in several ways.

We may choose to modify the activity in such a way that the communication skills typically required are no longer necessary for students' active participation. We may also attempt to teach the student the communication skills exhibited by classmates. On some occasions we may instead choose to teach a related skill in this same activity. Finally, we may elect to depart from the general education curriculum and target new communication skills:

- *Teach communication skills exhibited by classmates*. Other children select paint colours they wish to use. Tia may be taught to do so as well, perhaps choosing from a selection of three possibilities. Classmates comment on what they have drawn. Tia can use her AAC device to reveal similar information. Classmates request materials from one another. Tia can do likewise using her AAC device.
- *Teach a related skill in this same activity*. Continuing with this same example, art may provide an ideal instructional context to work on goals involving greetings, indicating 'finished', making other choices, and increasing Tia's rate of message transmission.
- *Depart from the general education curriculum*. Finally, we may conclude a particular art activity does not have sufficient educational value for Tia, as is or modified, to

Table 4 Examples of goals and corresponding objectives that emphasize participation and inclusion of students with the most severe disabilities using AAC. Specific AAC applications appear in parentheses

Goals: Choice making; Develop friendships Sarah will designate whom she wants to assist her during reading, selecting from a choice of three classmates who have volunteered to do so. *(She will activate a message on her voice output communication aid (VOCA) that invites a particular child to join her during silent reading.)*
Goals: Expand range of communicative functions; Develop friendships Lauren will compliment a classmate on a job well done. *(Near the end of art class she will approach a classmate and use her VOCA to comment on how pretty a friend's picture is.)*
Goals: Increase self-determination in activities of daily living and related areas; Expand variety of purposes for communicating. Kaitlin will assume increasing responsibility for her physical well being. *(Kaitlin will use her VOCA to indicate she is uncomfortable and wishes to have her position changed.)*
Goals: Increase participation in classroom and related activities; Increase range of leisure interests; Increase self-determination. Sean will initiate requests for adaptive equipment necessary for him to participate fully in classroom activities *(Sean will use his AAC device during free play to request his prone stander, providing access to the water table.)*
Goals: Expand range of communicative functions; Decrease frequency of challenging behaviours; Increase self-determination. Trevor will indicate his desire to have a pleasurable activity continue, replacing his present challenging behaviours with a behaviour that is more socially appropriate (Given a pleasurable activity is abruptly halted, Trevor will tap the hand of his Aide to indicate his desire to have the activity resume.)
Goals: Expand range of communicative functions; Decrease frequency of challenging behaviours; Increase self-determination. Melissa will reject unwanted objects using appropriate behaviour. *(In response to a disliked object being presented to her, Melissa will push the object away and avert her gaze, rather than biting her hand and screaming.)*
Goals: Develop friendships; Increase responsiveness to peers. Tiffany will engage in more appropriate turn taking with peers. *(In response to a classmate offering an open hand during Show 'N Tell, Tiffany will relinquish an object in her possession.)*

justify her participation, particularly when such participation limits her to nothing more than a spectator role. We may choose to go outside the general education curriculum. This might be a time Tia assists in responding to classmates' requests for materials they need to complete their art project. It may also be a time Tia leaves this classroom to participate in a school job or an extra recess or physical education class that affords opportunities to work on communication and other skills.

Inclusion is more than just a place

As paramount as the general education classroom is in relation to effective inclusion it is important that inclusion represents more than a simple matter of placement.

The inclusive classroom should be the least restrictive environment in which students' individualized special needs can be addressed effectively (Downing, 2005). Some activities provide ideal situations in which students' objectives can be targeted. For example, many children may be especially motivated by music. Rather than following the typical class schedule and limiting exposure to once a week, multiple periods may be scheduled. In so doing, the setting, in this case music, is viewed simply as an instructional context in which a variety of AAC and other instructional objectives can be addressed. All would be carried out with the shared purpose of enhancing the child's level of participation in music. This is a crucial point. The communication goal is not the point, nor is it viewed relevant in and of itself. It only takes on meaning as one component of a broader set of skills (e.g. music) fostering effective inclusion.

