

Occupational Therapy's Critical Role in Addressing Sensory Integration to Increase Academic Progress and Participation in Schools



Tiffany Northrop, MA, OTR/L

The primary goal of school is to learn. Students must be able to access and progress through the academic curriculum towards graduation, career, community integration, and/or further education. In addition to academic pursuits, occupational performance in school includes extracurricular activities as well as overall behavior, mental health, and social participation. It encompasses all school routines and locations such as recess; assemblies; art, physical education (PE), and music classes; fieldtrips; and lunch and restroom breaks. It also includes the ability to manage friendships and emotions, and incorporate feedback from peers and adults while adjusting behavioral and social responses accordingly. Occupational therapy practitioners can help to support functional and inclusive approaches that support school participation.

Sensory challenges can affect a student's learning and behavior. Practitioners should conduct an occupational therapy evaluation to identify difficulties with processing or integrating sensory information that may be affecting academic progress and/or school participation before implementing interventions (American Occupational Therapy Association [AOTA], 2018). *Sensory discrimination* (also referred to as *sensory perception*; see Table 1) is necessary for accurate perception and interpretation of visual, tactile, proprioceptive, and vestibular information; eye-hand-body coordination for smooth, accurate movements; meaningful praxis abilities; and effective responses in both academic and non-academic environments (Ayres, 2005). *Sensory modulation* (also referred to as *sensory reactivity*; see Table 2) acts as the foundation for a child's activity level, behavior, and emotional regulation (Ayres, 2005).

After evaluation, practitioners should work with the teacher and student (if appropriate) to select appropriate sensory tools; provide instruction for their use, cleaning, and purpose; and collect data and measurement protocols on outcomes. Using the outcomes information collected, practitioners can make adjustments to the tools, provide additional training if needed, and/or discontinue a tool's use if it is not having the desired effect. Multiple intervention methods may be effective, including availability and use of sensory tools in the classroom such as fidgets, weighted items, oral tools, noise-reducing headphones or earbuds, adaptive paper, slanted work surface, reading devices (e.g., reading windows, bookmarks), and alternative seating.

Previous research suggests that occupational therapy using a sensory integration approach may improve academic test scores in children with learning disabilities (Ayres, 1972). Two randomized controlled trials found that providing sensory integration to children with autism spectrum disorders in a clinical setting led to improvements in self-care and social skills (Schaaf et al., 2014) as well individualized goals (e.g., motor skills, social skills, sensory processing; Pfeiffer et al., 2011), all of which facilitate academic progress and school participation (AOTA, 2015). Additionally, the use of sensory-based strategies and tools in the classroom has been associated with improved attention to task, working memory, and

Table 1. Examples of Sensory Discrimination Deficits and Their Effect on School Progress and Participation

Underlying Sensory Discrimination Deficit	Potential Performance Challenge	Potential Effect on School Progress and Participation
Visual-spatial perception	<ul style="list-style-type: none"> Letter formation, word spacing, and line orientation 	<ul style="list-style-type: none"> Decreased handwriting legibility and speed of output Challenges with overall academic pace, note taking, and/or test completion
Visual memory	<ul style="list-style-type: none"> Shape, size, and orientation recall; basic drawing skills 	<ul style="list-style-type: none"> Decreased ability to complete assignments requiring basic drawing skills (e.g., journal entries, diagrams, maps) Challenges navigating school buildings safely and independently Difficulty recognizing faces or reading social cues of peers and teachers
Tactile-proprioceptive discrimination	<ul style="list-style-type: none"> Grasp pattern and pencil pressure Finger isolation and automaticity of finger movements Finger-thumb opposition and coordination of finger movements Greater effort and decreased accuracy for gross motor tasks that require planning, sequencing, and execution of tasks (praxis) 	<ul style="list-style-type: none"> Decreased endurance for handwriting and/or decreased handwriting legibility Decreased keyboarding and/or handwriting speed and accuracy Decreased self-care skills for managing mealtime containers, manipulating clothing (i.e., zipping, buttoning, snapping, tying), opening lockers, and maintaining clean hands, face, and clothing Poor performance, increased frustration, and/or preference to avoid recess games, school sports, or PE
Vestibular discrimination	<ul style="list-style-type: none"> Bilateral coordination and postural-ocular control 	<ul style="list-style-type: none"> Preference to avoid recess or PE class participation stemming from past failed experiences Difficulty learning to drive and passing driver's education course Challenges with activity level and ability to attend during class time

