

Perspectives on Early Childhood Psychology and Education

Volume 5
Issue 2 *Strategies for Early Childhood
Education of Deaf and Hard of Hearing
Students*

Article 7

February 2023

Educational Strategies for Deaf Children with Autism Spectrum Disorder (ASD)

Aaron Shield

Patrick Graham

Raschelle Neild

Follow this and additional works at: <https://digitalcommons.pace.edu/perspectives>

Recommended Citation

Shield, Aaron; Graham, Patrick; and Neild, Raschelle (2023) "Educational Strategies for Deaf Children with Autism Spectrum Disorder (ASD)," *Perspectives on Early Childhood Psychology and Education*: Vol. 5: Iss. 2, Article 7.

DOI: <https://doi.org/10.58948/2834-8257.1062>

Available at: <https://digitalcommons.pace.edu/perspectives/vol5/iss2/7>

This Article is brought to you for free and open access by DigitalCommons@Pace. It has been accepted for inclusion in Perspectives on Early Childhood Psychology and Education by an authorized editor of DigitalCommons@Pace. For more information, please contact nmcguire@pace.edu.

Educational Strategies for Deaf Children with Autism Spectrum Disorder (ASD)

Aaron Shield, Patrick Graham, & Raschelle Neild

Abstract

In this paper we highlight some of the difficulties that deaf and hard-of-hearing (DHH) children with autism spectrum disorder (ASD) are likely to exhibit in the classroom, such as echolalia and insistence on sameness, deficits in perspective-taking and theory of mind, difficulty producing and comprehending facial expressions and pronouns, articulation difficulties, and challenges with social interaction. For each challenging area we propose educational strategies that teachers may find useful, including video modeling, visual schedules, Social Stories, Power Cards, and peer support groups. We encourage educators to be flexible and creative in their use of multiple teaching strategies with these children, so that we can meet our ultimate goal of serving students' diverse educational needs more effectively.

Keywords: *autism spectrum disorder, deafness, American Sign Language, theory of mind*

Background

Autism spectrum disorder (ASD) is a neurodevelopmental condition affecting social communication and interaction, characterized by restricted interests and repetitive behaviors (American Psychiatric Association, 2013). ASD is a spectrum condition encompassing a range of presentations, ranging from the very high functioning who present with fluent language to the more severe forms, resulting in a lack of expressive language and behavioral challenges.

Much attention has been paid to the increased estimates of ASD prevalence, which has risen steadily since the 1970s. Most recent estimates are that one in 59 children in the US has ASD (Centers for Disease Control, 2014). An identical prevalence estimate was found in deaf/hard-of-hearing (DHH) American children, based on the Gallaudet Research Institute annual survey from nearly 10 years prior (Szymanski et al., 2012). Although challenges remain in identifying ASD in DHH children due to a lack of appropriate, sign-adapted instruments (Mood & Shield, 2014), it is clear that ASD is not uncommon in either the general or DHH population.

Despite recent research, there are still minimal resources available for educators of DHH children with ASD (Borders et al., 2016, for a review). We aim to provide educators with some useful tools in the classroom when working with DHH children with ASD. Before proceeding to strategies, however, a few notes are in order.

First, DHH children come from a wide array of families and backgrounds, with approximately 95% of DHH children coming from hearing families (Mitchell & Karchmer, 2004). This diversity of family settings means that DHH children are often exposed to a variety of communication modalities, which can include speech only (aided or unaided), signed languages (e.g., American Sign Language, ASL, in Anglophone North America), manual communication systems based on English (i.e., Signing Exact English), or contact sign systems such as Pidgin Signed English or Sim-Com. DHH children may not have full access to spoken languages, even if they have hearing aids or cochlear implants, leading to increased risk of language deprivation (Hall, 2017). Given the social

challenges that are diagnostic of ASD and the language deficits that often result from such social challenges (Eigsti et al., 2011), DHH children with ASD may be at increased risk of language deprivation compared to other DHH children. Thus, the role of educational interventions with these children is even more crucial.

The second important aspect to note is that DHH children are educated in diverse educational settings. Over three-quarters of the children included in the most recently published Gallaudet Research Institute Annual Survey (Gallaudet Research Institute, 2011) were being educated in mainstream settings (that is, in neighborhood schools with hearing children rather than specialized schools for the deaf). DHH children in mainstream schools are more likely to report feeling socially isolated and tend to have fewer friends than their hearing peers (Nunes et al., 2001). Children with ASD are also likely to experience social isolation in mainstream school settings (Chamberlain et al., 2007). The combination of being DHH and having ASD for a child in a mainstream setting may lead to even greater social isolation. Thus, in this paper, we stress (among other things) the importance of fostering an inclusive classroom for such children, whether the classroom is in a mainstream setting or a specialized (deaf) school. This emphasis on inclusivity could be particularly important for early childhood education, as early educational experiences set the stage for the rest of the child's educational journey.

