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# Creating Inclusive Environments for Children with Autism

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## 1. Introduction

Although the prevalence rate of Autism Spectrum Disorders (ASD) varies, recent figures suggest that close to 1% of children (Autism Society Canada, 2009; CDC, 2006) are identified with ASD. With inclusive philosophies paving the way for education in mainstream classrooms, attention must be given to equitable opportunities and practices for this growing population in our school systems (Killoran & Adams, 2006; Sapon-Shevin, 2003; United Nations, 2006). The research on inclusion and children with ASD is fairly limited; however, it has shown that in some regions at least, these students are excluded from school at a “significantly higher rate than students with other [special education needs]” (Humphrey & Lewis, 2008, p. 132). Children with ASD are “considered more difficult to include effectively than those with other SEN” (Humphrey & Lewis, 2008, p. 133). While there is much diversity with respect to strengths, abilities, functional levels and challenges among children with ASD, a core set of universal concerns exist. Some of these include sensory responsiveness, communication, and socialization. This chapter will focus on creating a sensory responsive environment, developing effective verbal and/or non-verbal communication, and fostering genuine relationships.

Using the three main principles of Universal Design for Learning (UDL) as an overarching assumption, this chapter will explore how educators can provide effective opportunities for multiple means of representation, expression, and engagement to address common areas of need (CAST, 2011; Hehir, 2009). By following these principles, an educator is able to create a community that welcomes all while addressing students’ specific needs. Many educators have been overwhelmed with the past practice of individualization in isolation, a task that left many students alone and disconnected from their peers. The current practices of differentiation and universal design for learning enable educators to plan for their students in such a way that all are integral, contributing, valued members of the learning community.

This chapter provides a synthesis of current research on evidence-based classroom interventions and accommodations for learners with ASD in inclusive settings, at all age levels, with respect to sensory environments, assisted communication, and facilitation of social relationships. Emphasis is placed on accommodations that meet UDL requirements. A comprehensive search of the Education Resources Information Center (ERIC) database was conducted using keywords for, and related to, autism, universal design for learning and

sensory, communication, and social skills interventions. Empirical research was reviewed, as well as qualitative studies and narratives. Manual searches of the reference lists were conducted to identify additional sources.

## 2. Creating a sensory responsive environment

Children with ASD often display atypical sensory processing. “Sensory processing” refers to the relationship between neurological thresholds and self-regulatory strategies for adaptive behaviour (Hocchauser & Engel-Yeger, 2010). From a clinical perspective, sensory under-responsiveness and/or over-responsiveness can lead to behaviours, which either generate or avoid sensory stimulation in an effort to help the child with ASD cope with environmental stimuli (Iarocci & McDonald, 2006). In order for inclusive education practices to be effective for children with ASD, a deeper awareness of sensory processing needs must be acquired by educators, and classroom environmental accommodations implemented.

Sensory integration dysfunction, or “sensory perceptual issue”, is defined as a disruption in the process of organizing sensational information gathered from the seven senses: smell, taste, touch, sight, sound, vestibular (movement), and proprioceptive (muscle and joint receptors) senses (Ayres, 1979; Bogdashina, 2003; Howe, Brittain, & McCathren, 2004; Myles, Cook, Miller, Rinner, & Robbins, 2000; Yack, Aquilla, & Sutton, 2002). Sensory integration difficulties have been reported in 42 to 88% of children with ASD (Baranek, 2002, p. 398). These difficulties can influence a child’s gross and fine motor development, balance, coordination, visual perception and self-help skills, thus having a potential impact on the ability to engage in social activities and develop feelings of success and mastery in the classroom (Baranek, Boyd, Poe, David & Watson, 2007; Howe, et al., 2004). The Ziggurat model, an intervention program for learners with ASD, stipulates that a student’s sensory needs must be met before effective and engaged learning can take place (Murray, Hudson Baker, Murray-Slutsky, & Paris, 2009; Myles, Grossman, Aspy, Henry & Bixler Coffin, 2007).

