Providing Occupational Therapy Using Sensory Integration Theory and Methods in School-Based Practice

The American Occupational Therapy Association (AOTA) recognizes sensory integration (SI) as one of several theories and methods used by occupational therapists and occupational therapy assistants working with children in public and private schools to improve a child’s ability to access the general education curriculum and to participate in school-related activities. These methods are used to achieve the overarching goal of occupational therapy to improve the client’s health and participation through engagement in everyday activities or “occupations” (AOTA, 2008). SI methods are used within occupational therapy when sensory-related issues are suspected to affect a child’s ability to access the general and special education curriculum, behave adaptively, and participate in activities at school. It is estimated that, within the general population, approximately 5–10 percent of children may have SI dysfunction (Ahn, Miller, Milberger, & McIntosh, 2004).

Operating Within State and Federal Mandates in Public and Private Education

According to AOTA’s (2009b) Scope of Practice, occupational therapists and occupational therapy assistants are required to abide by statutes and regulations when providing occupational therapy services. State laws and other regulatory requirements typically include statements about educational requirements to practice occupational therapy, procedures to practice occupational therapy legally within the defined area of jurisdiction, the definition and scope of occupational therapy practice, and supervision requirements (p. 283).

Specific to public schools are parameters established by federal law such as the Individuals with Disabilities Education Improvement Act (IDEA, 2004), No Child Left Behind (NCLB) of 2001, and Section 504 of the Rehabilitation Act of 1973 mandating a child’s right to a free, appropriate public education that includes occupational therapy as a related service. General education initiatives such as early intervening services and special education criteria for eligibility and related services are determined by each state on the basis of federal code. Local education agencies must provide, at a minimum, services mandated by federal and state levels and are able to provide a creative range of services at their own discretion.

Occupational therapists and occupational therapy assistants working in public schools may provide intervention to students in general education under early intervening services (e.g., using a response-to-intervention approach) and to students who are eligible under IDEA or Section 504 of the Rehabilitation Act of 1973. A child determined by the educational team to have a disability under IDEA must have an individualized education program (IEP). This includes a statement of the child’s present level of functioning and the impact of the disability on the child’s involvement and progress in the general education curriculum (§300.320(a)(1)(i)). The IEP must contain “a statement of the special education and related services…based on peer-reviewed research to the extent practicable, to be provided to the child, or on behalf of the child”

*Occupational therapists are responsible for all aspects of occupational therapy service delivery and are accountable for the safety and effectiveness of the occupational therapy service delivery process. Occupational therapy assistants deliver occupational therapy services under the supervision of and in partnership with an occupational therapist (AOTA, 2009a). When the term occupational therapy practitioner is used in this document, it refers to both occupational therapists and occupational therapy assistants (AOTA, 2006).
(§300.320(4)) in order for the child to progress on annual IEP goals, to be involved and make progress in the general education curriculum, and to be educated and participate with other children. A child determined by the school district to be a “qualified student with a disability” under Section 504 must have a 504 Plan that identifies the accommodations, modifications, and services needed. Occupational therapists and occupational therapy assistants may be participants in the development of the 504 Plan.

Application of SI Theory and Methods in Schools

Clinical and Professional Reasoning

Clinical reasoning based on professional training, evidence, and expertise guides the occupational therapist’s selection of the use of one or more frames of reference such as SI (Burke, 2001; Parham, 1987; Schaaf & Smith Roley, 2006; Schell & Schell, 2008). While concepts of SI theory are included in the entry-level education of occupational therapists (Jacobs, Koomar, Mailloux, & Smith Roley, 1999), comprehensive assessment and intervention focused on SI is considered advanced-level practice (Smith Roley & Jacobs, 2008). Opportunities for additional knowledge and skills are available to therapists through workshops, publications, mentoring, and post-graduate certification in SI, including administering and interpreting the Sensory Integration and Praxis Tests (SIPT).