In the sections that follow, we emphasize several aspects of the linguistic and cognitive profile of DHH children with ASD. For each area, we offer some possible strategies for working with such children in the classroom.

Prior Research on the Use of Signs and Alternative Communication Systems with Children with ASD

It is interesting to consider the paucity of research on DHH children with ASD in light of the extensive literature on the use of manual signs with hearing children with ASD who have minimal expressive spoken language skills. These signs are usually borrowed

from an established signed language like ASL, but are simplified and used in isolation, simultaneous communication with English words, and without ASL syntax. In general, these studies have shown that these children may have some ability to communicate using manual signs, despite difficulties with speech (Bonvillian et al., 1981; Carr, 1979, for reviews). Signs may be an effective communication tool for minimally verbal hearing children with severe ASD for several reasons: teachers and parents can mold children's hands in a way that the articulators of the vocal tract cannot, and signs can be held in space for an extended period of time, allowing for additional processing time, while words cannot (Jordan, 1990). Despite these seeming advantages, recent work (Shield et al., 2015) has shown that a significant proportion of deaf children with ASD also show minimal expressive ASL, despite lifelong exposure by their Deaf parents. Thus, while signs may be functional for some deaf and hearing children with ASD, it is clear that manual communication will not succeed for all children with ASD. In these cases, alternative and augmentative communication (AAC) systems are recommended, including but not limited to the Picture Exchange Communication System (PECS; Bondy & Frost, 1994) and BoardMaker. Additionally, children can use communication books with Velcro strips and add pictures to create simple sentences. While these strategies can be helpful for simple communication purposes, they do not seem as helpful for improving interactive academic and social dialogues.

Though alternative communication systems, such as using a token system for reinforcing desired behavior, may be successful in terms of behavioral intervention, they may not fully provide children with ASD with the tools necessary to engage in meaningful communication, nor do they ensure children's comprehension of social norms" (Borders et al., 2016). Delays in communication and language result in frustration for both communication partners (Ronski & Sevcik, 2005). DHH learners with ASD may need additional time to process language, which AAC allows and provides (Jones et al., 2006). Educators and researchers typically use the four aspects of communication frame-

work for organizing communication interventions with children with multiple disabilities (Bruce, 2002). Bruce and Borders (2015) suggest this same organization with children who are DHH and have ASD.

The four aspects of communication focus on mode, function, content, and context for any communication intervention selected. The framework requires professionals to understand individual needs and characteristics as they relate to other aspects of the individual's life, as well as their disability (Bruce & Borders, 2015). The framework seeks to recognize the relationship of the intervention to the individual, the environment, and the communication partner. Individuals who are DHH with ASD require communication and language models who can create a variety of language opportunities for them so that they can participate and engage in a variety of the communicative functions of language, not just to make requests (Olson et al., 1990).

In addition to this prior literature, there is nascent literature on the acquisition of signed languages by deaf children with ASD. These studies have taken place in the United Kingdom and the United States in the last 10 years, and have focused on deaf, signing children identified with ASD. In the UK, Denmark and colleagues have examined how deaf, signing children with ASD understand and produce facial expressions. In the US, Shield and colleagues have examined several facets of the linguistic and cognitive profile of deaf, signing children with ASD. In the sections below, we will briefly summarize this work and attempt to link it to educational strategies that can be used in the classroom. The facets of ASD that we focus on here are: echolalia and insistence on sameness, perspective-taking and theory of mind, the production and comprehension of facial expressions, the use of pronouns to refer to oneself and others, articulation difficulties, and challenges with social interaction.

Echolalia, Insistence on Sameness, Video Modeling, and Visual Schedules

Echolalia—repeating what others say in a conversationally inappropriate way—has been part of the linguistic profile of children

with ASD since Kanner's (1943) initial report, and echolalia is considered part of the diagnostic criteria for ASD (American Psychiatric Association, 2013). Echolalia may be immediate or delayed and can consist of a single word or short phrase that the child has heard from a source such as a speaker (i.e., a teacher, parent, etc.) or recorded media. Deaf, signing individuals with ASD have also been shown to be echolalic in sign: Poizner, Klima, and Bellugi (1990) documented the echolalic signing of an adult native signer with ASD, and Shield, Cooley, and Meier (2017) described how seven of 17 deaf, native-signing children with ASD echoed signs during interactions. These children had lower receptive language skills than the other ten children with ASD, suggesting that echolalia occurs in a subset of children with ASD who have limited language skills. Thus, echolalia is a repetitive behavior that occurs in both deaf and hearing children with ASD. Prizant and Duchan (1981) suggested echolalia may serve a communicative function and may also reflect the child with ASD's rote approach to language, as well as a preference for sameness and routine. Further determining the function of echolalic utterances is extremely important for educators, family members, and caregivers to understand how to best respond (Stiegler, 2015).