No two children are alike, and this is especially true for children with ASD. Because there is much variation with respect to sensory responsiveness, educators need to acquaint themselves with their students’ *specific* sensory needs before the school year commences, thus giving them time to make any necessary accommodations to the classroom environment (Killoran, 2005). Often children with ASD will require a sensory diet delivered during the school day (Baranak 2002; Yack, et al., 2002). Below is a synthesis of evidence-based environmental accommodations for a variety of sensory integration responses and behaviours. Each student with ASD will present with his or her own unique set of responses, behaviours and needs.

Hochhauser and Engel-Yeger (2010) have found an association between smell over-responsiveness and a reduced amount of participation in certain classroom activities in children with ASD. Common classroom activities such as crafts, colouring, drawing and snack/lunch periods can be particularly distressing for children with odour over-responsiveness (Hochhauser & Engel-Yeger, 2010). Making classrooms scent-free environments and purchasing odourless craft supplies can help not only those with ASD, but also any children with odour sensitivities in the classroom (Case-Smith & Arbesman, 2008). Encouraging children to bring in snacks and lunches that are not response-inducing

will eliminate the need for removal of students with ASD from the classroom during these particularly socially engaging periods in the school day.

Children with ASD who have an over-responsive tactile sense may exhibit negative emotional reactions to specific consistencies of solids and fluids, and/or to intentional or accidental touch. Tactile over-responders will engage in sensory avoiding behaviours, aimed at people, situations, tasks and activities that are anxiety inducing (Killoran, 2004; Myles et al., 2000; Murray, et al, 2009). These learners may need preferential seating within the classroom to give them distance from others who may contribute to touch that may be distressing (Murray, et al., 2009). When lining up for recess or other activities, educators should assign these students to the back or front of the line, thereby minimizing opportunities for unwelcome touch (Howe, et al., 2004; Killoran, 2004). The UDL guidelines call for multiple tools for expression, communication, composition and construction in the inclusive classroom (CAST, 2011). For learners with tactile over-responsiveness, educators should consider the use of tools rather than hands for craft and other messy classroom activities (Howe, et al., 2004). These tools can be used by all students in the inclusive classroom, not only those with ASD.

Children with ASD who are tactile under-responders must have their needs accommodated within the inclusive classroom environment as well. These children require consistent tactile stimulation throughout their school day. They respond well to the use of weighted or vibrating pencils and the use of sandpaper placed under written work (Myles et al, 2000; Murray, et al, 2009; Yack et al, 2002). Providing an under-responsive tactile learner with a fidget toy to hold can reduce potentially disruptive sensory seeking behaviour, such as touching peers at inappropriate times (Friedlander, 2008; Howe, et al, 2004). Placing a rice-filled or inflated cushion on their chair can provide needed tactile stimulation as well (Friedlander, 2008). These classroom accommodations respond to the UDL's requirement for the provision of tools for self-regulation and optimize access to tools and assistive technologies for students with ASD in inclusive classroom settings (CAST, 2011).

Learners with ASD who are sight and sound over-responders may be distracted by classroom stimuli such as fluorescent lights that buzz or flash, an overabundance of colours in the classroom, noise from fans or air conditioners, the clinking of dishes in the cafeteria down the hall, or a line tapping against a metal flagpole outside (Friedlander, 2008; Howlin, 2005). Environmental accommodations in the classroom are needed to calm their nervous systems by eliminating extraneous noise and visual distraction (Case-Smith & Arbesman, 2008; Murray, et al., 2009).

Hochhauser and Engel-Yeger (2010) found that children with ASD who have high visual and auditory sensitivity work best one-to-one rather than in groups, as the opportunity for visual and auditory distraction is minimized. The UDL guidelines highlight the need for educators to provide options for self-regulation that facilitate personal coping skills and strategies (CAST, 2011). One such strategy is the use of Auditory Integration Training (AIT). AIT is based on the concept that electronically filtered music provided through earphones may be helpful in remediating auditory hypersensitivities (Baranek, 2002; Case-Smith & Arbesman, 2008; Dawson & Watling, 2000). Auditory Integration Therapy was developed in 1993 by Berard and Tomasis. It involves listening to electronically modified music which has had the peak frequencies to which an individual with ASD is hypersensitive, dampened (Baranek, 2002; Dawson & Watling, 2000). Children typically listen to 2 half-hour daily

sessions for a total of 10 hours (Dawson & Watling, 2002). Recorded music is individualized according to specific needs, and can be kept in the classroom for use when sensory over-responsive behaviours are peaking.

