Innovation Configuration

# Preparing Teachers to Facilitate Communication Skills in Students With Severe Disabilities

Kathryn D. Peckham-Hardin
California State University, Northridge

Amy Hanreddy
California State University, Northridge

Billy T. Ogletree
Western Carolina University

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The CEEDAR Center

University of Florida
360 Norman Hall
PO Box 117050
Gainesville, FL 32611

www.ceedar.org
ceedar@coe.ufl.edu
352.273.4259

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## Innovation Configuration for Preparing Teachers to Facilitate Communication Skills in Students With Severe Disabilities

This paper features an innovation configuration (IC) matrix that can guide teacher preparation professionals in preparing scholars to facilitate communication skills in students with severe disabilities. This matrix appears in Appendix A.

An IC is a tool that identifies and describes the major components of a practice or innovation. With the implementation of any innovation comes a continuum of configurations of implementation from non-use to the ideal. ICs are organized around two dimensions: essential components and degree of implementation (Hall & Hord, 1987; Roy & Hord, 2004). Essential components of the IC—along with descriptors and examples to guide application of the criteria to course work, standards, and classroom practices—are listed in the rows of the far left column of the matrix. Several levels of implementation are defined in the top row of the matrix. For example, no mention of the essential component is the lowest level of implementation and would receive a score of zero. Increasing levels of implementation receive progressively higher scores.

ICs have been used in the development and implementation of educational innovations for at least 30 years (Hall & Hord, 2001; Hall, Loucks, Rutherford, & Newton, 1975; Hord, Rutherford, Huling-Austin, & Hall, 1987; Roy & Hord, 2004). Experts studying educational change in a national research center originally developed these tools, which are used for professional development (PD) in the Concerns-Based Adoption Model (CBAM). The tools have also been used for program evaluation (Hall & Hord, 2001; Roy & Hord, 2004).

Using this tool to evaluate course syllabi can help teacher preparation leaders ensure that they emphasize proactive, preventative approaches instead of exclusively relying on behavior reduction strategies. The IC included in Appendix A of this paper is designed for teacher preparation programs, although it can be modified as an observation tool for PD purposes.

The Collaboration for Effective Educator Development, Accountability, and Reform (CEEDAR) Center ICs are extensions of the seven ICs originally created by the National Comprehensive Center for Teacher Quality (NCCTQ). NCCTQ professionals wrote the above description.

Communication provides the vehicle by which we gain knowledge about our world, share thoughts, establish and maintain relationships with others, and exert control over our lives. Communication is a fundamental right for everyone, including children, youth, and adults with severe disabilities (Light & McNaughton, 2014). The National Joint Committee for the Communication Needs of Persons With Severe Disabilities (NJC) created the Communication Bill of Rights (CBOR) in support of communication for all. The NJC CBOR states that individuals with severe disabilities have the right to make requests, express personal preferences, refuse/reject choices, seek attention, be spoken to with respect and dignity, and have access to augmentative/alternative communication (AAC; Brady et al., 2016).

The right to communicate is central to all aspects of the lives of persons with severe disabilities. Functional communication abilities support this population's successful pursuits across a myriad of areas, including education, self-advocacy, employment, community integration, and leisure. Accordingly, all stakeholders of individuals with severe disabilities, including teachers, must understand and implement effective communication practices.

The purpose of this IC is to summarize evidence-based practices (EBPs; see Appendix B for a definition) promoting the communication success of students with severe disabilities and provide content that will prepare teachers to work with speech-language pathologists (SLPs) and other collaborative stakeholders as assessment and intervention partners.

Appendix B comprises terms and practice concepts central to understanding service delivery for this population. A quick review of this appendix should prepare the reader for the content of this IC. What follows is a general description of communicative expectations for students with severe disabilities that provides a framework from which recommended and evidence-based communication practices can be shared. This IC concludes with an overview of

communication-based assessment and intervention practices and addresses teachers' roles in service delivery. Sections on assessment and intervention culminate with teacher takeaways that highlight the critical participation of teachers in communication service delivery. This IC ends with suggestions for teacher preparation.

## Expected Communicative Abilities of Students With Severe Disabilities

Students with severe disabilities demonstrate restricted communication abilities compared to age-matched peers, which does not suggest that people with severe disabilities do not communicate. To the contrary, students with severe disabilities can be expected to use idiosyncratic communicative forms (e.g., body movements, squeals and cries, expressions, behaviors [including aberrant]) and conventional communicative forms (e.g., gestures, vocal speech-like approximations, gaze, words, non-speech symbols) to communicate for a variety of communicative purposes (e.g., requesting, protesting, greeting, commenting; Cirrin & Rowland, 1985; McLean, McLean, Brady, & Etter, 1991; Ogletree, Wetherby, & Westling, 1992). Receptively, this population may understand multiple symbol forms and even simple grammar, or may only possess general environmental awareness (Ogletree, Bruce, Finch, Fahey, & McLean, 2011).

Several classification systems to describe communication skills are available (Bates & Dick, 2002; Browder, Flowers, & Wakeman, 2008; Iacono, Carter, & Hook, 1998; Light & McNaughton, 2014; Rowland, 2005). Rowland's (2011) classification system describes four categories of presymbolic communication and three categories of symbolic communication, and these categories are used as a framework for current assessments and intervention practices as described below.

**Pre/Non-Symbolic Communication**

Pre/non-symbolic communication is expressive communication that does not use symbols such as objects, words, pictures, or text (Brady et al., 2012). Examples include crying, fussing, making facial expressions, laughing, and vocalizing. These behaviors require partner interpretation to be understood. Partner interpretation may be more or less challenging depending upon the level of conventionality of the communicative behavior offered.

Four levels of pre/non-symbolic communication exist: (a) pre-intentional, (b) intentional, (c) unconventional, and (d) conventional (Rowland, 2011). Pre-intentional communications are expressions offered without clear communicative intent. They can be observed in typical infants when they fuss (i.e., move in an agitated fashion) or vocalize (i.e., cry or whine) without persistence or clear purpose. Because intent is not clear, the partner is left to guess meaning (e.g., the child is uncomfortable or perhaps hungry). In contrast, intentional communications are under the child's control. That is, the child offers the behaviors (e.g., cry, fuss) with *a priori* knowledge that they will influence the partner. Intentionality is generally attributed if behaviors are persistent, accompanied by gaze shifts, repaired if unsuccessful, and terminated when successful. Unconventional communication includes idiosyncratic behaviors not generally understood or recognized beyond those close to the individual (e.g., child-specific vocalizations to affirm/deny). Finally, conventional communicative behaviors are intentional and are generally accepted and recognized gestures (e.g., a wave or nod of the head in greeting).

**Symbolic Communication**

Symbolic communication is expressed with symbols such as objects, pictures, icons, speech, text, and manual signs (Rowland, 2011). Symbolic communication relies on a shared meaning of symbols between the sender and the receiver of the message. Rowland (2011) described concrete and abstract symbols used in language. Concrete symbols are symbols that

closely look, feel, or sound like what they represent. They can include pictures, objects, sounds, and/or conventional gestures. For example, a picture of a water bottle to request a drink or a thumb drive to represent computer time would be concrete symbols. In contrast, abstract symbols do not resemble what they represent. Abstract symbols include speech, text, sign language, and Braille. Finally, language is the increasingly complex combination of abstract symbol forms (e.g., "want cheese," "I like donuts," "I want to play on the swings").

Regardless of whether one speaks of pre/non-symbolic communication or symbolic communication, two terms describe the expressive communicative abilities and needs of persons with severe disabilities—*communicative form* and *communicative function*. Form refers to the mode an individual uses to express him/herself. Individuals with severe disabilities use forms such as speech, facial expressions, objects, gestures, challenging behaviors, text, pictures, and body language. In contrast, the function of communication relates to how others interpret a communication form (i.e., the actual function the form serves within communication). Communicative functions include requesting and rejecting items, gaining someone's attention, confirming or denying in response to a question, demonstrating knowledge, asking questions, and commenting. Individuals with severe disabilities typically express regulatory functions (i.e., requests and protests; Ogletree et al., 1992).

For individuals who are symbolic, a third term, *content*, refers to what they actually say. The content of communication exchanges will vary widely based on the context of interactions and the learner's use and understanding of symbols and/or language. Finally, because communication is social in nature, the term *pragmatics* may be used to describe social behaviors that facilitate communication such as gaze, initiating and responding, or engaging in turn taking.

The ultimate goal for the learner with severe disabilities is communicative competence. Light and McNaughton (2014) described communicative competence as "the attainment of knowledge, judgment, and skills to meet communication goals and participate in key environments" (p. 2). The pursuit of communicative competence should be at the forefront of all efforts to assess and improve the communicative abilities of students with severe disabilities.

Some familiarity with the general communicative abilities of students with severe disabilities and the terms used to describe these abilities is helpful to teachers and other stakeholders who participate in communication assessment and intervention.

## Communication Assessment for Students With Severe Disabilities

Communication assessment for students with severe disabilities is typically conducted not to determine eligibility for services, but to provide direction in planning for interventions. As such, communication assessment is one of many vehicles used to inform students' Individualized Education Programs (IEPs). The overarching goal of communication assessment should be to generate representative and reliable data that inform decision making for intervention. Data must represent both typical and optimal communicative abilities and be reliable (i.e., easily replicable in subsequent assessments occurring within a reasonable timeframe and assuming intervention has not occurred).

Brady and colleagues (2016) noted that assessment begins "with the implementation of procedures that inventory and describe the individual's communication abilities; the skills, needs, culture, and behaviors of their communicative partners; and the communication supports and demands presented by different environments" (p. 125). This assessment clearly refers to a tri-focused effort, which includes the student with a communication impairment, his or her partners, and his or her environments. These authors reported the need for collaborative teams that incorporate families and other stakeholders and function across multiple settings; suggested

that communication is but one focus of the assessment team (e.g., in addition to attention to sensory abilities, motor skills, and positioning); and stressed that collecting information in all areas provides the best picture of learner abilities and support needs. Finally, Brady and colleagues called for both a receptive and expressive focus to communication assessment with an emphasis upon all possible communication modalities (including aberrant behaviors). Obviously, communication-based assessments need to utilize non-standardized and standardized tools and procedures, which are reviewed below.

The American Speech-Language Hearing Association (ASHA, n.d.) described standardized assessments as empirically developed measures with statistical reliability and validity. ASHA noted that standardized assessment tools are either norm or criterion referenced. While norm-referenced standardized tests allow individual performance to be compared to a broad sample of others for relative standing, criterion-referenced instruments provide performance comparisons against preset standards.

Compared to standardized tests, non-standardized assessment tools are less prescriptive regarding administration and scoring and include informant reports, interviews, and observations (ASHA, n.d.). Non-standardized observations can occur throughout natural interactions across contexts or during structured communication sampling (i.e., the presentation of enticing communication opportunities within engaging routines). In the school setting, typical contexts can include classrooms, hallways, gymnasiums, or cafeterias. Ogletree and Price (in submission) noted that SLPs have "[long] utilized non-standardized assessment measures to capture nuanced aspects of speech, language, and communication" and that "these procedures have been particularly helpful with individuals who are . . . developmentally young and do not possess the attentional or response capacities to participate in standardized testing" (p. 3). Finally,

non-standardized assessment generally provides real-world snapshots of communicative abilities and can be particularly helpful in determining the potential communicative functions of aberrant behaviors. For example, numerous researchers have used observation (i.e., functional analyses of behavior) to discover the potential hidden intent behind aggressive or other behaviors (Sigafoos, 2000).

The assessment of communication in students with severe disabilities is not without challenges. The population's characteristics and frequent concomitant disabilities make collecting representative and reliable data difficult. Furthermore, commercially available tests have often not been designed for or standardized on students with severe disabilities (Bruce & Ivy, 2017). Still, effective team-based communication assessment is possible and typically employs a tri-focused framework as well as both standardized and non-standardized tools.