When considering pedagogical methods for DHH children with ASD, we encourage consistent instructional strategies, such as providing video-mediated instructions. Typically, teachers may provide directions using different words (or signs) and different facial expressions and body language, but this may be confusing for learners with ASD. We suggest recording the directions and then providing this input to the children. This way, they will get consistent exposure to the same directions. Words must be carefully chosen, and specific facial expressions can be emphasized. Video-cued directions provide consistency and possibility for repetition that may facilitate the child's accessing of information.

The use of video modeling has been reported to be more effective than using live peer models in some instances (Darrow et al., 2016; McDowell et al., 2015) and is effective as a method of

instruction for DHH children with ASD (Hart & Whalon, 2012). Thrasher (2014) and Shukla-Mehta, Miller, and Callahan (2010) recommend three different strategies of video modeling: basic video modeling, self-video modeling, and point-of-view video modeling. Basic video modeling consists of providing a video of a peer signing the target sentence appropriately, either by initiating conversation or eliciting a response. Ideally, after students with ASD see this video, they should see the video of the response to or result of the first interaction. For example, when saying, "Hello, how are you?" the next video should show a different peer smiling and saying "Fine, thank you." This kind of video will allow the student with ASD to see an example of the full interaction. The second strategy (self-modeling) is for the student with ASD to make a video themselves practicing the interaction. They can return to watch their video and observe themselves doing the action itself.

The third strategy, point-of-view video modeling, facilitates understanding of interactions for both parties involved in the interaction. After the student records themselves giving or receiving instruction or directions, the receiver should record an immediate reaction to the direction or instruction. For example, if the DHH student with ASD gave the direction to drink water, the next video should be of the receiver drinking water. These can range from simple to complex, but the video should only last 40-60 seconds to maintain attention (Thrasher 2014).

In addition to preferring identical instructions and interactions, DHH students with ASD often have difficulty transitioning from one activity to the next and need structure and predictable routines (Bryan & Gast, 2000). Visual schedules help to support the development of communication (working on both expressive and receptive language, vocabulary and social interactions), behavior (assisting with predictability, fear of the unknown, and decreasing anxiety and stress), and independence (starting with the student's present level and building to increase responsibility and ownership – for example, by checking items off of a to-do list). Visual schedules have been used for over

30 years in a variety of ways to support students' learning needs. These supports can be used to sequence a day's events or show the steps needed to complete a specific task. Visual schedules create the structure that DHH children with ASD need to assist them with the transition between activities. Depending on the student's needs and developmental level, the schedule can be made static or interactive, and can incorporate real objects, photographs, drawings, or words.

Since visual schedules work to support language, social interactions, and transitions, they are a tool that can be used in many of the areas where DHH children with ASD need additional support. Visual schedules can help DHH children with ASD continue to build vocabulary and can help to reduce the anxiety which may contribute to echolalia (Neely et al., 2015). When using visual schedules, the intervention should include opportunities for the child to initiate communication, rather than primarily responding to questions and prompts (Blanc, 2012). Blanc (2012) suggested that interventions should allow opportunities to observe and assess the underlying functions of echolalic communication. Since visual schedules can be used in different ways throughout the day, they allow multiple opportunities for educators to observe children as they respond to everyday routines.

Rydell (2012) suggested that the intervention should engage the child in age-appropriate routines that vary in subjects, actions, locations, and objects. Visual schedules also allow for flexibility in the routine and can be changed as events in the daily routine change (e.g., field trips, assemblies, guests to the classroom, etc.). Opportunities should occur throughout the day to practice language with peers in a variety of meaningful ways in a natural environment (Blanc, 2012). Visual schedules are a part of the classroom that can become part of communication and conversation with peers.

Visual Perspective-Taking, Theory of Mind, Facial Expressions, and Social Stories

It has long been hypothesized that individuals with ASD struggle to understand the mental states of others, known as theory of

mind (Baron-Cohen et al., 1985), and similarly, some researchers have posited that individuals with ASD may also struggle to understand the visual perspectives of others (Hamilton et al., 2009). Visual perspective-taking could be especially crucial for DHH children with ASD who use a signed language to communicate because many aspects of ASL require perspective-taking, such as spatial depictions (describing where things are located), or even the direction of movement of certain verbs, such as “give” or “help.” To date, one study has shown that deaf signing children with ASD also struggle with theory of mind and visual perspective-taking: Shield, Pyers, Martin, and Tager-Flusberg (2016) found that the deaf children with ASD were unable to demonstrate comprehension of both visual perspectives and mental states of others, while a typically developing control group of deaf children with ASD did. Both groups performed equally well on a mental rotation task, which tested the children’s ability to mentally rotate objects in three-dimensional space. The fact that the children with ASD performed equally well on this spatial cognition task, but more poorly on the theory of mind and perspective-taking tasks, provided evidence that the children were impaired in their social cognition but not spatial cognition.