Some programmes with which I have worked find it helpful to follow a rule of bracketing one grade level above and below the student's in selecting instructional contexts. Thus Robbie, a third grader, participated in art classes with second, third, and fourth graders. Tamsyn benefited from multiple lunch periods. The motivation was not to provide opportunities for her to consume more food but instead to take advantage of an inclusive context in which multiple instructional objectives could be targeted systematically throughout the day.

Provide AAC services in a collaborative manner

Professionals are increasingly recognizing the importance of teamwork, integrated services, and collaboration in service delivery (Rainforth *et al.*, 1992; Robinson & Sadao, 2005), particularly in inclusive settings (Soto *et al.*, 2001). Nochajski (2001) gathered information from general and special education teachers, occupational, physical, and speech–language therapists regarding collaboration in their schools. Respondents cited many advantages to collaboration including student progress, team members learning from each other, integrated plans, therapists more likely to be viewed as vital team members, and general and special educators having equivalent roles.

Clearly the responsibility for incorporating AAC into school routines may be shared by many, rather than resting in the domain of SLSs alone. However this only becomes possible in situations characterized by collaboration and mutual respect among team members.

If AAC is to be effectively integrated in inclusive educational programmes, it is essential that the persons (e.g. general and special education teachers, special education aides, and classmates) conducting direct instruction have sufficient and meaningful access to communication and other support services so that they feel competent in these settings. To be effective, sufficient time must be allotted to these interactions.

One school found it was difficult to find time for different related service providers to observe students in their classrooms, consult with staff, and offer programme modifications. As an alternative they asked teachers and aides to identify situations

with which they needed assistance. The corresponding situation was videotaped and then presented at a staffing attended by the classroom teacher, aide, and those special educators germane to the questions being posed. Within a period of thirty minutes an aide and teacher could receive coordinated input from multiple service providers who offered new suggestions or provided feedback on existing practices.

Teachers and others in inclusive classrooms often find it helpful to observe ways in which an AAC device can be used to support the delivery of curriculum. The SLS can schedule a unit of time in the classroom each week to model effective uses of the communication aid. The SLS may rotate when she is available on a weekly basis, for example one week she may be present for art whereas in successive weeks she may be on hand for physical education, lunch, music, science, or social studies.

This strategy can be made possible through flexible scheduling, swapping blocks of time otherwise delegated to specific students. In a given week a particular student may be seen for several hours. Over the following weeks his communication supports may be provided exclusively by others as the SLS diverts her attention to other students requiring her direct and consultative services.

Ensure accountability

Data supporting the efficacy of AAC instruction should serve as a basis for dynamic curriculum design. The earlier discussions of service delivery, particularly the provision of AAC services by persons other than SLSs, may engender parent concerns about programme efficacy. Parents may question teams' abilities to meet their children's educational and related needs when an indirect, or, consultative model replaces the direct service delivery model to which they have grown accustomed. More specific to AAC, questions may arise regarding SLSs spending less time in direct contact with their children; implementation of communication programmes by individuals, including classmates, with no formal training in AAC; and concerns that their children's individual communication needs may not be addressed.

It is essential to reinforce the fact that irrespective of who is providing the service, SLSs maintain ultimate responsibility for AAC programme integrity, or, fidelity. SLSs are expected to take the lead role in the following:

- Providing input regarding the selection of communication goals and objectives that foster students' full participation in the classroom.
- Ensuring others have been trained adequately to encourage students' uses of AAC to access the curriculum.
- Systematically monitoring the ways in which these programmes are implemented and offering modelling and feedback when appropriate.