**Learner-Focused Assessment**

Learners with severe disabilities require a "unique, even idiosyncratic, instructional approach for effective communication intervention" (Siegel-Causey & Bashinski, 1997, p. 108). Thus, the learner-focused element of the tri-focused assessment framework emphasizes (a) understanding learner characteristics, current communication skills, and preferences and (b) providing data that inform the design of individualized, evidence-based instructional practices.

Clearly, learner-focused assessment will both inform students' IEPs and generate data useful in formulating goals that facilitate, where possible, access to the general education curriculum. Teachers and other school stakeholders should work with the SLP to ensure that assessment data contribute to these desired outcomes.

One way to gather information about the learner's current communication abilities and needs is to utilize non-standardized tools, including interview and observation, to gather data

from family members, teachers, therapists, peers, and others who know the learner well. Although several published measures are available to guide observations and interviews, two popular assessment instruments with this capacity are as follows.

**The Communication Matrix.** The Communication Matrix (CM; Rowland, 2005) is based on input from family and other team members concerning which behaviors the learner uses to express pre/non-symbolic or symbolic communication. The tool guides the assessment team through series of questions designed to identify how the learner currently expresses various needs. Sample questions include the following:

- Does your child intentionally show you that s/he doesn't want a certain thing or a certain activity?
- Does your child do certain things that attract your attention to him even though he isn't purposefully trying to get your attention?
- Can you sometimes tell that your child would like to continue an action or activity that you have just stopped doing with her?

Images and videos accompany questions to provide examples for respondents to increase the tool's accessibility to family members and teachers. The interviewee's responses to questions are sequentially organized into seven levels of communication competence and four primary functions of communication: (a) refusal, (b) acquiring things, (c) engaging in social interaction, and (d) providing/seeking information. The CM can be used with learners of different abilities and ages. Furthermore, this assessment is free to family members, teachers, related services staff, and others and is available online at www.communicationmatrix.org.

**Communication and Symbolic Behavior Scale.** The Communication and Symbolic Behavior Scale (CSBS; Wetherby & Prizant, 2001) assesses intentionality, use of symbols, and

interaction skills through naturalistic exchanges/play. The CSBS and CSBS-DP (Developmental Profile) are norm-referenced assessment tools designed for use with chronologically or developmentally young children ages 8 months to 72 months. Evidence supports the CSBS's validity in identifying developmental delays in young children (Wetherby, Allen, Cleary, Kublin, & Goldstein, 2002), and the data collected provide a profile useful for developing intervention plans addressing a range of communication skills.

In addition to the two measures described above, interviews and observations can occur more informally. For example, interviews can simply emerge as a natural interaction spurred by intake questionnaires or questions that arise throughout assessment. Likewise, sampling can occur casually as interviews are conducted or the learner is engaged in typical routines or interests.

Reliable and representative data specific to the communication abilities and needs of students with severe disabilities have also been gathered by administering standardized tests designed for infants and toddlers (e.g., CSBS). Although using such measures has been criticized, a student's performance can offer insights, if not standard scores.

Finally, both non-standardized and standardized assessments of students with severe disabilities will be more productive if they are conducted with specific learner targets in mind (Ogletree, Fischer, & Turowski, 1996). For example, assessment for the pre/non-symbolic learners should occur with the specific purpose of obtaining representative and reliable data about the presence or absence of communicative intent as well as how (i.e., communicative forms) and why (i.e., communicative functions) intent is understood and expressed. Similarly, learner assessment for the symbolic communicator should target the understanding and use of all

symbol forms. Having predetermined learner targets is a productive way to guide the assessment process.

**Partner-Focused Assessment**

Communication partners play a critical role in supporting learners with severe disabilities. The transactional nature of communicative interactions means that all partners influence the success or failure of a communication exchange. Some evidence suggests that communication partners tend to dominate interactions by using predominantly closed-ended questions, providing few opportunities for the learner to initiate, and controlling the direction and topics of conversation (Kent-Walsh & McNaughton, 2005; Shire & Jones, 2015). Thus, an assessment focus of partner communication is warranted.

Monitoring partners during non-standardized communication sampling is one way to collect representative and reliable data on their communication patterns and supports (see video analysis details on p. 17). In addition, some non-standardized assessment instruments, such as Social Networks (Blackstone & Hunt-Berg, 2003), assist with recording and understanding partners' contributions to communicative exchanges with students with complex communication needs. A few examples of partner-focused assessment strategies are described below, including person-centered planning, analysis of communication exchanges, and the use of gesture/communication dictionaries.

Again, one must remember that partner assessment is most effective if conducted with specific targets in mind. Ogletree and colleagues (1996) suggested targets such as the number of communication opportunities provided by the partner and the sensitivity and consistency with which partners interpret communicative attempts offered by their students with severe disabilities. Other important partner targets may address stakeholder preferences and partner understanding of communication-related needs.

**Person-centered planning.** Person-centered planning is an assessment process designed to help teams identify critical communication goals for the learner, his or her family, and other team members, including teachers and peers (Holburn, Jacobson, Vietze, Schwartz, & Sersen, 2000; Lyle O'Brien, O'Brien, & Mount, 1997). This planning approach also helps the team to understand the family context, including relevant cultural considerations. For example, some families may embrace aided communication systems such as speech-generating devices (SGD) while other families may not. Understanding these variables early in the assessment process is important for planning teams.

Person-centered planning is a critical element of partner-focused assessment because it allows the team to gain a better understanding of the learner's unique strengths and needs in the context of the family's long-term goals for the child. This planning, in turn, helps the team align targeted skills and strategies to these goals and increases the degree to which families are considered partners in this process. Clearly, understanding family priorities through person-centered planning assists teachers as they work to create meaningful IEPs and increase students' access to the general education curriculum.

**Video analysis.** Video recording and analysis allows teams to identify common patterns of interaction between the learner and his or her communication partners. For example, partners may dominate interactions, rely heavily on yes/no questions, and/or provide minimal opportunities for an AAC user to initiate an exchange (Kent-Walsh & McNaughton, 2005). Informal observation checklists (see Beukelman & Mirenda, 2013; Downing, Peckham-Hardin, & Hanreddy, 2015) support the video analysis process by helping to identify patterns of initiation and response within partner-learner exchanges. Team members can also use videos to identify partner responses, or lack thereof, to subtle and/or unconventional learner cues.

**Gesture/communication dictionaries.** Gesture dictionaries allow partners to record the communication behaviors of learners and their possible interpretations across interactions and environments (Siegel & Wetherby, 2006). As an assessment tool, dictionaries provide insight into the perspectives of partners—which forms they view as communicative and which functions they think these forms serve. Using a gesture dictionary not only assists with the collection of partner data, but also helps to promote the perspective among team members that everyone communicates and may motivate all stakeholders to recognize and respond to potential communicative acts (Siegel & Wetherby, 2006).

**Environment-Focused Assessment**

Environmental communication assessment typically occurs using non-standardized processes such as interviews and observations. As with partner assessment, some non-standardized tools can assist. For example, Charity Rowland and Phillip Schweigert's *An Environmental Inventory to Help Teachers Design Learning Opportunities for Children With Disabilities* (Rowland & Schweigert, 2003) provides guidance for examining the conduciveness of a child's social and physical environments to communicative success. Furthermore, video analysis (as described above) can be quite helpful.

Entering environmental assessment with predetermined targets is recommended. Ogletree and colleagues (1996) suggested planning to evaluate both communication opportunities afforded by the setting and potential barriers to communication attempts (e.g., the lack of availability of an AAC device).

Two tools supporting environmental assessment include ecological inventories and participation inventories. Both allow the communication assessment team insight into a learner's daily activities and participation patterns. Furthermore, teachers are frequently the team members who conduct these inventories.

**Ecological inventory.** The ecological inventory is an observation tool designed to provide an understanding of the demands of a given activity, task, routine, and/or lesson. For communication skills, the ecological inventory identifies which communication skills are needed to participate in the targeted routine or activity. This information assists with creating teaching sequences and protocols by isolating (a) the skills the learner already has, (b) the degree to which these skills enable the learner to effectively participate in the targeted activity, and (c) the additional skills and supports needed to assist the learner (see Downing, Peckham-Hardin et al., 2015). Through this process, the team determines (a) which skills to target for instruction; (b) when and how to teach the skills throughout the day; (c) which environmental barriers may exist and how to address them; and (d) which additional instructional, curricular, and/or communicative supports are needed to increase the learner's success.

**Participation inventory**. Similar to the ecological inventory, a participation inventory (Beukelman & Mirenda, 2013) provides an analysis of participation patterns within regularly occurring activities in familiar environments. In this approach, the steps of the activity are identified, and the learner's performance is described in terms of the level of independence, opportunity barriers, and access barriers. Subsequently, teams analyze the participation patterns of typical peers to establish clear expectations for the performance of a learner with severe disabilities. Using typical peers' performance as criteria, the learner's performance is described to identify gaps that the team will address. Although some gaps may relate to individual skills (e.g., the ability to raise a hand to ask a question), others may relate to opportunity (e.g., an expectation for participation does not exist) or access (e.g., the student cannot reach/hold the materials).

## Teacher Takeaways Related to Communication Assessment for Students With Severe Disabilities

Clearly, teachers are vital members of interprofessional teams charged with assessing students with severe disabilities. Although responsibilities may vary depending on the team structure employed, teachers can be expected to contribute to communication assessment in specific ways. This brief IC section reviews four communication-based assessment responsibilities that frequently fall to the classroom or special education teacher. These responsibilities cross all areas of tri-focused assessment, including activities designed for learners, partners, and environments. See Table 1 for a list of teacher takeaways for communication assessment.

Table 1

*Teacher Takeaways for Communication Assessment*

| | Teacher Takeaways |
|---|---|
| 1 | Teachers should partner with SLPs to become informed observers of students' communication abilities, needs, and barriers across partners and settings. |
| 2 | Teachers should offer their observations throughout the assessment process as informed members of the assessment team. |
| 3 | Teachers should be actively engaged as members of the communication-assessment team and open to varied levels of participation if such participation results in stronger findings and recommendations. |
| 4 | Teachers should broaden the reach of the communication-assessment team through their unique position as a school liaison. |

### Observation and Informancy

Teachers are potentially the most effective observers and informants on the communication assessment team. They view students with severe disabilities as they communicate with varied partners and across a myriad of communication settings. Accordingly,

teachers provide a unique set of eyes on communication successes and failures throughout a student's day. They are also able to observe the benefits of varied supports on communication success. For example, teachers provide critical team input on the effectiveness of supports such as AAC devices, systems, or specific intervention strategies.

Teachers can maximize observations by closely cooperating with the SLP. Specifically, generating observation targets related to the learner, her partners, and her environments can yield informed observations that assist with valid assessment conclusions and intervention direction (Ogletree et al., 1996). The first takeaway from this IC is that teachers should partner with SLPs to become informed observers of students' communication abilities, needs, and barriers across partners and settings.

As informants, teachers report on observations throughout the assessment process. Informancy prior to collecting data can assist with generating appropriate assessment activities. During data collection, teacher informancy can promote activity success. For example, the teacher's knowledge of desired reinforcers can make student participation in assessment activities more likely. Finally, teachers can offer observations after data have been collected both as a means of refuting or confirming the validity of assessment conclusions and assisting with creating ideal and socially valid interventions. Teachers hold invaluable information specific to students' overall learning and their interface with both the special education and general education curricula. This information should be a driver in intervention efforts and can be missed by other team members. In sum, the second teacher takeaway is that teachers should offer their observations throughout the assessment process as informed members of the assessment team.