In addition to challenges with theory of mind and perspective-taking, it is well established that individuals with ASD have difficulties recognizing emotional facial expressions (Uljarevic & Hamilton, 2013), and these challenges appear to extend to deaf, signing children. The ability of signing children with ASD to recognize facial expressions is important not just for understanding affective emotions, but potentially also for comprehending grammatical morphemes conveyed by the face, such as questions, negation, adverbials, or even lexical information. To date, only a few studies have examined the face processing abilities of deaf, signing individuals with ASD. Denmark, Atkinson, Campbell, and Swettenham (2014) studied how deaf British adolescents with ASD could interpret emotional facial expressions during signing. They found that the children with ASD were significantly less accurate than age-,

language-, and IQ-matched controls at identifying emotions conveyed by facial expressions. In a follow-up study, Denmark, Atkinson, Campbell, and Swettenham (2019) studied how deaf children with ASD produced facial expressions during a signed narrative task. They found that the deaf children with ASD produced fewer expressions that corresponded to those produced by adult deaf signers (i.e., the expressions were of reduced quality) and fewer expressions for “demand” and “mischief” emotions relative to deaf controls (though they produced more expressions of “disgust” than controls). Thus, Denmark and colleagues suggest that exposure to sign language, and the practice that such exposure entails to the processing and production of facial expressions are not sufficient to preserve facial expression recognition and production abilities.

We propose using Social Stories to aid DHH children with ASD in taking others’ perspectives and using facial expressions.” A significant amount of research related to Social Stories shows that they can be an effective tool for children with ASD (e.g., Simpson, et al., 2005). Though research about the intervention’s effectiveness specifically for DHH children with ASD is currently lacking, the components of Social Stories may support DHH children’s needs in specific situations, given the research noted above.

Social Stories are short narratives written from the child’s perspective that describe a specific situation or event using print and pictures (Spencer et al., 2008). The stories describe the appropriate social behavior for a specific situation (e.g., how to order food in a restaurant) or general social skills such as turn-taking, which can be applied to different situations (e.g., board game, recess, waiting for a toy, or in line at the grocery store). Social Stories follow a specific sentence structure. The format entails a description of the situation (typically in 5-10 sentences), telling the student how to respond appropriately to the situation, sharing other individuals’ feelings and perspectives, and finally, a statement of the typical behaviors that should be used in the situation (Grey, 1995). Teachers are able to create Social Stories for students that include text, images, audio,

and video using apps such as Book Creator. The video can include the ASL version of the Social Story, which allows the student to have access to both ASL and English. DHH children with ASD who have difficulty understanding the facial expressions of ASL would have multiple opportunities to watch the videos that illustrate others' perspectives and serve as a model.

When the story is first introduced, the student will need support using the strategy to understand the skills and concepts being addressed. The child can then select to read the story/watch the video story with an adult or on their own. If the story's situation comes up throughout the day, be sure to refer back to the Social Story (asking questions about what might have been a better solution, how the other person might be feeling). It is important to remember to check the child with ASD's prior knowledge of specific concepts and terminology before using the specific vocabulary in Social Stories. Many deaf children may be getting minimal exposure to incidental language opportunities, which can impact the comprehension of what is happening in the social world around them (Morgan, 2015). Many children learn how to socialize with each other through direct and indirect conversations and social interactions (Morgan, 2015; Akhtar, 2005), which can be challenging for children with ASD. It is important to understand the child's level of knowledge of the situation when developing Social Stories.

Pronouns and Power Cards

Pronouns (words like "you" and "me" in English) have often been a target of therapy for children with ASD due to their apparent difficulties using them. In particular, young children with ASD have been known to use the second-person pronoun "you" to refer to themselves (Evans & Demuth, 2012; Kanner, 1943; Naigles et al., 2016) or to avoid pronouns altogether in favor of using proper names (Jordan, 1989; Lee et al., 1994). Pronouns in ASL are points with the index finger to self (first-person "me") or other (second-person "you" and third-person "he," "she," "it"), yet deaf, signing children have also

been found to avoid pronouns in favor of names (Shield et al., 2015). Despite one report of pronoun reversals in ASL by two typically-developing deaf toddlers (Petitto, 1987), pronoun reversals have yet to be documented in deaf, signing children with ASD, suggesting that such reversals may be less common in sign than they are in speech. For DHH children who have difficulty using sign pronouns, we suggest that Power Cards could be one strategy used in the classroom.

Power Cards are a visual aid that helps teach appropriate academic, organization, social interaction, and behavior skills that a DHH student with ASD might not fully grasp without direct instruction or prompting (Gagnon, 2002). The strategy uses a brief scenario of the skill or behavior being changed, replaced, or reinforced. It is written from the perspective of the student's special interest (e.g., SpongeBob), who provides a solution described in simple steps. The information is placed on a card the size of an index card or business card. On one side of the card, there is a picture of the learner's special interest, and on the other side of the card, there are 3-5 steps that should be followed (Gagnon, 2002). This strategy with the picture and words is beneficial to pre-readers and readers. For pre-readers, the picture of the special interest can serve as a reminder of what to do in the situation.