in-seat behavior and engagement (Pfeiffer et al., 2008; Sarver et al., 2015; Schilling & Schwartz, 2004).

Occupational therapy practitioners also have the potential to affect students' academic progress and school participation through consultation and training with school staff, as well as through school and district-level advocacy work. Teachers may perceive sensory-related behaviors as being intentionally malicious or defiant; however, after an occupational therapy evaluation identifies sensory deficits

Table 2. Examples of Sensory Modulation Deficits and Their Effect on School Progress and Participation

Underlying Sensory Modulation Deficit	Potential Performance Challenge	Potential Effect on School Progress and Participation
Tactile sensitivity	<ul style="list-style-type: none"> ➤ Avoidance of glue, paint, and other craft activities ➤ Picky or restricted eating habits ➤ Avoidance of tactile-based classroom activities (e.g., gardening, water table) 	<ul style="list-style-type: none"> ➤ Fewer opportunities to develop foundational fine motor, visual-motor, and sequencing skills ➤ Power struggles with school staff and/or hunger-related listlessness ➤ Missed socialization, motor, and learning opportunities
Vestibular sensitivity	<ul style="list-style-type: none"> ➤ Intolerance to movement 	<ul style="list-style-type: none"> ➤ Nauseous after riding the school bus, affecting attention to the morning lesson(s) ➤ Nauseous during common PE and recess activities (e.g., swinging, yoga, stretches, sit-ups), resulting in student's avoidance of these tasks and potentially affecting motor skill development
Under-responsive to vestibular input	<ul style="list-style-type: none"> ➤ May present as overly lethargic arousal level or as excessively high arousal level 	<ul style="list-style-type: none"> ➤ Increased likelihood of social or behavioral difficulties and challenges sustaining effective participation
Auditory sensitivity	<ul style="list-style-type: none"> ➤ Avoidance and/or discomfort during PE class, assemblies, pep rallies, the cafeteria, or class time when the noise volume of the room escalates ➤ Extreme discomfort or anxiety during school safety drills (e.g., fire, earthquake, tornado) 	<ul style="list-style-type: none"> ➤ Missed socialization, motor, and learning opportunities ➤ Potential ongoing dysregulation for remainder of school day

and describes how they affect student participation, teachers may demonstrate greater tolerance and patience as they learn to interpret behavior from a sensory perspective. For example, a student who takes an extended period of time to complete academic work, is not “lazy,” but may have visual-spatial and ocular-motor delays (sensory discrimination) that affect performance. Likewise, a student who frequently covers their ears or withdraws during group work is not “task avoidant” but may have auditory modulation challenges and is attempting to self-regulate. Teachers and paraprofessionals have expressed a desire for professional development in the areas of sensory and behavior, and subsequent improvements in teachers’ sensory-related knowledge has resulted in greater awareness and empathy for students with disabilities (Masin & Valle-Riestra, 2007).

Current legislation includes occupational therapy practitioners as Specialized Instructional Support Personnel, thereby supporting their work in addressing student physical and mental health as well as their participation in developing school-wide initiatives and ensuring positive conditions for learning (Every Student Succeeds Act,

2015). School- or district-level advocacy led by occupational therapy practitioners to provide multi-tiered systems of support can facilitate change in school policy or school routines to support all students, thereby improving readiness for learning schoolwide. Some examples include schoolwide or classroom movement breaks, frequency and duration of opportunities for less structured learning, play and/or movement time (e.g., recess, clubs), planning and designing shared social space (e.g., playground, cafeteria, library, study areas), positive behavior interventions and supports, and flexible seating (and standing) options in classrooms. Occupational therapy practitioners can advocate for and train additional personnel to provide these key therapeutic services along with the necessary tools to support the entire school population.