Additional sound dampening accommodations such as tennis balls on chair legs, floor carpeting and vent covers may be helpful in decreasing background noises in the classroom as well (Myles et al., 2000; Murray et al., 2009; Yack et al., 2002). Visual schedules can help over-responders to focus their attention to the task at hand (Case-Smith & Arbesman, 2008; Humphrey, 2008). These environmental accommodations can be useful in minimizing sound and visual distractions for all learners in the inclusive classroom, not just those with ASD.

The vestibular system is located in the inner ear. Accurate processing of vestibular information allows individuals to successfully regulate posture, balance, and eye movement (Howe et al., 2004; Yack et al., 2002). Children with ASD who are over-responders to vestibular input are fearful, cautious or avoidant of movement; those who are under-responders seek excessive vestibular input (Howe, et al, 2004; Myles et al., 2000; Yack et al., 2002). Hocchauser and Engel-Yeger (2010) found that children who are over-responsive to vestibular input tend to be clumsy, have motor difficulties, low muscle tone and low levels of energy. Consequently, they may be reluctant or unable to participate in physical education classes (Hocchauser & Engel-Yeger, 2010). Howe, et al.,(2004) caution against forcing these children into participating in physical activities. Instead, they suggest offering the student opportunities for self-directed movement. Additionally, it is important to provide over-responsive vestibular learners with secure seating in the classroom, given their difficulties with balance. In place of traditional seating, educators should consider providing these students with alternative forms of seating such as bean bag chairs that mould to the student's body (Howe, et al., 2004).

Children with ASD who are under-responsive to vestibular input require regular opportunities for physical exercise and stimulation (Baranek, 2002; Yack et al., 2002). Daily routines and classroom accommodations may include sensory-motor breaks or movement breaks to improve attention spans, social skills and work performance (Howlin, 2005; Murray, et al., 2009). These can be built in to the daily physical activity that all children should be getting. The use of therapy balls in the classroom on which students can bounce to stimulate the vestibular system is another strategy that other children in the inclusive classroom may benefit from (Howlin, 2005; Wong Bonggat & Hall, 2010).

Finally, attention must be paid to the proprioceptive system of children with ASD. The proprioceptive system is located in the muscles and joints, and notifies the brain with respect to body position (Howe, et al.,2004; Killoran, 2004; Yack et al., 2002). The brain uses this information to move in a coordinated manner and to plan movements for a new task (Howe, et al., 2004). Children with proprioceptive difficulties can appear clumsy when completing tasks; they may bump into their surroundings in an effort to collect needed input for the body with respect to position (Howe, et al., 2004; Yack et al., 2002). Murray, et al., (2009) point out the need for strong sensory input that provides meaningful sensory feedback. Songs with gestures, high-energy rhythmic activities, jumping on a trampoline, stretching activities, or other activities to wake up the sensory systems should be integrated into the learners' day (Murray, et al., 2009). These activities will not only benefit the students with ASD in the classroom, but all children learning in the inclusive classroom.



All of the accommodations discussed above satisfy CAST's (2011) guidelines for UDL. The accommodations mentioned above support inclusive learning environments, as they do not necessitate the removal of children with ASD from general education classrooms. These accommodations can benefit many learners in the classroom, as they are designed for universal use and multifaceted situations. They provide the sensory responsive environment necessary for children with ASD to learn in an engaging and inclusive classroom. Coupled with effective communication programs, strategies and accommodations, the foundation for fostering genuine relationships is laid.