Since this strategy incorporates the special interest of the DHH learner with ASD and uses the character's perspective, the educator is able to focus attention on modeling and incorporating bilingual (ASL-English) strategies naturally so that the learner can become familiar with pronoun use with a character of interest. Two common bilingual strategies, sandwiching and chaining, would be simple to incorporate using Power Cards. Sandwiching in order to teach the use of a pronoun would involve fingerspelling the name of the character, pointing/using the pronoun, then fingerspelling the name again to reinforce the meaning of the pronoun. Chaining involves the production of the sign, followed by fingerspelling, pointing/pronoun, picture support, and the sign again. For some students, this

could be written out, and pictures could be incorporated to have the words and pictures to support the addition of the bilingual strategy.

Articulation, Peer Support Groups, and Video Modeling

Articulation is typically preserved in the speech of children with ASD, even when the same children have severe language impairments in other domains (Boucher, 2003; Kjelgaard & Tager-Flusberg, 2001). Interestingly, articulation errors appear to be more common in the signing of children with ASD than in speech. In particular, signing children with ASD have been found to sometimes reverse the direction of their hand while signing (particularly during fingerspelling) and imitating (Shield & Meier, 2012). Such errors have also been found in the imitation of gestures by hearing children with ASD, suggesting perspective-taking/imitation difficulties (Brown, 1996; Hobson & Lee, 1999; Ohta, 1987; Whiten & Brown, 1998). Recently, Shield and Meier (2018) reinterpreted this striking phenomenon as being reflective of a different approach to imitation known as *visual matching*: some children with ASD appear to imitate what they see from their perspective. Regardless of the origin of such errors, what is clear is that a subset of children with ASD produce signs that are unlike those of typical children by reversing the direction of their palm. Shield and Meier (2012) originally suggested that sitting next to the child rather than across from them could be helpful, and we repeat this suggestion here, given that children with ASD appear to have difficulty imitating and taking others' perspectives.

In addition to sitting next to the child, we suggest that peer-to-peer interaction strategies could foster inclusive learning and support the development of sign articulation. While Social Stories and visual schedules may help DHH students with ASD, children also need more interactive modeling to see these skills in action. A study by Peterson, Slaughter, Moore, and Wellman (2016) found that interactions between children can contribute to the development of theory of mind, as an essential component of cognitive development. Lederberg, Schick, and Spencer (2013) explain that deaf children may

not have anyone at home to converse with, since most DHH children have hearing parents (Mitchell & Karchmer, 2004) with whom they may not share a communication modality. These children may not have a chance to engage in incidental learning until they reach school. Part of incidental learning is learning to understand and comply with spoken and unspoken social rules. A study by Travis, Sigman, and Ruskin (2001) concluded that there was a correlation between how children with ASD interacted with peers and how they develop emotional intelligence and theory of mind from these interactions. We encourage the concept of peer interactions between one or two people with the student with ASD, so they can navigate through the social worlds of school and pick up incidental learning and social language.

Though significant research has been conducted about individuals with ASD and social skills, peer groups, and friendships, limited research has focused on DHH children with ASD. While children and teens often learn about friendships, other types of relationships and basic social rules through observation of peers, family members and direct instruction from parents, a child with ASD often needs explicit instruction, guidance, and practice (Langeson et al., 2008). By the end of first grade, most children have adapted to the school routine, classroom rules, schedules, and the environment and are successful at navigating the unspoken norms established by their peers (Frankel & Whitham, 2011). Children with ASD may begin to feel isolation and social rejection from multiple infractions of rules that they do not know, misinterpret, or do not remember. Children who are not included by their peers become more aggressive and isolated while withdrawing from social situations and their peers even more (Fredrickson & Turner, 2003).

To break the cycle of exclusion, multiple aspects of the social void must be addressed on both sides. The effort and focus should be placed on improving the social skills of the individual with ASD and on educating all of the students in the classroom (Buron & Wolfberg, 2014). Through alternating the skills, experiences, and perceptions of

all children, it is possible to narrow the gap between children with different hearing statuses, life experiences, and neurodevelopmental conditions. It will also allow a new classroom and school culture to emerge that is inclusive and unique in its ways of relating, communicating, and fostering relationships (Buron & Wolfberg, 2014).

Seeking interventions that support social skills and build lasting relationships while fostering inclusive learning and generalization of skills should be the ultimate goal of the classroom. Peer support groups like Circle of Friends or Friend 2 Friend (F2F) assist with making a meaningful home, school, and community connections. These support groups attempt to foster mutual relationships, develop understanding, and build capacity for acceptance and empathy in peers, siblings, and classmates (McCracken, 2004). Both programs are supported by research and use a systematic approach to educate individuals with ASD and their peer groups in an inclusive learning environment (Buron & Wolfberg, 2014). These programs also facilitate the inclusion of children with disabilities in the community.

Video modeling also can be beneficial for positive peer-to-peer interaction. When children with ASD watch social interactions through video and have an opportunity to practice these skills after seeing video repeatedly, they can use self-video modeling and have a teacher or paraprofessional film them going through the social interaction, and then they can watch this video before the next social event so they can remind themselves of the same interactions, and obtain feedback from these videos. An example can be seen from Macpherson, Charlop & Miltenberger's (2014) study on how children with ASD learned to use general compliments during athletic play. They found that when children with ASD watched videos of compliments on the iPad before they participated in athletic play, they were more likely to use the same compliments.