Case Example

Carlos, a first-grade student diagnosed with Specific Learning Disability, presented with a high need for movement and constantly rocked in his chair, leading to safety concerns by his teacher; when not rocking, he sat at his desk with his head propped in his hand, and he appeared lethargic. These behaviors made it difficult for Carlos to attend and participate in classroom activities, thereby affecting his academic performance. Moreover, Carlos experienced continuous redirections from his teacher to stop his rocking, creating negative attention during class time. An occupational therapy evaluation determined that Carlos was under responsive to vestibular input, which explained his frequent rocking as an attempt to maintain his level of alertness. The occupational therapist (OT) suggested increasing movement opportunities throughout the day by allowing Carlos to hand out papers and class materials and stand at his desk to work, but these strategies were unsuccessful in increasing Carlos’ participation and engagement in the classroom. After speaking with the teacher, the OT suggested that Carlos trial a flexible seating option (a rocker chair), hypothesizing that the chair would provide a safe means for him to seek the movement he craved, support his optimal arousal level, and bolster his ability to attend and participate in classroom activities.

Carlos’ teacher worked with the OT to develop a data sheet for tracking his progress. The teacher would use interval time sampling to complete a 3-item checklist, 3 times per day for a total of 15 days (3 school weeks). The checklist included the following yes/no questions: (1) Is Carlos sitting with upright posture? (2) Are Carlos’ body and eyes oriented toward the instructional activity? (3) Is Carlos actively engaged in the activity (e.g., raises hand to ask/answer questions; actively participates in the instructional activity, such as writing, typing, cutting, coloring, discussing with peer)? At the end of the 3-week period, the OT and teacher reviewed the data, and the results were promising. In 36 of 45 observations (80% of the time), Carlos met all three criteria. Moreover, Carlos’ teacher expressed to the OT that she was no longer “nervous all the time” about Carlos tipping backwards, falling, and hurting himself, and that Carlos mentioned repeatedly how much he loved his “special chair.” Carlos’ teacher reported she was having positive interactions with Carlos each day as opposed to constantly redirecting him to stop tipping his chair, sit up, and pay attention. Carlos’ self-esteem had improved; he was often the first student to raise his hand to offer a response and the first student picked to be a learning partner by his peers. Carlos’ teacher asked the OT if she could have more rocker chairs in her classroom. A conversation about flexible seating in a general education classroom had begun and the OT was thrilled!

Conclusion

Occupational therapy supports student participation in school, including adaptability, social behavior, and academic performance. Identifying sensory-based needs and their effect on participation across various school contexts is one component of a comprehensive evaluation of school function that occupational therapy can offer. Practitioners can help students and staff members embed sensory strategies and tools within existing school routines to support participation in both curricular and extracurricular activities. Additionally, practitioners are in an excellent position to design and facilitate professional development opportunities for administrators, teachers, and paraprofessionals while advocating for district and schoolwide initiatives that support the participation of all students.

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About the Sensory Integration & Processing SIS

The Sensory Integration & Processing (formerly Sensory Integration) Special Interest Section (SIPSIS) focuses on the research and development of sensory integration theory, assessment, and intervention as applied in occupational therapy practice. Sensory integration is used to enrich the occupational performance and participation of individuals with a variety of disabilities across the lifespan by focusing on the neurobiological, sensory, and praxis foundations of occupation.

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- Tiffany Northrop**, MA, OTR/L, works as an Occupational Therapist for School District 89 in Maywood, Illinois—a suburb of Chicago. She can be reached at tenorthrop@gmail.com.

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