### **3. Developing effective communication**

Children with ASD can live relatively secluded lives with little social interaction outside of school hours (Hochhauser & Engel-Yeger, 2010). Social isolation stems in part from qualitative impairments in reciprocal social interaction and communication, and a tendency for restricted, repetitive, and stereotyped patterns of behavior, interest, or activity (Walker & Berthelsen, 2008). Communication challenges are most pronounced in children with ASD who are non-verbal; however echolalia, expressive language delay, receptive language difficulties and literal interpretations of idioms and colloquial language contribute to communication difficulties even among high-functioning, verbal children with ASD. The ability to communicate effectively, be it through the medium of spoken language, sign language, PECS, or computer assisted communication, is the foundation upon which meaningful social relationships are built. This section will examine the communicative challenges of children with ASD, and the role of the classroom teacher in creating an inclusive classroom environment in which various forms of communication are valued and explored. Effective communication programs, strategies and accommodations will be discussed, with an emphasis on their contribution to opportunity for social and academic success in the general education classroom.

The ability to communicate effectively contributes to meaningful, reciprocal and satisfying social relationships. Children with ASD who are nonverbal require effective communication programs, strategies and accommodations within the inclusive classroom in order to have an equitable opportunity for social engagement with peers and educators (Freeman, Perry, & Bebkco, 2002). Through the use of gestures, vocalizations and/or augmentative and adaptive communication systems, children with ASD are able to interact meaningfully and reciprocally with their peers and their classroom environment (Mastrangelo & Killoran, 2007). A universally designed classroom is one in which multiple modes of communication and expression are explored, encouraged and given value (CAST, 2011).

Children with ASD who are nonverbal can use a number of strategies and assistive technologies in order to communicate more effectively with the world around them. One such assistive strategy is the use of the Picture Exchange Communication System (PECS). PECS teaches spontaneous communicative skills within a social context through the use of pictures or symbols (Howlin, 2004; Magiati & Howlin, 2003). In a universally designed inclusive classroom, these pictures or symbols can be used throughout the room as an assistive technology for use with all learners, not only specifically those with ASD. Teaching all children in the classroom how to communicate using the PECS binders of peers with

ASD can help to facilitate reciprocal communication (Simpson, 2005). Educators who have incorporated the use of PECS in their inclusive classrooms report positive outcomes not only for children with ASD, but for the entire classroom population. They cite increased independence and confidence, improvement in the use of words for learners with ASD, reduced tantrums and frustrations over the inability to communicate, and improved teaching practices (Case-Smith & Arbesman, 2008; Magiati & Howlin, 2003). Mirenda (2003) notes increased reciprocal communication exchanges and social interactions with peers as additional benefits to symbolically augmented communication.

Training in Sign Language (SL) can result in quicker and more complete learning of vocabulary among children with ASD than does speech training (Goldstein, 2002; Mirenda, 2003; Yoder & Layton, 1988). The presentation of speech training programs is particularly ineffective among those children with ASD who have poor verbal imitation skills (Yoder & Layton, 1988). Incorporating SL gestures into the inclusive classroom setting serves to benefit all learners (Bonvillian, Nelson & Rhyne, 1981; Tincani, 2004). Teaching typically developing children SL has become commonplace in mainstream society, as a means to pair spoken language with gestures. Typically developing school-aged children often learn second languages through the pairing of speech and SL gestures (Iverson & Goldin-Meadow, 2005; McCafferty, 2002). This use of SL can thus be expanded within the inclusive classroom setting to teach both learners with ASD and those without how to reciprocally communicate with one another. This satisfies CAST's (2011) UDL guidelines for provision of multiple options for perception and comprehension, use of multiple types of media for communication, and fostering a sense of collaboration and community.

The use of speech generating devices (SGD) with children with ASD is an emerging field. SGDs are an assistive technology that can help children with ASD who are non-verbal or language emergent, communicate with peers and educators in the classroom. Despite the small number of studies conducted with respect to SGD's success as an accommodation in the inclusive classroom, researchers are finding that the use of SGDs with some children with ASD can lead to verbal imitation of SGD output and a desire to use more communicative tools/devices in general (Blischak, Lombardino & Dyson, 2003; Franco et al., 2009; Thunberg, Ahlsen, & Dahlgren Sandberg, 2007). Implementation of SGD use in the inclusive classroom provides children with ASD an option with respect to expression and communication, and optimizes access to assistive tools and technologies, all of which are part of the UDL guidelines (CAST, 2011).