Regarding the issue of less direct time provided by the SLS to students, it may be helpful to share the matrix in Table 2 with parents, pointing out the actual frequency with which AAC goals are targeted in relation to curriculum content and expectations, the variety of people implementing them, and the diversity of settings in which they are targeted. It is also compelling for many parents to consider with whom they

wish their children communicate. It would be odd to find parents who cite SLSs as primary persons with whom they wish their children be competent communicators.

Conclusion

The title of this paper purposely pairs two constructs, AAC and inclusive education, one being mutually dependent on the other. Each provides a set of opportunities for students, classmates, and educators.

Mere access to AAC and other forms of technology in the general education classroom may not, in itself, contribute to increases in students' active participation in the curriculum. Nor will it necessarily contribute to students acquiring skills that are aligned with the general education curriculum These connections need to be forged carefully and deliberately by speech–language specialists and others who support student learning. The process is fostered by practices that look at development of AAC skills as a means (e.g. to accessing all facets of the general education curriculum) and not an end in and of itself.

Similarly, effective inclusion will depend on students' communication needs being met in a manner that allows all students to access the curriculum in and out of the classroom. Communication pervades all aspects of the curriculum. The student who is unable to meet the ever-changing communication demands of the classroom, whether or not they are modified, will likely adopt a spectator role in his or her education.

The successful inclusion of students with complex communication needs will depend greatly on how the educational system responds to these needs. AAC is but one of many pieces to this puzzle, but an important one at that.

References

Beukelman, D. & Mirenda, P. (2005) Educational inclusion of students who use AAC, in: D. Beukelman and P. Mirenda (Eds) *Augmentative and alternative communication* (3rd edn) (Baltimore, MD, Paul H. Brookes), 391–431.

Bloom, L. and Lahey, M. (1978) *Language development and language disorders* (New York, NY, Wiley).

Brown, L., Nietupski, J. & Hamre-Nietupski, S. (1976) Criterion of ultimate functioning, in: M. Thomas (Ed.) *Hey, don't forget about me! Education's investment in the severely, profoundly and multiply handicapped* (Reston, VA, Division of Mental Retardation), 125–147.

Brown, L., Shiraga, B., York, J., Zanella, K. & Rogan, K. (1984) *The discrepancy analysis technique in programmes for students with severe handicaps* (Madison, WI, University of Wisconsin-Madison and Madison Metropolitan School District).

Calculator, S. (1994) Designing and implementing communicative assessments in inclusive settings, in: S. Calculator & C. Jorgensen (Eds) *Including students with severe disabilities in schools* (San Diego, CA, Singular), 113–181.

Calculator, S. (1997) AAC and individuals with severe to profound disabilities, in: S. Glennen & D. DeCoste (Eds) *Handbook of augmentative and alternative communication* (San Diego, CA, Singular), 445–471.

Calculator, S. (2000) Augmentative and alternative communication, in: E. Pritchard Dodge (Ed.) *The survival guide for speech–languages* (San Diego, CA, Singular), 345–366.

Calculator, S. (2007) Developmental considerations in addressing the AAC needs of children with severe disabilities, in R. Paul (Ed.) *Language disorders from a developmental perspective* (Englewood Cliffs, NJ, Lawrence Erlbaum Associates), 357–376.

Calculator, S. & Jorgensen, C. (1994) *Including students with severe disabilities in schools* (San Diego, CA, Singular).

Chapman, R. (2007) Children's language learning: an interactionist perspective, in R. Paul (Ed.) *Language disorders from a developmental perspective* (Englewood Cliffs, NJ, Lawrence Erlbaum Associates), 1–53.

Chomsky, N. (1957) *Syntactic structure* (The Hague, Moton).

Chomsky, N. (1959) A review of Skinner's 'Verbal Behavior', *Language,* 35, 26–58.

Chomsky, N. (1995) *A minimalist program* (Cambridge, MA, MIT Press).

Cipani, E. (1989) Providing language consultation in the natural context: a model for delivery of services, *Mental Retardation,* 27, 317–324.