**Co-Administrator of Assessment Tests or Procedures**

Communication-assessment team members call upon teachers to assist with administering specific tests or procedures, most often in the form of leading communication sampling or setting up and directing assessment tasks. The decision to employ teachers at this level allows more familiar partners to guide interactions in an attempt to collect representative and reliable data. Some teams and team members will be more open than others to this type of role sharing and role release (Ogletree, Fischer, & Schulz, 1999). Accordingly, team member roles and activities should be an early point of discussion for the communication-assessment team.

Teachers must present an openness to assist with assessment activities when asked. As suggested above, if teachers assume the roles of observer and informant, they will be engaged in the assessment process, and, thus, active involvement in testing will flow seamlessly. The third teacher takeaway, then, is that teachers should be actively engaged as members of the communication assessment team and open to varied levels of participation if such participation results in stronger findings and recommendations.

**Liaison**

A final role for teachers on the communication-assessment team is that of liaison. Teachers have connections across and beyond the school that make them invaluable as team members. Specifically, they can extend the reach of the team to others throughout and beyond the school as they question stakeholders specific to learner, partner, or environmental assessment targets. Teachers may also provide the ideal conduit by which team recommendations can flow to everyone engaged with the student in the school setting.

Others on the team may also serve a liaison role within and beyond the school. One such team member is the social worker. A final teacher takeaway, therefore, in the area of

communication assessment is for teachers to broaden the reach of the communication-assessment team through their unique position as a school liaison.

## Communication Intervention for Students With Severe Disabilities

Brady and colleagues (2016) defined communication intervention as "any systematic effort to improve how individuals understand the communication of others and express themselves" (p. 127). Although intervention for students with severe disabilities has traditionally focused upon the learner, it has been re-conceptualized in recent years according to the tri-focused framework presented in this paper (Siegel & Wetherby, 2006), and today's intervention for this population addresses the learner, her partners, and her environments.

Brady and colleagues (2016) suggested other emerging intervention trends, including a more expansive view of who intervenes, what to target, where intervention occurs, and how to measure progress. Specifically, the role of the interventionist has expanded to include a variety of stakeholders and partners (i.e., the intervention team) who work alone or with others across the various environments of the learner. Furthermore, discrete and sequential developmental goals have been replaced by those with the potential to affect socially valid or meaningful change in the learner's life. Finally, progress is being redefined to capture the learner's movement toward functional communication, leading to increased engagement, community involvement, and self-advocacy. Brady and colleagues noted the absence of interventions addressing comprehension as a need deserving of attention.

This IC reviews evidence-based interventions for students with severe disabilities with a specific focus on what teachers need to know. What follows is a review of a few seminal learner interventions presented along a continuum of structure and function that Ogletree and Oren (1998) first introduced. These authors described structure as the control of stimuli and response acceptability and described response consequences and functionality as using natural events,

objects, and consequences to pursue practical goals within typical routines. Structured, semi-structured, and limited-structured categories provide a framework for organizing interventions for students with severe disabilities. Also included in the following section are interventions directed at partners and environments.

## Learner-Focused Interventions

### Structured Intervention

Structured interventions are trainer directed, utilize a planned set of resources, and occur in a relatively controlled environment. The techniques used within these approaches are behavioral (e.g., prompting, chaining, reinforcement, extinction) and are often used prescriptively, with gradual fading after skill acquisition. Structured interventions vary in functionality but are generally considered less functional than their less structured counterparts (Ogletree & Oren, 1998). A structured intervention example is the Picture Exchange Communication System (PECS).

PECS (Frost & Bondy, 2002) is an effective intervention for teaching emergent communication (primarily requesting) by exchanging two-dimensional symbols or photographs (S. L. Hart & Banda, 2010; Sulzer-Azaroff, Hoffman, Horton, Bondy, & Frost, 2009). In early PECS stages, learners exchange a picture for a preferred item or activity. Initially, two trainers guide the process, one offering the stimuli, and the other prompting responses. With time, a single trainer can implement the intervention. As the PECS process progresses, the trainer introduces distance (e.g., the learner has to walk to the other side of the room to access or deliver symbols) during communication opportunities. Additional pictures are consistently introduced, and, as the learner increases her symbol use, more abstract pictures may be used. Upon mastery of initiating requests, the learner is taught other communicative functions and to construct simple sentences using a combination of concrete and abstract pictures (Bondy & Frost, 2009).

Several experimental studies have compared PECS with other communication systems (e.g., SGDs, sign language) with findings indicating that students make similar progress when provided with comparable instruction (Boesch, Wendt, Subramian, & Hsu, 2013; Tincani, 2004). Although demonstrated to be effective for teaching early symbol use, some questions remain regarding maintaining and generalizing the skills in this approach (Fillipin, Reszka, & Watson, 2010).

Research suggests that teaching requests using systematic structured instruction through PECS or a similar approach can be an evidence-based first step in communication intervention (Lancioni et al., 2007). Finally, PECS is moderately functional within the classroom setting because it can be personalized to each student and used in a range of activities.

**Semi-Structured Intervention**

Semi-structured interventions occur in more naturalistic settings, during social interactions, and within the context of the child's daily routines and activities. They are structured in that the choice of intervention techniques (e.g., prompting, modeling, reinforcement); stimuli; and environmental manipulations are consistent with structured interventions yet flexible with the progression of activities, opportunities for spontaneity, and using natural reinforcement. All interventions in the semi-structured category tend to be described as functional due to their high degree of flexibility and ability to be modified according to a student's progress and changing needs. Enhanced milieu training (EMT) is a seminal evidence-based example of a semi-structured intervention.

EMT is a naturalistic teaching strategy designed to increase the frequency and complexity of communicative exchanges through modeling, prompting, and reinforcing communication skills as they occur in the context of ongoing activities and routines (Kaiser & Trent, 2007). The four components of EMT are (a) arranging the environment to increase the probability of

communication, (b) clearly articulating the communication skills targeted for instruction, (c) responding to and expanding on the learner's communication to model and encourage more complex communication, and (d) reinforcing/responding to communicative attempts and shaping learner behaviors over time (Kaiser & Roberts, 2013). EMT is an evidence-based strategy with a robust research base for improving communication and language skills in children with disabilities and is considered exceptionally functional (Kaiser & Trent, 2007).

**Limited-Structured Intervention**

Limited-structured interventions include less directive and play-based therapies. They occur within the child's natural environment with practitioners following the child's lead while targeting learner interaction and engagement. Limited-structured interventions may appear less than functional due to their ongoing demands on teachers and other stakeholders (i.e., following each child's lead and modeling throughout the school day). This, of course, can be managed if partners apply training principles more intermittently. A seminal evidence-based limited-structured intervention example is the System for Augmenting Language (SAL; Romski & Sevcik, 1996; Romski, Sevcik, Cheslock, & Barton-Hulsey, 2016).

SAL is a naturalistic communication intervention whereby partners model and expand communication attempts of learners. It has been applied by partners of children and adults with severe disabilities who use AAC devices and systems. Although SAL focuses on using AAC systems, the basic tenet of the intervention is to model using the learner's device or system during natural interactions. Other extant communication forms are also modeled and expanded. Research data have been quite supportive, revealing substantial gains in expressive communication among SAL participants (Sevcik, 2006). A limited-structured intervention very similar to SAL is Aided Language Stimulation (ALS; Harris & Riechle, 2004). Both SAL and ALS are considered to be functional intervention options.

## Partner-Focused Intervention Strategies

Partner-focused interventions emphasize training communication partners to increase communication opportunities, consistent partner responses to communication attempts, and learner initiations (Shire & Jones, 2015). Partner interventions can be an effective means of extending the impact of communication intervention.

Several practices for training communication partners to support interactions have been demonstrated to be effective (Bingham, Spooner, & Browder, 2007; Pennington, 2009; Shire & Jones, 2015). Many of these, such as PECS (Ganz et al., 2013; Howlin, Gordon, Pasco, Wade, & Charman, 2007); EMT (Nunes & Hanline, 2007; Pennington, 2009); and ALS (Binger, Kent-Walsh, Berens, del Campo, & Rivera, 2008) focus on the partner's role within established learner interventions. Studies have also emphasized the communication partner's role in shared book reading (Kent-Walsh, Binger, & Hasham, 2010; Koppenhaver, Erickson, & Skotko, 2010), a semi-structured intervention implemented in home and school contexts with learners across a wide range of ages.

An interesting seminal example of a partner-focused intervention for students who are pre/non-symbolic is the van Dijk approach (Ogletree, 1995). This intervention initially relies heavily on partner interpretations of unconventional behaviors during movement activities as a means of shaping these behaviors into more intentional forms. Using movement to encourage communication has long been a practice of interest (Siegel-Causey & Guess, 1989; Sternberg, McNerney, & Pegnatore, 1987).

The van Dijk approach is a movement-based method designed to establish rapport with the learner and encourage using early communicative forms (MacFarland, 1995; Westling, Fox, & Carter, 2015). The approach is primarily used with individuals with deaf-blindness but can be used with children with other disabilities (e.g., severe disabilities and autism). In initial van Dijk

instruction, communication partners join in learner movements as a means of turn taking and resonating with the child. For example, the child begins to rock back and forth, and the partner does as well. As the child stops, the partner stops. The learner begins rocking again, and the partner mimics the learner. After a pattern has been developed, the communication partner begins to insert pauses into the routines. Pauses serve as cues to the learner to signal for "more" through gestures, vocalizations, and, over time, more sophisticated communicative forms. The approach gradually physically and temporally distances the learner from the partner to promote intentional communicative behaviors.

The van Dijk approach is a partner intervention in that it is premised on the recognition of and response to potential or idiosyncratic communicative behaviors. As partners respond contingently to communication (perceived or actual), they encourage more interactive behaviors and create an environment conducive to other more directive learner-focused instructional methods.

**Environment-Focused Intervention**

Interventions that address the environment typically either identify and remove barriers to communication or interject communication opportunities. Environmental interventions are generally informed by ecological and participation inventories (see p. 18 for environment-focused assessment details).

Beukelman and Mirenda (2013) described a host of potential barriers to communication, including those related to opportunity and access. Opportunity barriers may be associated with restrictive policies (e.g., toilet-training requirements); the limited knowledge and skills of trainers; and non-supportive trainer attitudes. In contrast, access barriers can include restrictions specific to the physical layout of the classroom (e.g., no wheelchair access or incorrect table

height) or difficulties associated with instructional materials or methods (e.g., print size, loudness levels).

Environmental interventions related to barriers are typically implemented as barriers are identified. In the case of opportunity barriers, interventions may take the form of addressing policies, educating staff, and incentivizing trainers. With access barriers, interventions involve physical and instructional modifications. In all cases, environmental interventions are closely tied to environmental assessment and occur in an ongoing fashion.

Opportunity-related environmental interventions are generally designed to increase student engagement and participation throughout the day. Again, the need for communication opportunity emerges during environmental assessment, specifically as participation inventories are conducted. As new opportunities for communication are identified throughout the student's day, a range of structured to less structured inventions can be introduced within typical routines. One simple intervention often used to increase opportunity is choice making. Choice making crosses learner-, partner-, and environment-focused categories of intervention.

Teaching choice making is a well-established practice for teaching communicative intent and the connection between a symbol and its referent (Rowland & Schweigert, 2000). It involves conducting a preference inventory, pairing preferred symbols with their referent, offering a choice of items within typical activities and routines, and providing immediate reinforcement following the selection. Natural reinforcement strategies should be used and may include access to an item or time to engage in the selected activity (Clark & McDonnell, 2008; Rowland & Schweigert, 2000).

A large component of choice making is identifying choice opportunities within a student's daily environments. Such identification will require a careful review of the various

unexpected and recurring events and activities for students. Too often, these reviews identify missed opportunities (i.e., times when teachers or other stakeholders act for students) for choice making that can be targeted by the intervention team.