Final Considerations

This paper is intended as a preliminary list of suggestions for educators who have DHH children with ASD in their classrooms. While

the tools included here are by no means exhaustive, they may serve as a starting point for educators who are unsure of how to target skills that are challenging for children with ASD. We have attempted to link specific strategies to some aspects of the cognitive and linguistic profile of DHH children with ASD that have been described in the scientific literature, but this does not mean that these strategies cannot be used for other skills that educators wish to focus on, nor does it mean that there are not additional skills that could benefit from such strategies. In particular, we wish to emphasize that children with ASD are an extremely heterogeneous group; therefore, the useful strategies for one child may not be useful for another. We encourage educators to be flexible and creative in their use of multiple teaching strategies with such children. Although research in this area is just beginning, advances have been made in to understand DHH children with ASD in recent years. Such advances inform our approach to the classroom and lead to our ultimate goal, which is to serve our students' diverse educational needs more effectively.

References

- Akhtar, N. (2005). The robustness of learning through overhearing. *Developmental Science*, 8, 199–209.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders, fifth edition*. Arlington, VA: American Psychiatric Publishing.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition*, 21(1), 37–46.
- Blanc, M. (2012). *Natural language acquisition on the autism spectrum: The journey from echolalia to self-generated language*. Madison, WI: Communication Development Center.
- Bondy, A. S., & Frost, L. A. (1994). The picture exchange communication system. *Focus on Autism and Other Developmental Disabilities*, 9, 1–19.
- Bonvillian, J. D., Nelson, K. E., & Rhyne, J. M. (1981). Sign language and autism. *Journal of Autism and Developmental Disorders*, 11, 125–137.

- Borders, C. M., Jones Bock, S., & Probst, K. M. (2016). A review of educational practices for deaf/hard of hearing students with comorbid autism. *Deafness & Education International, 18*(4), 189-205.
- Boucher, J. (2003). Language development in autism. *International Journal of Pediatric Otorhinolaryngology, 67*, S159-163.
- Brown, J. D. (1996). *Imitation, play and theory of mind in autism: An observational and experimental study* (Unpublished doctoral dissertation). Saint Andrew's University, United Kingdom.
- Bruce, S. M. (2002). The impact of a communication intervention model on teachers' practice with children who are congenitally deaf-blind. *Journal of Disability, Development and Education, 52*, 233-251.
- Bruce, S. M., & Borders, C. (2015). Communication and language learners who are deaf and hard of hearing with disabilities: Theories, research, and practice. *American Annals of the Deaf, 152*(4), 368-384.
- Bryan, L. C., & Gast, D. L. (2000). Teaching on task and on schedule behaviors to high functioning children with autism. *Journal of Autism and Developmental Disorders, 30*(6), 553-567. doi: 10.1023/a:1005687310346.
- Buron, K. D., & Wolfberg, P. J. (2014). *Learners on the autism spectrum: Preparing highly qualified educators and related practitioners* (2nd ed.). Shawnee Mission, KS: AAP Publishing.
- Carr, E. G. (1979). Teaching autistic children to use sign language: Some research issues. *Journal of Autism and Developmental Disorders, 9*, 345-359.
- Centers for Disease Control. (2014). Prevalence of autism spectrum disorder among children aged 8 years—Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2010. *Morbidity and Mortality Weekly Report, 63*, 1-21.
- Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders, 37*(2), 230-242. <https://doi.org/10.1007/s10803-006-0164-4>
- Darrow, A. A., Meehan, L., Center, C. E., & Todd, C. (2016). The effect of peer modeling on the rate of appropriate social, academic, and musical behaviors exhibited by students with disabilities in multiple-age settings. *ISME Commission on Special Music Education and Music Therapy, 98*.
- Denmark, T., Atkinson, J., Campbell, R., & Swettenham, J. (2019). Signing with the face: Emotional expression in narrative production in deaf children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 49*(1), 294-306. doi: 10.1007/s10803-018-3756-x