Cole, K., Dale, P. & Mills, P. (1990) Defining language delay in young children by cognitive referencing: are we saying more than we know?, *Applied Psycholinguistics,* 11, 291–302.

Cress, C. (2002) Expanding children's early augmented behaviors to support symbolic communication, in: J. Reichle, D. Beukelman & J. Light (Eds) *Exemplary practices for beginning communicators* (Baltimore, MD, Paul H. Brookes). 219–272.

Cress, C. & Marvin, C. (2003) Common questions about AAC services in early intervention, *Augmentative and Alternative Communication,* 19, 254–272.

Cushing, L., Clark, N., Carter, E. & Kennedy, C. (2005) Access to the general education curriculum for students with significant cognitive disabilities, *Teaching Exceptional Children,* 38, 6–13.

Donnellan, A. (1984) The criterion of the least dangerous assumption, *Behavioural Disorders,* 9, 141–150.

Downing, J. (2005) Inclusive education for high school students with severe intellectual disabilities: supporting communication, *Augmentative and Alternative Communication,* 21, 132–148.

Featherly, C. (2000) Life with cerebral palsy, in M. Fried-Oken & H. Bersani (Eds) *Speaking up and spelling it out* (Baltimore, MD, Paul H. Brookes), 189–193.

Ferguson, D. (1992) Is communication really the point? Some thoughts on where we've been and where we might want to go, in: *Proceedings of the 2nd National Symposium on Effective Communication for Children and Youth with Severe Disabilities, 'A Vision for the Future'* (McLean, VA: Interstate Research Associates).

Fried-Oken, M. & Bersani, H. (2000) *Speaking up and spelling it out: personal essays on augmentative and alternative communication* (Baltimore, MD, Paul H. Brookes).

Giangreco, M., Cloninger, C. & Iverson V. (1993) *Choosing options and accommodations for children (C.O.A.C.H.): a guide to planning inclusive education* (Baltimore, MD, Paul H. Brookes).

Glennen, S. & Calculator, S. (1985) Training functional communication board use: a pragmatic approach, *Augmentative and Alternative Communication,* 1, 131–141.

Guess, D. & Helmstetter, E. (1986) Skill cluster instruction and the individualized curriculum sequencing model, in: R. Horner, L. Meyer & H Fredericks (Eds) *Education of learners with severe handicaps: exemplary service strategies* (Baltimore, MD, Paul H. Brookes), 221–248.

Hughes, C., Carter, E., Hughes, T., Bradford, E. & Copeland, S. (2002) Effects of instructional versus non-instructional roles on the social interactions of high school students, *Education and Training in Mental Retardation and Developmental Disabilities,* 37, 146–162.

Iacono, T. (2003) Pragmatic development in individuals with developmental disabilities who use AAC, in: J. Light, D. Beukelman & J. Reichle (Eds) *Communicative competence for individuals who use AAC* (Baltimore, MD, Paul H. Brookes), 323–360.

Johnston, S., Reichle, J. & Evans, J. (2004) Supporting augmentative and alternative communication use by beginning communicators with severe disabilities, *American Journal of Speech–Language Pathology,* 13, 20–30.

Jorgensen, C. (1992) Natural supports in inclusive schools: curricular and teaching strategies, in: J. Nisbet (Ed.) *Natural supports in school, at work, and in the community for people with severe disabilities* (Baltimore, MD, Paul H. Brookes), 179–215.

Jorgensen, C. (1994) Developing individualized inclusive educational programmes, in: S. Calculator & C. Jorgensen (Eds) *Including students with severe disabilities: fostering communication, interaction, and participation* (San Diego, CA, Singular), 27–74.

Kangas, K. and Lloyd, L. (1988) Early cognitive skills as prerequisites to augmentative and alternative communication use: what are we waiting for?, *Augmentative and Alternative Communication,* 4, 211–222.

Kent-Walsh, J. & Light, J. (2003) General education teachers' experiences with inclusion of students who use augmentative and alternative communication, *Augmentative and Alternative Communication,* 19, 104–124.