## Other Thoughts About Intervention

Before providing teacher takeaways specific to communication intervention for students with severe disabilities, a few additional considerations are necessary. For example, how does AAC fall into the continuum of structured to limited-structured interventions described above? Furthermore, how does the communication-intervention team assist with other instructional areas such as behavior replacement, feeding, and literacy instruction? Finally, what do data say about intervention efficacy with this population, and are some interventions along the structure continuum preferred for specific learners?

### Augmentative/Alternative Communication

AAC is best described as an area of clinical practice that attempts to "compensate for temporary or permanent impairments, activity limitations, and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension, including spoken and written modes of communication" (Beukelman & Mirenda, 2013, p. 4). Clearly, AAC is applicable for many individuals with severe disabilities. In fact, its broad-based use with this population has made AAC access a featured right in CBOR published by the NJC (Brady et al., 2016).

First and foremost, AAC interventions should be available for all students with severe disabilities regardless of their communication levels. For too long, students have been denied AAC access due to assumptions based upon the notion of required prerequisite behaviors. Research does not support this idea.

After AAC services are ensured, the communication-intervention team makes a host of decisions based upon the student's abilities and needs. AAC communication interventions for most students with severe disabilities range from unaided options, such as training the use of or understanding gestures or signs, to expressive and receptive applications with dedicated communication devices (e.g., communication rings, wallets, boards, SGDs). AAC systems utilize signals (e.g., gestures) and symbols (e.g., signs, objects, photographs, line drawing, scenes, print) and lend themselves to both structured and unstructured intervention options.

AAC is often a critical component of study transition throughout the school years. Student success depends upon effective information sharing regarding devices and systems (Romski, Sevcik, Barton-Husley, & Whitmore, 2015). Focusing on students' speech alone during transitions may be tempting because AAC systems are less familiar to new providers, but doing so may compromise student success.

Three common AAC applications for students with severe disabilities are described below. Another of these applications, SAL, was presented earlier.

**Picture/object calendars and schedules.** Picture or object calendars and schedules are examples of EBPs used to teach the meaning of symbols within daily activities and routines (Arthur-Kelly, Sigafoos, Green, Mathisen, & Arthur-Kelly, 2009; Siegel-Causey & Guess, 1989). With calendars and schedules, items or pictures representing an activity are presented as the learner transitions to activities. The goal is for the learner to understand the association between the object/picture and the activity it represents. The symbols can be concrete (e.g., an actual paintbrush to indicate painting) or more abstract such as a line drawing of a lunch box to indicate lunch time. When the association is supported in a consistent manner, the learner can begin to use these symbols with communication systems/devices.

**Speech-generating devices.** SGDs are portable communication systems that provide either synthetic or recorded voice output. Some are simple and offer single messages (e.g., the BigMACK device by Ablenet) while others (e.g., tablet devices [iPad] and high-tech systems [the Tobii device by Dynavox]) allow for complex messages and alternate forms of access (e.g., eye gaze). A variety of SGDs have applications for students with severe disabilities, and reasonable evidence exists supporting their use to promote communicative competence (Ganz et al., 2011; Rispoli, Franco, van der Meer, Lang, & Camargo, 2010; Schlosser, Sigafoos, & Koul, 2009). Although research emphasizes using SGDs for initiations and requests (Boesch et al., 2013; van der Meer, Sutherland, O'Reilly, Lancioni, & Sigafoos, 2012), most SGDs allow for greater expressive complexity (Ostryn, Wolfe, & Rusch, 2008). In addition, some evidence indicates that voice feedback offered through SGDs may support literacy-skills development (Blischak, Lombardino, & Dyson, 2003; Brady, 2000). One must remember that using SGDs often necessitates a measure of partner training and technical support (Baxter, Enderby, Evans, & Judge, 2012).

A feature unique to some SGDs is the ability to use predictive technology to anticipate which words/symbols are likely to come next in a sequence, thus reducing the demand placed on the learner to navigate between many pages. This predictive technology supports expanding and using language by combining several words/symbols (Drager & Light, 2010; Garcia, De Oliveira, De Matos, 2014; Hanson, Beukelman, Heidemann, & Shutts-Johnson, 2010).

**Visual scene displays.** Visual scene displays utilize photographs or images of familiar scenes, objects, or people displayed on a tablet, touch-screen computer, or dynamic-display device (e.g., touch screens that allow a child to access a large amount of vocabulary in one AAC system). A learner can touch a hot spot on the picture to communicate a message related to the

scene. One of the primary advantages of this approach is that messages are taught in the context of a familiar picture rather than on a grid-based layout. The contextual cues embedded in the picture aid in developing vocabulary. Although this approach does not lend itself to expanding vocabulary beyond these concrete and predetermined messages, evidence suggests that the practice is effective among learners who are emerging in their understanding that pictures/symbols carry meaning (Ganz, Hong, Gilliland, Morin, & Svenkerud, 2015; Gevarter et al., 2014; Olin, Reichle, Johnson, & Monn, 2010).

**Behavior Replacement**

During the assessment process previously described, the assessment team may identify student behaviors that convey communicative intent. Such behaviors may have been a central concern of those referring for assessment or may have surfaced during standardized or non-standardized test administration. In either case, functional analyses of behavior (FAB) may be introduced to determine what occurs before (i.e., antecedent) and immediately after (i.e., consequences) behaviors (Hanley, Iwata, & McCord, 2003). Findings from such analysis can provide insight into behavioral intervention targets. For example, throwing a tantrum may be determined to serve an escape function, allowing a student to avoid academic instruction.

When behaviors are identified through FAB, the intervention team can target them for replacement. Beukelman and Mirenda (2013) suggested that behavior-replacement efforts are most successful when functionally equivalent forms are identified, when replacement forms are as easy to produce as old forms, and when the student's environment is modified to reduce the likelihood of occurrence of concerning behaviors. Typically, behavior replacement is taught using more structured intervention efforts.

**Feeding and Swallowing**

Teams serving students with severe disabilities often implement learner, partner, and environmental intervention goals to improve abilities in the areas of feeding and swallowing. Intervention is guided by a child's feeding safety, functional skills, quality of life, and ability to take nutrition by mouth (ASHA, 2001). Interventions typically involve direct management by the SLP or another qualified team member and/or may include partner and environmental modifications such as alterations in feeding intervals/methods as well as adjustments of solid and liquid intake. Seminal data suggest that feeding and swallowing interventions can contribute to decreased morbidity, gains in nutrition, and increased energy in individuals with severe disabilities (Schwarz et al., 2001).

**Literacy**

Increasingly, the communication-intervention team for students with severe disabilities provides assistance with this population's emergent literacy needs. Karen Erickson and David Koppenhaver (1995) offered early guidance in this area through their discussion of *light* and *high* technology to infuse basic literacy activities into ongoing instruction. These researchers also used available computer software and group activities to promote literacy-related skill acquisition (e.g., spelling and modeled writing).

More recently, Erickson (2017) described comprehensive emergent and conventional literacy instruction for students with severe disabilities as a part of a special issue of the *American Journal of Speech-Language Pathology* dedicated to interprofessional collaborative practice and the roles of team members in planning and delivering instruction. She reviewed the critical need to present students with reading and writing opportunities (e.g., independent and shared reading experiences and independent and co-constructed writing) and discussed instructional modifications and participation strategies to promote success across partners and

environments. Clearly, exposing students with severe disabilities to print experiences is both a right and a necessity, and we must all commit to meeting the literacy needs of this special population.

**Intervention Efficacy and Preferences for Students With Severe Disabilities**

Although practitioners and stakeholders have long observed the positive impacts of communication-based interventionss for individuals with severe disabilities, until recently, few large-scale studies considering intervention efficacy with this population existed. In 2010, this void in research changed with Snell and colleagues' (2010) publication of a 20-year summary of research findings specific to intervention. A database including 116 studies and 460 individuals with severe disabilities was evaluated across a host of dependent variables, including improvements in expressive abilities. Subjects presented a range of communicative abilities (pre/non-symbolic to symbolic) and participated in varied learner-focused interventions (e.g., structured, semi-structured, and limited structured). More than 97% of studies reported positive and immediate results with trained skills after introducing intervention. Although many interventions employed with subjects in the sample included partner and environmental components, the effectiveness of more isolated examples of these types of interventions awaits additional study.

Snell and colleagues' (2010) work provides strong evidence for using communication-based interventions with students with severe disabilities. The question of intervention choice remains unanswered, however, as providers have a plethora of available intervention options.

As previously described, the communicative abilities of students with severe disabilities can be described as pre/non-symbolic and symbolic. Pre/non-symbolic communicators express themselves with intentional or non-intentional non-symbolic behaviors that others interpret.

These individuals are typically observed to use gestures, movements, expressions, vocalizations, and behaviors to convey regulatory communicative functions such as protests and requests. To the contrary, symbolic communicators use recognizable symbols (e.g., speech, objects, photographs, print, Braille) to express regulatory and other functions such as comments, greetings, or requests for information. Symbolic communicators may even be capable of complex multisymbol constructions. Both pre/non-symbolic and symbolic communicators can be expected to demonstrate communication/language comprehension ranging from no (or simple) responses to environmental stimuli to an understanding of basic word order.

Questioning whether the interventions described in previous sections are more applicable to one or the other of our two groups of communicators is reasonable. First, learner interventions implementing AAC or addressing behavior, feeding and swallowing, and literacy are applicable to all students regardless of their communicative level. Remember, AAC or literacy prerequisites do not exist. All students can benefit from interventions with these emphases. Of course, feeding and swallowing interventions and those addressing behaviors will be directed to students with these specific needs.

Partner and environmental interventions previously described and reviewed also apply to all students with severe disabilities. Obviously, these interventions will stress different goals depending upon a learner's communicative functioning and needs.

In contrast, structured and semi-structured learner-focused interventions appear to work well for pre/non-symbolic students, especially those with intentional communicative abilities (Warren & Yoder, 1998), which likely relates to learners' need for structure given their passive nature. Interestingly, less structured interventions have been shown to be most effective with

learners who are symbolic and more actively engaged in their environments (Romski et al., 2016; Wilcox & Shannon, 1998).

At this point, a formula does not exist for applying interventions based on communication complexity and/or intervention structure. Decisions regarding more or less structured interventions involves a host of variables such as family/stakeholder preferences and individual student needs.

## Teacher Takeaways Related to Communication Interventions for Students With Severe Disabilities

The importance of teachers as intervention team members cannot be overstated. Simply put, no one other than family members, aides, or direct-care staff members will have more daily contact with students with severe disabilities than teachers. Given this group's unique position at the front line of ongoing instruction and interaction, teacher communication-intervention takeaways for this population are plentiful. Below are two general intervention roles and responsibilities for teachers as well as several evidence-based instructional suggestions for ongoing use. See Table 2 for a full list of teacher takeaways for communication intervention.

Table 2

*Teacher Takeaways for Communication Intervention*

| | Teacher Takeaways |
|---|---|
| 1 | Teachers should come to the team process prepared to function as collaborative partners. |
| 2 | Teachers should know what is expected of them as team members assisting with communication assessment or intervention. When roles are not clear, teachers must ask for clarification from the SLP and team at large. |
| 3 | Teachers are in the ideal position to utilize systematic instructional techniques. In doing so, teachers are in a unique position to monitor progress and provide feedback regarding needs for change in intervention procedures. |

| | |
|---|---|
| 4 | Teachers should know their students' motivations and preferences. |
| 5 | Teachers should provide ample and meaningful practice opportunities to address communication-intervention targets. |
| 6 | Teachers should find opportunities to sabotage the environments of students. |
| 7 | Teachers should find opportunities to wait for students to respond throughout the day. |
| 8 | Teachers should engage students and apply intervention strategies in real-world settings. |
| 9 | Teachers should implement intervention strategies in a manner consistent with skill generalization. |
| 10 | Teachers should assist other team members with ensuring that communication intervention is implemented in natural school contexts in ways consistent with students' IEPs and, when possible, in pursuit of general education curricular outcomes. |

**General Intervention Takeaways**

**Be active on the intervention team**. Teachers are vital intervention team members. Simply stated, their participation is central to many decisions about intervention, and they will often be the primary intervention agents leading activities to build communicative competence.