- Denmark, T., Atkinson, J., Campbell, R., & Swettenham, J. (2014). How do typically developing deaf children and deaf children with autism spectrum disorder use the face when comprehending emotional facial expressions in British Sign Language? *Journal of Autism and Developmental Disorders*, *44*(10), 2584–2592. doi: 10.1007/s10803-014-2130-x
- Eigsti, I.-M., de Marchena, A. B., Schuh, J. M., & Kelley, E. (2011). Language acquisition in autism spectrum disorders: A developmental review. *Research in Autism Spectrum Disorders*, *5*(2), 681–691. <https://doi.org/10.1016/j.rasd.2010.09.001>
- Evans, K. E., & Demuth, K. (2012). Individual differences in pronoun reversal: Evidence from two longitudinal case studies. *Journal of Child Language*, *39*, 162–191.
- Frankel, F., & Whitman, C. (2011). Parent-assisted group treatment for friendship problems of children with autism spectrum disorders. *Brain Research*, *1380*, 240–245.
- Fredrickson, N., & Turner, J. (2003). Utilizing the classroom peer group to address children's social needs: An evaluation of the Circle of Friends intervention approach. *The Journal of Special Education*, *36*(4), 234–245.
- Gagnon, E. (2002). *Power Cards: Using Special Interests to Motivate Children and Youth with Asperger Syndrome and Autism*. AAPC Publishing.
- Gallaudet Research Institute (2011). *Regional and national summary report of data from the 2009–2010 annual survey of deaf and hard of hearing children and youth*. Washington, DC: GRI, Gallaudet University.
- Gray, C. (1995). Teaching children with autism to “read” social situations. In K. Quill (Ed.). *Teaching children with autism: Strategies to enhance communication and socialization*. (pp. 219–241). Albany, NY: Delmar.
- Hall, W. C. (2017). What you don't know can hurt you: The risk of language deprivation by impairing sign language development in deaf children. *Maternal and Child Health Journal*, *21*(5), 961–965. <https://doi.org/10.1007/s10995-017-2287-y>
- Hamilton, A., Brindley, R., & Frith, U. (2009). Visual perspective taking impairment in children with autistic spectrum disorder. *Cognition*, *113*, 37–44. <https://doi.org/10.1016/j.cognition.2009.07.007>
- Hart, J. E., & Whalon, K. J. (2012). Using video self-modeling via iPads to increase academic responding of an adolescent with autism spectrum disorder and intellectual disability. *Education and Training in Autism and Developmental Disabilities*, *47*(4), 438–446.
- Hobson, R. P., & Lee, A. (1999). Imitation and identification in autism. *Journal of Child Psychology and Psychiatry*, *40*, 649–659.
- Jones, T. W., Jones, J. K., & Ewing, K. M. (2006). Students with multiple disabilities. In D. F. Moores & D. S. Martin (Eds.), *Deaf learners: Developments in curriculum and instruction* (pp. 127–143). Washington, DC: Gallaudet University Press.

- Jordan, R. (1989). An experimental comparison of the understanding and use of speaker-addressee personal pronouns in autistic children. *British Journal of Disorders of Communication*, 24, 169–179.
- Jordan, R. (1990). Signing and autistic children. *Communication*, 19, 9–12.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217–250.
- Kjelgaard, M. M., & Tager-Flusberg, H. (2001). An investigation of language impairment in autism: Implications for genetic subgroups. *Language and Cognitive Processes*, 16(2), 287–308. <https://doi.org/10.1080/01690960042000058>
- Laugeson, E. A., Frankel, F., Mogil, C., & Dillon, A. R. (2008). Parent-assisted social skills training to improve friendships in teens with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 39, 596–606.
- Lederberg, A. R., Schick, B., & Spencer, P. E. (2013). Language and literacy development of deaf and hard-of-hearing children: Successes and challenges. *Developmental Psychology*, 49(1), 15–30. <https://doi.org/10.1037/a0029558>
- Lee, A., Hobson, R. P., & Chiat, S. (1994). I, you, me, and autism: An experimental study. *Journal of Autism and Developmental Disorders*, 24, 155–176.
- Macpherson, K., Charlop, M.H. & Miltenberger, C.A. *J Autism Dev Disord* (2015) 45: 3836. <https://doi.org/10.1007/s10803-014-2072-3>
- McCracken, H. (2004). *Enhancing peer relations in children with ASD: Friend to Friend to model*. Presentation at the BC Association of Speech-Language Pathologists and Audiologists, Kelowna, BC, Canada.
- McDowell, L. S., Gutierrez Jr, A., & Bennett, K. D. (2015). Analysis of live modeling plus prompting and video modeling for teaching imitation to children with autism. *Behavioral Interventions*, 30(4), 333–351.
- Mitchell, R. E., & Karchmer, M. A. (2004). Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies*, 4, 138–163.
- Mood, D., & Shield, A. (2014). Clinical use of the Autism Diagnostic Observation Schedule-Second Edition with children who are deaf. *Seminars in Speech and Language*, 35, 288–300. <https://doi.org/10.1055/s-0034-1389101>
- Morgan, G. (2015). Social-cognition for learning as a deaf student. *Educating deaf learners: Creating a global evidence base*, 261–282.
- Naigles, L. R., Cheng, M., Xu Rattanasone, N., Tek, S., Khetrpal, N., Fein, D., & Demuth, K. (2016). “You’re telling me!” The prevalence and predictors of pronoun reversals in children with autism spectrum disorders and typical development. *Research in Autism Spectrum Disorders*, 27, 11–20. <https://doi.org/10.1016/j.rasd.2016.03.008>