Assisted communication for non-verbal children with ASD is a necessary component of the inclusive classroom. Inclusive classrooms promote social interactions between children with ASD and their typically developing peers, leading to improved educational outcomes and greater learning and social competencies (Mastrangelo & Killoran, 2007). Opportunities for increased and successful social interactions are strongly correlated with the achievement of communicative competence (Prizant, Wetherby, Rubin, & Laurant, 2003). Research indicates that limited communication skills are strongly associated with peer rejection for children with ASD in inclusive classroom settings (Fujiki & Brinton, 1996; Humphrey, 2008; Walker & Berthelsen, 2008). A universally designed classroom is one which provides options for language, optimizes access to assistive technologies and fosters collaboration and community (CAST 2011). A universally designed classroom is the setting necessary for the creation of meaningful and genuine friendships for children with ASD.

#### 4. Fostering genuine relationships

Children with ASD often face challenges socializing in general education classroom settings and have trouble interacting with others (Embregts & van Nieuwenhuijzen, 2009; Fujiki & Brinton, 1996; Humphrey, 2008). Inclusive school settings should set the development of social competence as one of their primary goals (Walker & Berthelsen, 2008). The World Health Organization defines participation in meaningful social activities and relationships as a vital part of human development and life experience, through which children acquire skills and competencies, and find purpose and meaning in life (Hochhauser & Engel-Yeger, 2010). Research indicates that increasingly, children with developmental disabilities are being socially isolated, bullied and excluded in general education classroom settings (Humphrey, 2008; Wang & Parrila, 2008).

Children with ASD require individual and appropriate support to engage in positive play experiences and social interactions with their peers (Mastrangelo & Killoran, 2007; Walker & Berthelsen, 2008). The degree to which they are supported in acquiring peer-related social skills is a consequence of their classroom teacher, who has a significant role in creating a learning community within which all children are valued (Mastrangelo & Killoran, 2007; Walker & Berthelsen, 2008). UDL guidelines specifically outline the need for creating classroom environments which foster community and collaboration (CAST, 2011). These inclusive classroom settings make the development of genuine friendships a possibility for children with ASD.

Too often, peer helpers are mistaken as “friends” for children with ASD in inclusive classroom settings. Group seating plans and group work activities often perpetuate the idea that typically developing peers who help students with disabilities, or merely sit next to them, are akin to “friends.” Peer-mediated strategies have long been used by educators to increase the rate of social interaction by reinforcing and prompting a typically developing peer to initiate interactions or shape the social responding of a student with disabilities (Haring & Breen, 1992; DiSalvo & Oswald, 2002; McConnell, 2002). However, genuine friendships are those that translate into the after-school settings of home and community activities; peer-mediated strategies do not always see this translation materialize. As such, children with ASD remain socially isolated despite having a network of peer support in the classroom setting. A strategy that is effective at building up more intimate relationships at all age levels is Circle of Friends, or Circle of Support (Falvey, Forest, Pearpoint, & Rosenberg, 2000; Forest, Pearpoint, & O’Brien, 2000).

One opportunity often available to educators who have children with disabilities in their classes is the chance to work with an educational assistant (teacher aide, paraprofessional, support worker). Research has shown, however, that this resource is often misused and the results on socialization, particularly, are detrimental to the students (Giangreco, Edelman, Luiselli, & MacFarland, 1997; Malmgren, & Causton-Theoharis, 2006). With very little in-service, an educational assistant is able to make a significant difference to peer interactions and socialization (Causton-Theoharis & Malmgren, 2005). Among the strategies/accommodations that an educational assistant can provide for a student with ASD in the classroom are:

- Increasing physical proximity to peers
- Fading assistance to allow for more natural peer interaction opportunities



- Partnering student with ASD with peers during academic tasks
- Verbally highlighting similarities between student with ASD and peers
- Creating communication cards focused on social exchanges
- Teaching peers how to communicate with target student using sign language gestures
- Utilizing interactive technology
- Giving student with ASD classroom responsibilities that encourage interaction with peers (Causton-Theoharis, J., & Malmgren, 2005, p. 436)