Although SLPs may take the lead while selecting specific interventions and goals for individual student's IEPs, engaged teachers on intervention teams have the potential to make critical contributions to improve intervention effectiveness. For example, teachers' knowledge of student likes and dislikes can inform reinforcement choices. Likewise, their understanding of behavior states (e.g., fatigue, illness, agitation) can maximize intervention scheduling. Finally, teachers' unique perspectives about classroom schedules/dynamics and potential student pairings

for intervention groups can create socially valid intervention opportunities that will lead to skill generalization (see discussion later in this section).

Aside from the assistance described above, teachers will often be the primary intervention providers for students in their classrooms. Team participation will ready them for this task by providing familiarity with recommended techniques and strategies (e.g., specific interventions and support ideas such as seating and positioning tips).

The most effective intervention teams will be those that keep lines of communication open and hold paramount the welfare of the children served. Our first intervention takeaway is to come to the team process prepared to function as a collaborative partner.

**Know roles in intervention implementation**. Whether involved in learner-, partner-, or environment-focused intervention efforts, teachers should be knowledgeable about their roles in intervention, which will require close consultation with the SLP and other team members. Intervention roles may vary from the direct implementation of intervention sequences to the general application of strategies. Teachers involved as intervention agents should keep communication lines open with the team at large to allow for feedback and clarification when needed and to offer performance data to support intervention continuance or modification. Our second intervention takeaway is that teachers should know what is expected of them as team members assisting with communication assessment or intervention. When roles are not clear, teachers must ask for clarification from the SLP and team at large.

**Specific Evidence-Based Intervention Takeaways**

Teachers in most instructional settings can employ many evidence-based instructional principles or tips. Successfully implementing these may require discussion and guidance from the intervention team at large. Ideas are provided below.

**Utilize systematic instruction.** Systematic instruction is a set of instructional procedures

to help learners acquire new skills. The process begins with clearly defining the target skill in a way that is observable and measurable (Snell, Brown, & McDonnell, 2016). Target skills may represent discrete behaviors (e.g., touching the switch to ask for help); continuous behaviors (e.g., engaging in several turn-taking communication exchanges); or complex behaviors that require the learner to complete several steps (e.g., completing a task using a visual task analysis). After the target response is clearly defined, the next step is to teach the skill using modeling, prompting, differential reinforcement, shaping procedures, errorless learning strategies, and error correction. In sum, systematic instruction has a robust literature base and is considered an EBP for learners with severe disabilities (Browder, Wood, Thompson, & Ribuffo, 2014; Spooner, Browder, & Mims, 2011).

Teachers frequently use two of the techniques mentioned above (modeling and promoting) to promote communication. Modeling consists of demonstrating, saying, or showing the learner the expected response. Instructional prompts are behaviors the communication partner uses to elicit a correct response. Prompts can include using gestures (e.g., pointing to the picture the learner is to pick up); verbal cues (e.g., telling the learner to "grab this picture"); or physical prompts, including nudging/guiding the learners' arm toward the picture or helping the learner to pick up the picture using full physical guidance (Downing, 2010; Snell et al., 2016; Westling et al., 2015).

Prompting systems provide an overarching structure of how the prompts will be used. For example, in a least-to-most prompting system, a set of three to four prompts are identified and organized in a hierarchy from least to most supportive (e.g., indirect verbal cue, gesture cue, gesture cue plus direct verbal cue, and, finally, a partial physical prompt). The communication opportunity is presented, and the communication partner waits for a response. If the learner does

not respond, the first-level prompt is provided. Additional wait time is given, and if the learner still does not respond, the second-level prompt is provided. This sequence continues until the learner displays the target response. Other prompting systems include most-to-least prompting, constant or progressive time delay, and simultaneous prompting (Downing, 2010; Snell et al., 2016; Westling et al., 2015). The third takeaway is simple: Teachers are in the ideal position to utilize systematic instructional techniques.

**Determine and add to students' communication motivation and preferences.** People communicate because they have a reason for doing so. Therefore, the importance of teaching communication skills in the natural settings where needs abound cannot be overstated (Coogle, Floyd, Hanline, & Kellner-Hoczewski, 2013). However, simply being in a natural environment does not necessarily provide a reason or motivation to communicate. In fact, at times, motivations in all settings may be unclear, requiring data collection and hypothesis testing.

Teams must consider both forms and functions for communication that are motivating for the individual receiving communication support. For example, Micah pulls hair (i.e., form) to gain the attention of adults and peers (i.e., function). Because Micah's current form for communicating his interest in others is problematic in a classroom setting, teaching additional communication skills for gaining the attention of others becomes a priority (Peckham-Hardin, 2015). Rather than pulling hair, Micah learns to initiate an interaction by showing (e.g., holding up) favorite items from home (e.g., keychain, DVD case, photo album) to his peers, who then sit with him and talk to him about the items (see earlier behavior replacement).

In another example, Lita's significant motor challenges make pointing difficult. She employs partner-assisted scanning using a communication book. Although high-tech devices that make use of eye-tracking technology are available, Lita has been frustrated by these systems

and prefers to work with the support of adults and peers to use her communication book. With both students, motivation is considered from the outset, and the students engage in meaningful communication exchanges using methods that match their preferences and skills.

Clearly, teachers are in a unique position to provide team input specific to student motivation and preference. Teachers can also systematically add motivating experiences through trial and error. The fourth takeaway is for teachers to know their students' motivations and preferences.

**Provide multiple opportunities to practice.** Teaching and refining communication skills must include explicit teaching for how a student is to communicate a message (e.g., smiling, pointing to a picture, eye gaze; Beukelman & Mirenda, 2013). At times, developing accuracy with a particular form requires extensive time and practice. Thus, many opportunities to practice meaningful use of the target form must be embedded throughout an individual's day in a variety of activities (Downing & Eichinger, 2003). While refining forms for communication, the principle of response efficiency should be considered. Essentially, the target form should provide the greatest reinforcement for a communicative attempt requiring the least amount of effort in comparison to other potential forms (Horner & Day, 1991; Johnson, 2006).

Again, due to the time teachers spend with students with severe disabilities, they are likely the front-line team member who will provide practice opportunities. Of course, for practice to be meaningful, it must reflect a clear understanding of intervention goals and methods. The fifth takeaway, then, is for teachers to provide ample and meaningful practice opportunities for communication-intervention targets.

**Consider sabotage.** The concept of sabotage, or environmental manipulation, can be applied to everyday home, work, and school routines (Westling et al., 2015). For example, the

routine of setting the table at home can be interrupted by ensuring that not all items are present (e.g., missing forks, only three instead of four plates). Assuming the child knows this routine well, she will notice that an item is missing, which serves as a communication opportunity for her to ask for the needed item. Similarly, in school, the routine of an arts and crafts activity can be interrupted by placing needed items out of reach and requiring the learner to seek assistance from a peer or adult. Finally, at work, the job of stocking shelves can be interrupted by handing the person the incorrect item and requiring that the employee (i.e., youth or adult with disabilities) recognize that the item is incorrect and ask for the correct item. Numerous ways exist to arrange the environment to elicit these types of communicative responses.

Time delay is a specific environmental manipulation strategy that sets up a communication exchange by offering the child an item of interest and waiting for the child to respond (Liber, Frea, & Symon, 2008; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002). A target response is identified, and the adult then engineers opportunities for the child to practice the response. For example, the mother gets her child's attention and holds a juice box in the child's line of vision. The mother looks at her child with an expectant look and waits for her child to respond. If the child responds, she gives the child the juice box (i.e., natural reinforcement). If her child does not respond, the mother can prompt or model the desired response. Over time, the communicative behavior is shaped through reinforcement of successive approximations to the target response (Westling et al., 2015). For example, if the target response was to sign juice, initially any attempt to form the sign is reinforced by giving the child juice. Eventually, only more accurate approximations of the sign are acknowledged and reinforced. Using highly desired items and offering choices helps to increase motivation to communicate. The sixth intervention teacher takeaway is to find opportunities to sabotage the

environments of students. Remember, environmental manipulation will be most effective when the student knows the routine in which the manipulation is introduced.

**Provide wait time**. In general, learners with severe disabilities need additional time to respond to verbal and non-verbal input (Johnson & Parker, 2013). Thus, providing wait time is an effective strategy to help elicit communicative responses. Johnson and Parker (2013) compared the effects of wait time while teaching three young children with visual impairments and developmental disabilities to complete a variety of tasks. The tasks included pointing to the correct picture (e.g., "find mommy"); turning on music; and writing on an iPad. In one condition, prompting occurred within 0 and 1 second following the request. In the second condition, the adult waited between 5 and 15 seconds before prompting. All three children completed more tasks under the wait-time condition.

Providing response wait time can be a very effective strategy for teachers and other stakeholders serving students with severe disabilities. The seventh takeaway is to find opportunities to wait for students to respond throughout the day. Doing so can increase communicative behaviors and lead to greater student autonomy.

**Work in natural settings.** To achieve communicative competence, individuals with communication challenges must utilize communication skills in a variety of settings and with multiple communication partners. Natural settings, such as general-education classrooms, the community, and the home, provide many opportunities for interactions with friends and family members as well as acquaintances, service people, and others. Several studies have found that embedded instruction in these settings supports both generalization and maintenance of new communication skills (Johnston, McDonnell, Nelson, & Magnavito, 2003; Sonnenmeier, McSheehan, & Jorgenson, 2005; Stoner, Angell, & Bailey, 2010). Calculator and Black (2009)

developed an inventory of best practices related to integrating AAC services into inclusive settings based upon analysis of current relevant research. The inventory emphasizes the importance of collaboration, planning, and family involvement in designing and implementing communication programs in general-education settings.

By teaching communication skills in the settings where they are necessary, access to integrated settings is promoted throughout the intervention process. The eighth takeaway, then, is to engage students and apply intervention strategies in real-world settings.

**Promote generalization.** The goal of communication intervention is not only to learn new skills, but to also use newly learned skills across settings, people, materials, and activities (Kaiser & Roberts, 2013). This outcome is referred to as a generalization of skills. Unfortunately, for learners with severe disabilities, the generalization of skills is not likely to occur unless it is specifically planned for while designing the intervention (Westling et al., 2015). In other words, generalization must be part of the intervention package from the start to ensure that learned skills are extended to non-intervention settings.

Several effective strategies to promote generalization have been identified over the years and include (a) teaching in natural contexts; (b) providing multiple exemplars; and (c) offering multiple opportunities to practice targeted skills across settings, people, tasks, and materials (Westling et al., 2015). Peterson (2007) completed an exhaustive review of published research in the area of naturalistic language training (NLT). This broad term includes strategies such as time delay, milieu teaching, mand-model, and incidental learning, some of which have been discussed in this IC. All of these strategies should include the effective components identified above (e.g., natural context and multiple opportunities to practice across different people, settings, and tasks). Peterson (2007) reviewed 57 articles that featured NLT approaches to

increase language and communication skills, with a focus on examining whether generalization and maintenance of skills occurred. Not all of the studies measured these outcomes. Of those that did, generalization of skills occurred in 96% of the studies, and maintenance of skills occurred in 86% of the studies. The ninth takeaway for teachers, then, is to implement intervention strategies in a manner consistent with skill generalization.

Related to skill generalization, the 10th and final teacher takeaway is that communication intervention should be implemented in a manner consistent with the execution of students' IEPs. That is, communication intervention should be seamlessly threaded throughout a student's school day and, whenever possible, tied to both socially valid communication outcomes and the pursuit of goals consistent with the general education curriculum.