- Neely, L., Gerow, S., Rispoli, M., Lang, R., & Pullen, N. (2015). Treatment of echolalia in Individuals with Autism Spectrum Disorder: A systematic review. *Review Journal of Autism and Developmental Disorders*, 3. 10.1007/s40489-015-0067-4.
- Nunes, T., Pretzlik, U., & Olsson, J. (2001). Deaf children's social relationships in mainstream schools. *Deafness & Education International*, 3(3), 123–136. <https://doi.org/10.1179/146431501790560972>
- Ohta, M. (1987). Cognitive disorders of infantile autism: A study employing the WISC, spatial relationship conceptualization, and gesture imitations. *Journal of Autism and Developmental Disorders*, 17, 45–62.
- Olson, K., Miles, B., & Riggio, M. (1999). Environments that encourage communication. In B. Miles & M. Riggio (Eds.), *Remarkable conversations: A guide to developing meaningful communication with children and young adults who are deafblind*, (pp. 76-93). Watertown, MA: Perkins School for the Blind.
- Petitto, L. A. (1987). On the autonomy of language and gesture: Evidence from the acquisition of personal pronouns in American Sign Language. *Cognition*, 27, 1–52.
- Poizner, H., Klima, E. S., & Bellugi, U. (1990). *What the hands reveal about the brain*. Cambridge, MA: MIT Press.
- Prizant, B. M., & Duchan, J. F. (1981). The functions of immediate echolalia in autistic children. *Journal of Speech and Hearing Disorders*, 46, 241–249.
- Romski, M. A. & Sevcik, R. A. (2005). Augmented input: Enhancing communication development. In J. C. Light, D. R. Beukelman, & J. Reichle (Eds.), *Communicative competence for individuals who use AAC: From research to effective practice*, (pp. 147- 168). Baltimore, MD: Brookes.
- Rydell, P. (2012). *Learning style profile for children with autism spectrum disorders*. Lone Tree, CO: Rocky Mountain Autism Center.
- Shield, A., Cooley, F., & Meier, R. P. (2017). Sign language echolalia in deaf children with autism spectrum disorder. *Journal of Speech Language and Hearing Research*, 60(6), 1622. https://doi.org/10.1044/2016_JSLHR-L-16-0292
- Shield, A., & Meier, R. P. (2012). Palm reversal errors in native-signing children with autism. *Journal of Communication Disorders*, 45(6), 439–454. Doi: 10.1016/j.jcomdis.2012.08.004.
- Shield, A., & Meier, R. P. (2018). Learning an embodied visual language: Four imitation strategies available to sign learners. *Frontiers in Psychology*, 9, 811. doi:10.3389/fpsyg.2018.00811
- Shield, A., Meier, R. P., & Tager-Flusberg, H. (2015). The use of sign language pronouns by native-signing children with autism. *Journal of Autism and Developmental Disorders*, 45, 2128–2145.

- Shield, A., Pyers, J., Martin, A., & Tager-Flusberg, H. (2016). Relations between language and cognition in native-signing children with autism spectrum disorder. *Autism Research, 9*, 1304–1315. <https://doi.org/10.1002/aur.1621>
- Shukla-Mehta, S., Miller, T., Callahan, K. (2010). Evaluating the effectiveness of video instruction on social and communication skills training for children with autism spectrum disorders: A review of the literature. *Focus Autism Other Dev Disabilities, 25*(1)23–36.
- Simpson, R. L., de Boer-Ott, S. R.; Griswold, D. E. et al. (2005). *Autism spectrum disorders: Interventions and treatments for children and youth*. Thousand Oaks, CA: Corwin Press.
- Spencer, V. G., Simpson, C. G., & Lynch, S. A. (2008). Using social stories to increase positive for children with autism spectrum disorders. *Intervention School and Clinic, 44*(1), 58- 61.
- Stiegler, L. N. (2015) Examining the echolalia literature: Where do speech-language pathologists stand? *American Journal of Speech-Language Pathology 24*(4), 750-767.
- Szymanski, C. A., Brice, P. J., Lam, K. H., & Hotto, S. A. (2012). Deaf children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*, 2027–2037.
- Thrasher, A. (2014). Video modeling for children with dual diagnosis of deafness or hard of hearing and autism spectrum disorder to promote peer interaction. *Seminars in Speech and Language, 35*(4), 331-342.
- Travis, L., Sigman, M., & Ruskin, E. (2001). Links between social understanding and social behavior in verbally able children with autism. *Journal of Autism and Developmental Disorders, 31*(2), 119–130. <https://doi.org/10.1023/a:1010705912731>
- Uljarevic, M., & Hamilton, A. (2013). Recognition of emotions in autism: A formal meta-analysis. *Journal of Autism and Developmental Disorders, 43*(7), 1517–1526. <https://doi.org/10.1007/s10803-012-1695-5>
- Whiten, A., & Brown, J. (1998). Imitation and the reading of other minds: Perspectives from the study of autism, normal children and non-human primates. In S. Bråten (Ed.), *Intersubjective communication and emotion in early ontogeny* (pp. 260–280). Cambridge: Cambridge University Press.