Morgan, J. & Demuth, K. (1996) *Signal to syntax: bootstrapping from speech to grammar in early acquisition* (Englewood Cliffs, NJ, Lawrence Erlbaum Associates).

Nochajski, S. (2001) Collaboration between team members in inclusive educational settings, *Occupational Therapy in Health Care,* 15, 101–112.

Osgood, C. (1963) On understanding and creating sentences, *American Psychologist,* 18, 735–751.

Owens, R. (2005) *Language development: an introduction* (New York, NY, Pearson).

Rainforth, B., York, J. & Macdonald C. (1992) *Collaborative teams for students with severe disabilities* (Baltimore, MD, Paul H. Brookes).

Robinson, N. & Sadao, K. (2005) Person-focused learning: a collaborative teaching model to prepare future AAC professionals, *Augmentative and Alternative Communication,* 21, 149–163.

Rowland, C. & Schweigert, P. (2003) Cognitive skills and AAC, in: J. Light, D. Beukelman & J. Reichle (Eds) *Communicative competence for individuals who use AAC* (Baltimore, MD, Paul H. Brookes), 241–275.

Ryndak, D. & Billingsley, F. (2004) Access to the general education curriculum, in: *Including students with severe disabilities* (Boston, MA, Allyn & Bacon), 55–56.

Schlesinger, I. (1977) The role of cognitive development and linguistic input in language acquisition, *Journal of Child Language,* 4, 153–169.

Schlosser, R. & Sigafoos, J. (2002) Selecting graphic symbols for an initial request lexicon: Integrative review, *Augmentative and Alternative Communication,* 18, 102–123.

Sienkiewicz-Mercer, R. & Kaplan, S. (1989) *I raise my eyes to say yes* (Boston, MA, Houghton Mifflin).

Sigafoos, J., Couzens, D., Roberts, D., Phillips, C. & Goodison, K. (1996) Teaching requests for food and drink to children with multiple disabilities in a graphic communication mode, *Journal of Developmental and Physical Disabilities,* 8, 247–262.

Skinner, B. F. (1957) *Verbal behavior* (New York, NY, Appleton-Century-Crofts).

Sonnenmeier, R., McSheehan, M. & Jorgensen, C. (2005) A case study of team supports for a student with autism's communication and engagement within the general education curriculum: preliminary report of the Beyond Access model, *Augmentative and Alternative Communication,* 21, 101–115.

Soto, G., Muller, E., Hunt, P. & Goetz, L. (2001) Professional skills for serving students who use AAC in general education classrooms: a team perspective, *Language, Speech and Hearing Services in the Schools,* 32, 51–56.

Sutton, A., Soto, G. & Blockberger, S. (2002) Grammatical issues in graphic symbol communication, *Augmentative and Alternative Communication,* 18, 192–204.

Vlachoe, A. (2004) Education and inclusive policy making: implications for research and practice, *International Journal of Inclusive Education,* 8, 3–21.

Weitz, C., Dexter, M. & Moore, J. (1997) AAC and children with developmental disabilities, in S. Glennen & D. Decoste (Eds) *Handbook of augmentative and alternative communication* (San Diego, CA, Singular), 395–445.

Williams, B. (2000) More than an exception to the rule, in: M. Fried-Oken & H. Bersani (Eds) *Speaking up and spelling it out* (Baltimore, MD, Paul H. Brookes), 245–254.

Williams, C., Zori, R., Hendrickson, J., Stalker, H., Marum, T., Whidden, E. & Driscoll, D. (1995) Angelman Syndrome, *Current Problems in Pediatrics,* 25, 216–231.

Yoder, P. & Warren, S. (1998) Maternal responsivity predicts the prelinguistic communication intervention that facilitates generalized intentional communication, *Journal of Speech, Language, and Hearing Research,* 41, 1207–1219.