## Guidelines for Teacher Preparation

This IC has reviewed EBPs designed to assess, teach, enhance, facilitate, and strengthen communication skills in learners with severe disabilities. This IC began by illuminating core values that should guide every teacher preparation program in severe disabilities. The central value that should guide teacher education is the fact that all individuals communicate and that everyone, regardless of functioning level, has the right to high-quality and effective communication intervention, including access to AAC. Teaching this central premise will ensure that teachers in preparation recognize and value students' current communication systems while simultaneously teaching and reinforcing new communication skills.

Ultimate success for teachers and others in preparation will require the understanding of concepts highlighted early in this IC, including interprofessional collaborative practice (IPCP), family centeredness, tri-focused framework, and EBPs. To prepare communication assessment and intervention team members to work effectively, teacher preparation efforts should also address basic information about emergent communicative abilities (both pre/non-symbolic and

symbolic) as well as teacher roles in communication assessment and intervention. Although thorough knowledge specific to communication-based assessment and intervention methods is unnecessary, teacher preparation should provide an adequate overview of seminal practices to prepare teachers for team functioning.

Table 3 summarizes the components, considerations, and EBPs reviewed in this IC, which are known to support communication skills for students with severe disabilities. Teacher-education faculty and others can use this table as both as a resource and to critique teacher-preparation and professional-development programs.

Table 3

*Summary of Evidence-Based Practices for Improving Communication Skills for Students with Severe Disabilities*

| Topic/Practice | Brief Description of Practice | Evidence/Citation(s) |
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| Core Beliefs That Guide Communication Assessment and Intervention for Learners With Severe Disabilities | • Communication Bill of Rights<br>• All individuals communicate<br>• No prerequisites to receive communication intervention<br>• Augmentative/alternative communication (AAC) available to all learners<br>• Least dangerous assumption should guide assessment and intervention | • ASHA; www.asha.org/public/outreach/bill_rights<br>• Donnelan, 1984<br>• NJC; http://www.asha.org/uploadedFiles/NJC-Communication-Bill-Rights-Poster.pdf |
| Communication Characteristics of Learners With Severe Disabilities | • Pre/non-symbolic: communication of learner does not include the use symbols<br>• Pre/non-symbolic levels: (a) pre-intentional, (b) intentional, (c) unconventional, and (d) conventional<br>• Symbolic: learner communicates using symbols<br>• Symbolic levels: (a) concrete, (b) abstract, and (c) language | • Brady et al., 2012<br>• Rowland, 2011<br>• Rowland & Schweigert, 1989, 2000<br>• Werner & Kaplan, 1984 |
| What Are EBPs and Why Are They Important? | • Practices supported through research that result in positive outcomes for learners with severe disabilities<br>• Individuals With Disabilities Act (IDEA) and Elementary & Secondary Education Act (ESEA) require educators to implement EBPs; Institutions of Higher Education (IHEs) are obligated to infuse these practices into teacher-preparation programs | • ASHA, 2005<br>• Council for Exceptional Children (CEC), 2014<br>• Every Student Succeeds Act (ESSA), 2002<br>• IDEA, 2004 |
| Team-Based, Family-Focused Approach to Assessment and Intervention | • Team based and family focused are EBPs<br>• Team begins with the individual and his or her family | • Cloninger, 2004<br>• Downing & Ryndak, 2015<br>• Ryndak, Lehr, Ward, & DeBevoise, 2013<br>• Soto & Yu, 2014 |

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| | • Potential additional team members: SLP, occupational therapist (OT), physical therapist (PT), deaf and hard of hearing (DHH) teacher, general education development (GED) teacher, special education (SPED) teacher, vision teacher, and others who know the learner well | |
| Tri-Focused Approach to Assessment and Intervention | Assessment and intervention take place within natural contexts across three levels: (a) learner with severe disabilities, (b) communication partners, and (c) environment | • Siegel & Wetherby, 2006<br>• Siegel-Causey & Bashinski, 1997 |
| Components of Communication | Form, function, content, and pragmatics | Downing, Peckham-Hardin, & Hanreddy, 2015 |
| Communication Competence | • Maintain high expectations<br>• Communication competence includes (a) linguistic, (b) operational, (c) social, and (d) strategic competence | • Hymes, 1972<br>• Light, 1989<br>• Light & McNaughton, 2014<br>• Teachman & Gibson, 2014 |
| Interventions | • Understand learners' current communication skills and preferences<br>• Design individualized interventions | • Downing, Peckham-Hardin, & Hanreddy, 2015<br>• Snell, Brown, & McDonnell, 2016<br>• Westling, Fox, & Carter, 2015 |
| Assessment Tools to Determine Use and Intentionality in Learners With Severe Disabilities | • CM: measures intentionality, use of symbols, and interaction skills within natural settings; can be used with learners of different abilities and ages; free to family, teachers, specialists<br>• CSBS: norm referenced; used with very young children (8-72 months) | • CM website: https://communicationmatrix.org/<br>• Prizant & Wetherby, 2003<br>• Rowland, 2004 |
| Interventions for Teaching Intentional Communication in Learners With Severe Disabilities | • Communicative intent defined as "dual orientation—orientation to both the communication partner and topic or referent"<br>• Intentional communication developed through consistent responding to pre-intentional behaviors<br>• van Dijk approach: movement-based method to teach turn taking and initiation | • Carter & Grunsell, 2001<br>• Cooper, Heron, & Heward, 2007<br>• Kaiser & Roberts, 2013<br>• Kaiser & Trent, 2007<br>• Lechago, Carr, Grow, Love, & Almason, 2010<br>• MacFarland, 1995<br>• Olive et al., 2007<br>• Westling, Fox, & Carter, 2015 |

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| | • EMT: designed to increase frequency and complexity of communication exchanges | |
| Intervention for Teaching Symbolic Communication in Learners With Severe Disabilities | • Many benefits to using symbols<br>• Picture/object calendars and schedules: teach meaning of symbols within the context of daily routines; teach association between symbol and activity<br>• Visual scene displays: photo or images of familiar scenes used on a touchscreen device; teaches vocabulary for familiar items, people, etc.<br>• Choice making: present preferred and non-preferred (or neutral) objects/activities; teaches intentionality and association between symbol and item/activity<br>• PECS: exchange of picture for item/activity; teaches initiation and association between symbol and item/activity; can advance to creating sentences by putting several concrete/abstract pictures together | • Arthur-Kelly, Sigafoos, Green, Mathisen, & Arthur-Kelly, 2009<br>• Boesch, Wendt, Subramian, & Hsu, 2013<br>• Bondy & Frost, 2009<br>• Clark & McDonnell, 2008<br>• Frost & Bondy, 2002<br>• Ganz, Hong, Gilliland, Morin, & Svenkerud, 2015<br>• Gevarter et al., 2014<br>• S. L. Hart & Banda, 2010<br>• Olin, Reichle, Johnson, & Monn, 2010<br>• Rowland & Schweigert, 2000<br>• Siegel-Causey & Guess, 1989<br>• Sulzer-Azaroff, Hoffman, Horton, Bondy, & Frost, 2009<br>• Tincani, 2004 |
| Interventions for Expanding Symbolic Communication in Learners With Severe Disabilities | • Core words: small set of words that can be used in a number of settings<br>• Teaching AAC through modeling: communication partner models use of AAC while interacting with learner<br>• Using text, word prediction, and initial sounds: teaching sounds of letters<br>• SGDs: portable devices that provide synthetic or recorded voice output<br>• Multi-modal communication: respecting all forms of communication (total communication approach) | • Baxter, Enderby, Evans, & Judge, 2012<br>• Beukelman & Mirenda, 2013<br>• Binger & Light, 2007<br>• Binger, Maquire-Marshall, & Kent-Walsh, 2011<br>• Blischak, Lombardino, & Dyson, 2003<br>• Boenisch & Soto, 2015<br>• Boesch, Wendt, Subramian, & Hsu, 2013<br>• Brady, 2000<br>• Campbell & Ramey, 2010<br>• Dada & Alant, 2009<br>• Dincer & Erbas, 2010<br>• Dodd & Gorey, 2014<br>• Drager et al., 2006 |

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| | | • Erickson & Clendon, 2009<br>• Erickson, King, & DeBaun, 2006<br>• Fallon, Light, McNaughton, Drager, & Hanner, 2004<br>• Ganz et al., 2011<br>• Hanser & Erickson, 2007<br>• Harris & Reichle, 2004<br>• P. Hart, Sherz, Apel, & Hodson, 2007<br>• Keen, 2003<br>• Kent-Walsh, Binger, & Hasham, 2010<br>• Koppenhaver & Williams, 2010<br>• Morrow, Mirenda, Beukelman, & Yorkston, 1993<br>• Ostryn, Wolfe, & Rusch, 2008<br>• Polloway, Miller, & Smith, 2012<br>• Rispoli, Franco, van der Meer, Lang, & Damargo, 2010<br>• Roche et al., 2014<br>• Rosa-Lugo & Kent-Walsh, 2008<br>• Rowland & Schweigert, 2000<br>• Schlosser, Sigafoos, & Koul, 2009<br>• Snodgrass, Stoner, & Angell, 2013<br>• van der Meer, Sutherland, O'Reily, Lancioni, & Sigafoos, 2012<br>• Venkatagiri, 2002<br>• Wendt, 2009 |
| Partner-Focused Assessment and Intervention Strategies | • Person-centered planning: tool to help teams identify critical communication goals important to the learner and his or her family<br>• Video analysis: used as both an assessment and teaching strategy; use recordings to help identify previously unrecognized communicative behaviors (often unconventional behaviors); teach others to recognize and respond to these behaviors | • Holburn, Jacobson, Vietze, Schwartz, & Sersen, 2000<br>• Kent-Walsh & McNaughton, 2005<br>• Lyle O'Brien, O'Brien, & Mount, 1997<br>• Ogletree, Bruce, Finch, Fahey, & McLean, 2011<br>• Renzaglia, Karvonen, Drasgow, & Stoxen, 2003<br>• Siegel & Wetherby, 2006 |

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| | • Gesture/communication dictionaries: documents that the communication partner can reference to understand function of unconventional forms of communication<br>• Communication partner training: emphasis on increasing communication opportunities, responding, and supporting initiations | |
| Environmental-Focused Assessment and Intervention Strategies | • Ecological and participation inventory: assessment tools designed to understand the communicative demands of typical routines and activities; understand the skills/abilities the learner currently has; identify potential skills to teach; detect potential environmental barriers; and articulate curricular, instructional, communicative, and/or environmental supports to increase learner success | • Beukelman & Mirenda, 2013<br>• Downing & Demchak, 2002<br>• Downing, Peckham-Hardin, Hanreddy, 2015 |
| Additional Teaching Considerations | • Systematic instruction: set of procedures to teach new skills<br>• Multiple opportunities to practice: embed teaching opportunities throughout the day<br>• Motivating students to communicate: purposely and strategically create communication opportunities<br>• Sabotage<br>• Time delay<br>• Wait time<br>• Natural settings: teach skills within natural contexts<br>• Promoting generalization: teach new skills across different settings, tasks, activities, and people | • Beukelman & Mirenda, 2013<br>• Browder, Wood, Thompson, & Ribuffo, 2014<br>• Calculator & Black, 2009<br>• Coogle, Floyd, Hanline, & Kellner-Hoczewski, 2013<br>• Downing, 2010<br>• Downing & Eichinger, 2003<br>• Horner & Day, 1991<br>• Johnson, 2006<br>• Johnson & Parker, 2013<br>• Johnston, McDonnel, Nelson, & Magnavito, 2003<br>• Kaiser & Roberts, 2013<br>• Liber, Frea, & Symon, 2008<br>• Peckham-Hardin, 2015<br>• Peterson, 2007<br>• Snell, Brown, & McDonnell, 2016<br>• Sonnenmeier, McSheehan, & Jorgenson, 2015<br>• Spooner, Browder, & Mims, 2011 |

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| | • Stoner, Angell, & Bailey, 2010<br>• Westling, Fox, & Carter, 2015<br>• Wolery, Anthony, Caldwell, Synder, & Morgante, 2002 |

Although this IC is not exhaustive in all aspects of communication-based assessment and intervention for students with severe disabilities, it provides an overview of critical evidence-based ideas and practices. Hopefully, all teachers in practice or preparation can use this and other information to develop their knowledge in this area and be a part of critically important communication services for this special population.