Social skills training programs are another possible response to the need for individualized training in reciprocal play and conversational skills for children with ASD. While social skills training programs have been shown to have a positive effect on problem-solving skills in children with ASD (Embregts & van Nieuwenhuijzen, 2009; McConnell, 2002; Wolfberg & Schuler, 1993), these programs can lack social validity in terms of generalization of skills outside of the training sessions (Haring & Breen 1992; Ozonoff & Miller, 1995). Haring and Breen (1992) found that social skills training packages, while useful in terms of determining existing levels of social competence, may not translate into friendship relationships outside of the training context. Thus, attention should be turned toward the acquisition and development of social skills within the inclusive classroom environment, rather than in clinical training settings.

Research indicates that children with ASD who have at least one reciprocal, genuine friendship are more involved in their classroom social networks and more accepted by peers overall (Rotheram-Fuller, Kasari, Chamberlain & Locke, 2010). In the younger and middle elementary school years, inclusion alone appears to be sufficient in integrating some children with ASD into the social structure of classrooms; however, changing cognitive and physical skills, coupled with emerging and evolving competitive games, leave children with ASD needing assistance in facilitating true social involvement in the older grades (Howlin, 2005; McConnell, 2002; Rotheram-Fuller, Kasari, Chamberlain & Locke, 2010).

Children with ASD often lack the conversational skills necessary to develop effective reciprocal social speech. A possible response to this problem is through the use of pre-determined scripts. Pre-determined scripts teach children with ASD role-specific dialogue in socio-dramatic play situations (Causton-Theoharis, J., & Malmgren, 2005; Charlop-Christy & Kelso, 2003; Thiemann & Goldstein, 2001). Activities can be incorporated into the inclusive classroom in which the whole student population participates in dramatic role-playing activities. Educators model role-appropriate behaviour and speech, and provide opportunities for verbal and social exchanges between children with ASD and those without (Charlop-Christy & Kelso, 2003; Thiemann & Goldstein, 2001). Research indicates that following pre-determined script teaching sessions, role-appropriate speech and play in play settings increases among children with ASD (Charlop-Christy & Kelso, 2003; Ganz, Kaylor, Bourgeois, & Hadden, 2008; Thiemann & Goldstein, 2001). Pre-determined script teaching provides children with ASD with options for fostering collaboration and building fluencies, with graduated support for practice and performance, guidelines recommended by the UDL (CAST, 2011).

Other evidence-based teaching strategies/accommodations that may be useful in the creation of genuine friendships for children with ASD, especially younger children, include:

- Pre-linguistic Milieu Teaching (PMT) (McCathren & Watson, 2001)
- Using AAC systems with peers (Garfinkle & Schwartz, 2001)
- Peer interaction play centres (PALS) (Chandler, 1998)
- Can-do Thinking (Hull, Venn, Lee, & Buren, 2000).

(adapted from Mastrangelo & Killoran, 2007, pp. 81-82).

Ultimately, educators are the ones responsible for creating universally designed classrooms that circumvent barriers, provide opportunities for positive and reciprocal social interactions, and foster the development of specific skills (Mastrangelo & Killoran, 2007; Walker & Berthelsen, 2008). Children with ASD have the right to learn in equitable, sensory responsive classrooms that value multiple means of communication and expression. When these vital conditions are met, children with ASD will have the foundation necessary to create meaningful, lasting and genuine friendships. Through using the suggestions discussed within this chapter, educators have the opportunity to create a mutually beneficial learning community, one in which all students are included and valued. It is our responsibility to do so and it is our students' right to expect it of us.

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## **Autism Spectrum Disorders - From Genes to Environment**

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Autism spectrum disorders are a major topic for research. The causes are now thought to be largely genetic although the genes involved are only slowly being traced. The effects of ASD are often devastating and families and schools have to adapt to provide the best for people with ASD to attain their potential. This book describes some of the interventions and modifications that can benefit people with ASD.

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