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Appendix A

Innovation Configuration for Preparing Teachers to Support Communication Skills in Students With Disabilities

| Essential Components | Implementation Levels | | | | |
|---|---|---|---|---|---|
| Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately. | **Level 0** | **Level 1** | **Level 2** | **Level 3** | **Rating** |
| | There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component. | Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz. | Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study. | Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship. | Rate each item as the number of the highest variation receiving an X under it. |
| **1.0 Knowledge of Expected Communication Abilities** | | | | | |
| 1.1 - Expected communicative abilities: Presymbolic.<br><br>1.2 - Expected communicative abilities: Symbolic. | | | | | |
| **2.0 Tri-Focused Framework** | | | | | |
| 1.1 - Tri-focused orientation. | | | | | |
| **3.0 Learner-Focused Assessment Process** | | | | | |
| 3.1 - Non-symbolic and symbolic communication assessment.<br><br>3.2 - The Communication Matrix (CM).<br><br>3.3 - The Communication and Symbolic Behavior Scales (CSBS). | | | | | |

| Essential Components | Implementation Levels | | | | |
|---|---|---|---|---|---|
| Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately. | **Level 0** | **Level 1** | **Level 2** | **Level 3** | **Rating** |
| | There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component. | Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz. | Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study. | Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship. | Rate each item as the number of the highest variation receiving an X under it. |
| **4.0 Learner-Focused Assessment** | | | | | |
| 4.1 - Determining expressive abilities (e.g., expressive use of communicative intent, use of symbols, use of behavior to express communication).<br><br>4.2 - Determining receptive abilities (e.g., understanding of non-symbolic and symbolic communication used by others). | | | | | |
| **5.0 Partner-Focused Assessment** | | | | | |
| 5.1 - Person-centered planning.<br><br>5.2 - Video analysis.<br><br>5.3 - Gesture/communication dictionaries.<br><br>5.4 - Ecological inventory.<br><br>5.5 - Participation inventory. | | | | | |

| Essential Components | Implementation Levels | | | | |
|---|---|---|---|---|---|
| Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately. | **Level 0** | **Level 1** | **Level 2** | **Level 3** | **Rating** |
| | There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component. | Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz. | Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study. | Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship. | Rate each item as the number of the highest variation receiving an X under it. |
| **6.0 Environmental Assessment** | | | | | |
| 6.1 - Assess students within the contexts in which communication occurs naturally.<br><br>6.2 - Determine the communication demands and performance in all learner environments. | | | | | |
| **7.0 Learner-Focused Interventions** | | | | | |
| 7.1 - Structured interventions (e.g., Picture Exchange Communication System [PECS]).<br><br>7.2 - Semi-structured interventions (e.g., enhanced milieu teaching [EMT]).<br><br>7.3 Limited-structured interventions (e.g., System for Augmenting Language [SAL]). | | | | | |

| Essential Components | Implementation Levels | | | | |
|---|---|---|---|---|---|
| Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately. | **Level 0** | **Level 1** | **Level 2** | **Level 3** | **Rating** |
| | There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component. | Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz. | Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study. | Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship. | Rate each item as the number of the highest variation receiving an X under it. |
| **8.0 Partner-Focused Interventions** | | | | | |
| 8.1 - van Dijk approach.<br><br>8.2 - Responsive communicative partners. | | | | | |
| **9.0 Environment-Focused Intervention** | | | | | |
| 9.1 - Providing opportunities.<br><br>9.2 - Choice making. | | | | | |
| **10.0 Other Interventions** | | | | | |
| 10.1 - Augmentative/alternative communication (AAC; e.g., speech-generating devices [SGDs], visual scene displays).<br><br>10.2 - Picture/object calendars and schedules.<br><br>10.3 - Behavior replacement.<br><br>10.4 - Feeding and swallowing.<br><br>10.5 - Literacy. | | | | | |

| Essential Components | Implementation Levels | | | | |
|---|---|---|---|---|---|
| Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately. | **Level 0** | **Level 1** | **Level 2** | **Level 3** | **Rating** |
| | There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component. | Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz. | Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study. | Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship. | Rate each item as the number of the highest variation receiving an X under it. |
| **11.0 Effective Practices** | | | | | |
| 11.1 - Collaborate with intervention team.<br><br>11.2 - Understand role in intervention process.<br><br>11.3 - Utilize systematic instruction.<br><br>11.4 - Motivate students and offer alternatives.<br><br>11.5 - Provide multiple opportunities for practice.<br><br>11.6 - Consider sabotage.<br><br>11.7 - Provide wait time.<br><br>11.8 - Work in natural settings.<br><br>11.9 - Promote generalization. | | | | | |

Appendix B

Terms and Practice Concepts

**Severe Disabilities**

The American Association on Intellectual and Developmental Disabilities (AAIDD; 2010) states that intellectual disability (ID) originates during the developmental period (before the age of 18) and is characterized by significant limitations in both intellectual functioning and adaptive behavior. Although categories of ID based on IQ have been discouraged since 1992, IQ continues to be reported and has been suggested to provide useful general expectations for stakeholders (Shapiro & Batshaw, 2013). The term *severe disabilities* has been used to describe a collective group of individuals with IQs below 40 (Westling, Fox, & Carter 2015) who have developmental skills consistent with functioning within the birth to 30-month range (Sternberg, Pegnatore, & Hill, 1983; Westling et al., 2015) and need significant assistance with daily activities (e.g., feeding, dressing, self-care, basic reading, writing, money manipulation). Obviously, this population is quite heterogeneous, and needs can range from total care to some degree of assistance with aforementioned life tasks. Finally, individuals with severe disabilities frequently present coexisting conditions that include, but are not limited to, heart defects, seizures, physical malformations, cerebral palsy, spina bifida, hearing loss, visual impairments, and other sensory deficits (Westling et al., 2015).

The Association for Persons with Severe Handicaps (TASH, 2017) stresses that individuals with severe disabilities need extensive and ongoing supports to participate in integrated life settings and enjoy a quality of life available to those without disabilities. Supports help with academic, communication, social, self-care, home care, and vocational-skill acquisition. For example, curricular and instructional modifications undergird the acquisition of literacy, math, writing, and problem-solving skills. Similarly, augmentative/alternative

communication (AAC) supports communication efforts through the expressive and receptive use of objects, photographs, sign language, line drawings, print, Braille, and videos accessed via assistive devices such as boards, simple switches, and more sophisticated communication aides. Other assistive technologies, including text-to-speech software, magnification, talking calculators, and hearing aids, support a wide range of other life needs. Finally, visual referents (e.g., pictorial task analyses) assist in completing everyday self-care, home care, and vocational tasks. In all support areas, systematic instruction with repeated opportunities to practice current and new skills helps individuals with severe disabilities to acquire, generalize, and maintain learned abilities (see p. 39 for description of systematic instruction).

**Interprofessional Collaborative Practice**

Providing optimal services and supports for individuals with severe disabilities requires a team of dedicated professionals and other stakeholders (Downing & Ryndak, 2015). Interprofessional Collaborative Practice (IPCP) teams work collaboratively to pursue high-quality care (World Health Organization [WHO], 2010).

Few settings are more prepared to create integrated care teams than today's schools. Professional school teams typically include, but are not limited to, educators, occupational and physical therapists (OT/PT), speech-language pathologists (SLP), teachers of the deaf and hard of hearing (TDHH), teachers of the visually impaired (TVI), social workers (SW), behavior specialists, and medical professionals. Stakeholder team members generally include the child with a disability, the parent or caregiver designee, and school administrators. Of course, team composition will vary based upon the needs of the student with disability. Typical responsibilities of team members and other stakeholders are described below.

**Educators**. General and special education teachers have expertise in curriculum and instruction. General educators have deep knowledge of core content, common-core standards, and thematic instruction while special educators combine expertise in curricular modifications and accommodations and systematic instruction designed to meet individualized learning needs. In addition, special education teachers often serve as team leaders and may play a key role in integrating team expertise into daily routines and activities. Clearly, teachers bring valuable assets to the team process.

**Related-services providers**. OTs and PTs have expertise in motor and movement disorders and specialized knowledge of assistive technology to address learning, communication, and physical needs. OTs have expertise in fine (i.e., small) motor skills while PTs specialize in gross (i.e., large) motor abilities. SLPs, in turn, have knowledge related to speech, language, and social-communication disorders and assist with assessing and designing effective intervention plans to enhance communication, language, feeding, and cognition. A TDHH supports the modification of curriculum and instruction to provide meaningful access to language and auditory information. Similarly, TVI and/or orientation-mobility specialists assist with determining functional vision (if any), making curricular adaptations, and helping learners with blindness/low vision navigate their environments safely. SWs inform the team's understanding of family issues and systems while identifying and accessing needed family services. Finally, behavior and medical specialists provide clarity regarding critical behavioral or health issues (e.g., aberrant behaviors, health diagnoses, intervention needs) that impact all areas of life.

**Stakeholders**. Of course, the student and family members or their designees are central members of the successful school team. Their priorities and needs should drive all decisions, including those related to communication assessment and intervention (see team discussion

below). Finally, the school administrator typically fills a support role by easing potential barriers to practice and assisting with the implementing recommendations.

**The Roles of Family Members on Interprofessional Collaborative Practice Teams**

A family-focused and culturally responsive approach to communication assessment and intervention reflects established evidence-based practice (EBP; Cloninger, 2004; Ryndak, Lehr, Ward, & DeBevioise, 2013; Soto & Yu, 2014). The overarching goal of assessment and intervention processes is to improve quality of life for the learner and family. Realizing this lofty goal requires a collaborative team that develops a collective vision, shares unique expertise and knowledge, and assists with creating, implementing, and evaluating intervention (Downing & Ryndak, 2015).

The team begins with the learner and family. Learners' and family members' preferences must be considered while designing assessment and intervention plans (Downing & Ryndak, 2015). For example, if a family member prefers to interact with the child in a certain way (e.g., speech and gestures only), these preferences should be honored. Similarly, understanding and respecting typical home habits, customs, and routines is essential. Family members can also help to articulate priority outcomes such as increasing participation in typical home and school activities (e.g., traditional family activities, school clubs); initiating and maintaining social interactions; and establishing a broader network of friends. Finally, families have a life-long perspective and can provide information related to past educational and intervention efforts, including strategies that have been both effective and ineffective.

**Cultural Issues in Service Delivery**

Students with severe disabilities come from diverse cultural and ethnic backgrounds that must be understood if service delivery is to be successful. School team members must be

cognizant of family beliefs that impact, among other things, communication assessment and intervention. These include, but are not limited to, cultural variances in language usage, differences in communication style, and varied perceptions of both the need for clinical/educational services and the family's role in such services (Rhodes & Washington, 2016). Finally, recognizing that many students with severe disabilities can learn more than one language through adequate exposure and instruction is important (Rhodes & Washington, 2016).

**Tri-Focused Approach to Assessment and Intervention**

Historically, assessment and intervention strategies have focused on the individual learner with little or no consideration for the contexts in which communication occurs. We now recognize the importance of broadening this perspective to include the partners interacting with the learner as well as the environments (i.e., settings) in which these interactions take place. Ellen Siegel and her colleagues labeled this encompassing perspective as a *tri-focused framework* and applied it to individuals with severe and multiple disabilities (Siegel & Wetherby, 2006; Siegel-Causey & Bashinski, 1997). In sum, a tri-focused framework is a holistic approach in which communication is viewed from the perspectives of the learner, the communication partner, and the environmental context.

Within this framework, the learner is the individual with a severe disability. Assessment and intervention targeting the learner provides information about current pre/non-symbolic and symbolic abilities and needs (see p. 8 for more on expected communication abilities). The communication partner is any individual interacting with the learner. Tri-focused processes evaluate and modify the quality of partners' engagements as they (a) acknowledge and give meaning to communicative expressions, (b) create communication opportunities, (c) enhance the learner's access to language through symbols, and (d) generally facilitate the learner's receptive

and expressive communication. Finally, tri-focused practices targeting environments assess and modify (a) opportunities to engage in communication exchanges (e.g., number of individuals in the immediate environment); (b) the degree to which the environment is interesting, motivating, and stimulating; (c) the availability of alternative forms of communication (e.g., alternative systems are readily available, easy to use, and understood by those in the setting); and (d) physical variables that may impact the learner's level of alertness and/or excitability (e.g., lighting, positioning, noise level).

**Evidence-Based Practices**

For the purpose of this IC, EBPs emerge from research efforts that employ strenuous peer-review processes. Quality peer review assists with the generation of well-designed and theoretically sound research methodologies that result in findings that inform clinical practices with confidence. Although websites (and many other sources) may identify and describe practice methods, they often lack sufficient peer review to be accepted as EBPs. In contrast, journal articles and book chapters can be valuable sources of scientifically supported information as they rely heavily on peer review. Hence, this IC makes exclusive use of evidence appearing in published peer-reviewed articles and chapters.

The communication-assessment practices and interventions described in this IC are drawn from evidence-based research in several fields with an emphasis on special education, speech-language pathology, and AAC. Both the Individuals with Disabilities Education Improvement Act (IDEA, 2004) and the Every Student Succeeds Act (ESSA, 2015) require that educators implement practices based on scientifically based research. Teachers in practice and institutions of higher education, then, have a responsibility to implement and teach educational

practices that are evidence based and likely to improve student outcomes when implemented with fidelity.

Appendix C

Recommended Practice and Supportive Research for Preparing Teachers to Support Communication Skills in Students With Disabilities

| Essential Components | Supportive Research |
|---|---|
| **General Knowledge** | |
| 1.0 Knowledge of Expected Communication Abilities<br><br>1.1 - Expected communicative abilities: Presymbolic.<br><br>1.2 - Expected communicative abilities: Symbolic. | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138.<br>Brady, N., & McLean, L. (2000). Emergent symbolic relations in speakers and nonspeakers. *Research in Developmental Disabilities, 21*, 197-214.<br>Brady, N. C., & McLean, L. K. (1996). Arbitrary symbol learning by adults with severe mental retardation: A comparison of lexigrams and printed words. *American Journal on Mental Retardation, 100*, 423-427.<br>Brady, N. C., McLean, J. E., McLean, L. S., & Johnston, S. (1995). Initiation and repair of intentional communication acts by adults with severe to profound cognitive disabilities. *Journal of Speech, Language, and Hearing Research, 38(6)*, 1334-1348.<br>McLean, J., McLean, L. K. S., Brady, N. C., & Etter, R. (1991). Communication profiles of two types of gesture using nonverbal persons with severe to profound mental retardation. *Journal of Speech and Hearing Research, 34*, 294-308.<br>Ogletree, B. T., Bruce, S., Finch, A., & Fahey, R. (2011). Recommended communication-based interventions for individuals with severe intellectual disabilities. *Communication Disorders Quarterly*, *32*(3), 164-175.<br>Ogletree, B. T., Wetherby, A. M., & Westling, D. L. (1992). Profile of the prelinguistic intentional communicative abilities of children with profound mental retardation. *American Journal on Mental Retardation*, *97*(2), 186-196. |

| Essential Components | Supportive Research |
|---|---|
| **Assessment** | |
| 2.0 Tri-focused framework.<br><br>2.1 - Tri-focused orientation. | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138.<br>Siegel, E., & Wetherby, A. (2006). Enhancing nonsymbolic communication. In M. Snell & F. Brown (Eds.), *Systematic instruction of persons with severe disabilities* (6th ed., pp. 405-446). Columbus, OH: Pearson/Merrill.<br>Siegel-Causey, E., & Bashinski, S. M. (1997). Enhancing initial communication and responsiveness of learners with multiple disabilities: A tri-focused framework for partners. *Focus on Autism and other Developmental Disabilities*, *12*(2), 105-120. |
| 3.0 Learner-Focused Assessment Process<br><br>3.1 - Non-symbolic and symbolic communication assessment.<br><br>3.2 - The Communication Matrix (CM).<br><br>3.3 - The Communication and Symbolic Behavior Scales (CSBS). | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138.<br>Communication Matrix: www.communicationmatrix.org<br>CSBS: http://www.brookespublishing.com/resource-center/screening-and-assessment/csbs/<br>Downing, J. E., Peckham-Hardin, K. D., & Hanreddy, A. (2015). Assessing communication skills. In J. E. Downing, A. Hanreddy, & K. D. Peckham-Hardin (Eds.), *Teaching communication skills to students with severe disabilities* (3rd ed., pp. 51-83). Baltimore, MD: Paul H. Brookes.<br>Rowland, C. (2011). Using the communication matrix to assess expressive skills in early communicators. *Communication Disorders Quarterly*, *32*, 190-201. doi:10.1177/1525740110394651 |

| Essential Components | Supportive Research |
|---|---|
| **Assessment** | |
| 4.0 Learner-Focused Assessment<br><br>4.1 - Determining expressive abilities (e.g., expressive of communicative intent, use of symbols, use of behavior to express communication).<br><br>4.2 - Determining receptive abilities (e.g., understanding of non-symbolic and symbolic communication used by others). | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138.<br>Ogletree, B. T. (2016). Measuring communication and language skills in individuals with severe intellectual disabilities. In R. A. Sevcik & M. A Romski (Eds.), *Communication interventions for individuals with severe disabilities* (pp. 281-298). Baltimore, MD: Paul H. Brookes.<br>Ogletree, B. T., & Price, J. (in submission). Nonstandardized evaluation of emergent communication in individuals with severe intellectual disabilities: Exploring existing options and proposing innovations. *Advances in Neurodevelopmental Disorders*, *2*(1), 38-48. |
| 5.0 Partner-Focused Assessment<br><br>5.1 - Person-centered planning.<br><br>5.2 - Video analysis.<br><br>5.3 - Gesture/communication dictionaries.<br><br>5.4 - Ecological inventory.<br><br>5.5 - Participation inventory. | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138.<br>Siegel, E., & Wetherby, A. (2006). Enhancing nonsymbolic communication. In M. Snell & F. Brown (Eds.), *Systematic instruction of persons with severe disabilities* (6th ed., pp. 405-446). Columbus, OH: Pearson/Merrill.<br>Sigafoos, J., & York, J. (1991). Using ecological inventories to promote functional communication. In J. Reichle, J. York, & J. Sigafoos, *Implementing augmentative and alternative communication: Strategies for learners severe disabilities* (pp. 61-70). Baltimore, MD: Paul H. Brookes. |

| Essential Components | Supportive Research |
|---|---|
| **Assessment** | |
| 6.0 Environmental Assessment<br><br>6.1 - Assess students within the contexts in which communication occurs naturally.<br><br>6.2 - Determine the communication demands and performance in all learner environments. | Brady, N., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, B. T., … & Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121-138. |
| **Intervention** | |
| 7.0 Learner-Focused Interventions<br><br>7.1 - Structured interventions (e.g., Picture Exchange Communication System [PECS].<br><br>7.2 - Semi-structured interventions (e.g., enhanced milieu teaching [EMT]).<br><br>7.3 - Limited-structured interventions (e.g., System for Augmenting Language SAL]). | Sevcik, R. S., & Romski, M. A. (2016). *Communication interventions for individuals with severe disabilities*. Baltimore, MD: Paul H. Brookes.<br>Snell, M., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., . . . & Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Association on Intellectual and Developmental Disabilities*, *115*(5), 364-380. doi:10.1352/1944-7558-115-5.364 |

| Essential Components | Supportive Research |
|---|---|
| **Intervention** | |
| 8.0 Partner-Focused Interventions<br><br>8.1 - van Dijk approach.<br><br>8.2 - Responsive communicative partners. | Chung, Y. C., Carter, E., & Sisco, L. (2012). A systematic review of interventions to increase peer interactions for students with complex communication challenges. *Research and Practice for Persons with Severe Disabilities*, *37*, 271-287.<br>Ogletree, B. T. (1995). Movement as a strategy to encourage prelanguage development: Have you tried it? *Focus on Autistic Behavior*, *9*(6), 12-15.<br>Ogletree, B. T., Bruce, S., Finch, A., & Fahey, R. (2011). Recommended communication-based interventions for individuals with severe intellectual disabilities. *Communication Disorders Quarterly*, *32*(3), 164-175. |
| 9.0 Environment-Focused Intervention<br><br>9.1 - Providing opportunities.<br><br>9.2 - Choice making. | Ogletree, B. T., Bruce, S., Finch, A., & Fahey, R. (2011). Recommended communication-based interventions for individuals with severe intellectual disabilities. *Communication Disorders Quarterly*, *32*(3), 164-175.<br>Snell, M., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., . . . & Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Association on Intellectual and Developmental Disabilities*, *115*(5), 364-380. doi:10.1352/1944-7558-115-5.364 |

| Essential Components | Supportive Research |
|---|---|
| **Intervention** | |
| 10.0 Other Interventions<br><br>10.1 - Augmentative/alternative communication (AAC; e.g., speech-generating devices [SGDs], visual scene displays).<br><br>10.2 - Picture/object calendars and schedules.<br><br>10.3 - Behavior replacement.<br><br>10.4 - Feeding and swallowing.<br><br>10.5 - Literacy. | Erickson, K. (2017). Comprehensive literacy instruction, interprofessional collaborative practice, and students with severe disabilities. *American Journal of Speech-Language Pathology*, *26*, 193-205.<br>Rispoli, M. J., Franco, J. H., van der Meer, L., Lang, R., & Camargo, S. P. H. (2010). The use of speech generating devices in communication interventions for individuals with developmental disabilities: A review of the literature. *Developmental Neurorehabilitation*, *13*, 276-293.<br>Schwartz, S. M., Corredor, J., Fischer-Medina, J., Cohen, J., & Rabinowitz, S. (2001). Diagnosis and treatment of feeding disorders in children with developmental disabilities. *Pediatrics*, *108*(3), 671-676.<br>Snell, M., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., . . . & Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Association on Intellectual and Developmental Disabilities*, *115*(5), 364-380. doi:10.1352/1944-7558-115-5.364 |
| 11.0 Effective Practices<br><br>11.1 - Collaborate with intervention team.<br><br>11.2 - Understand role in intervention process.<br><br>11.3 - Utilize systematic instruction.<br><br>11.4 - Motivate students and offer alternatives.<br><br>11.5 - Provide multiple opportunities for practice.<br><br>11.6 - Consider sabotage. | Calculator, S. N., & Black, T. (2009). Validation of an inventory of best practices in the provision of augmentative and alternative communication services to students with severe disabilities in general education classrooms. *American Journal of Speech-Language Pathology*, *18*, 329-342. doi:10.1044/1058-0360(2009/08-0065)<br>Peterson, P. (2007). Promoting generalization and maintenance of skills learned via natural language teaching. *The Journal of Speech-Language Pathology—Applied Behavior Analysis*, *2*(1), 99-123.<br>Snell, M., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., . . . & Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Association on Intellectual and Developmental Disabilities*, *115*(5), 364-380. doi:10.1352/1944-7558-115-5.364 |

| Essential Components | Supportive Research |
| --- | --- |
| **Intervention** | |
| 11.7 - Provide wait time.<br><br>11.8 - Work in natural settings.<br><br>11.9 - Promote generalization. | |