SI theory describes information processing as a neurobiological process requiring the detection, assimilation, organization, interpretation, and use of sensory information that allows an individual to interact adaptively within the environment in daily activities at home, at school, and in other settings (Ayres, 1972b). The theory of SI is grounded on research in neuroscience (Ayres, 1972a; Bundy, Lane, & Murray, 2002; Smith Roley, Blanche, & Schaaf, 2001) and occupational science (Blanche & Parham, 2001; Parham, 2002; Smith Roley & Jacobs, 2008). Occupational therapy provides evaluation and interventions designed to identify, prevent, and remediate deficits related to the child’s sensory sensitivities, sensory–perceptual skills, motor and praxis skills, and related patterns of performance (Ayres, 1972b, 1975; Bundy et al., 2002; Dunn, 2001; Mulligan, 1998a, 1998b, 2000; Schaaf & Smith Roley, 2006; Smith Roley et al., 2001; Smith Roley, Mailloux, Miller-Kuhaneck, & Glennon, 2007). The outcome of occupational therapy using SI theory is to improve function in various daily occupations (Ayres, 1979; Bundy et al., 2002; Dunn, 2001; Parham & Mailloux, 2004; Roley, Blanche, & Schaaf, 2001; Spitzer, Roley, Clark, & Parham, 1996).

Evaluations

Occupational therapy practitioners working in schools consider existing academic and nonacademic expectations when determining the child’s academic, adaptive, and functional needs. Services are recommended as a result of the findings to support success in reaching positive yearly and long-term outcomes in education. Evaluations in the educational setting must include a review of educational information including (1) information and evaluation results provided by the parents, (2) assessment or observation results related to performance in the current classroom or on local or state assessments, and (3) teacher and other service provider observations (§300.305). In addition, therapists may review pertinent medical information; interview teachers, parents, and the student; observe in natural settings to observe performance; and use various assessments, including standardized tests (Clark & Coster, 1998). Multiple

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It is important to note occupational therapy’s use of the term sensory integration. A. Jean Ayres developed her sensory integration theory originating from the work of Sherrington (1906, cited in Ayres, 1972a). Using supportive evidence from neuroscience and applied science, this theoretical model supports its application in occupational therapy practice. The trademarked term Ayres Sensory Integration™ is used to describe the use of sensory processing and sensory-related methods as guided by Ayres’s sensory integration theory. Occupational therapy practitioners are the key professionals using this sensory integration therapy founded on principles of neuroscience (Reeves, 2007).
sources of information must be used when determining educational disabilities. The occupational therapist selects a variety of measures that include developmental and skill-based observations in addition to those that identify occupational and sensory strengths and weaknesses. The occupational therapist interprets the test findings relative to the child’s performance skills, patterns of engagement, and ability to participate.

The evaluation specific to SI includes performance measures of the child’s ability to adapt, organize, and integrate sensory information in the environment that affects participation in academic and nonacademic activities at school. Sensory deficits are complex and include various patterns of perceptual, motor, and praxis difficulties (Parham & Mailloux, 2004) affecting the speed and accuracy of learning as well as variations in sensory responsiveness (Ayres & Tickle, 1980; Dunn, 1999) affecting emotional well-being (Ayres, 1979) and social competencies, including play (Mailloux & Burke, 2008).

Structured and unstructured assessments of sensory responsiveness, sensory perception, motor skills, and praxis are essential features of the evaluation (Windsor, Smith Roley, & Szklut, 2001). Multiple data sources should be used when evaluating skills and performance in SI.

Several structured screenings and assessments have been developed for children:

- **DeGangi Berk Test of Sensory Integration** (DeGangi & Berk, 1983) is a preschool screening focused on sensory-based postural and motor functions.

- **Sensory Integration and Praxis Tests (SIPT)** (Ayres, 1989, 1998) is a standardized performance measure used to diagnose sensory integrative dysfunction related to learning and behavior. Professionals using this tool must complete postgraduate training leading to certification in the administration and interpretation of the SIPT and related measures. The SIPT (Ayres, 1989, 1998) is a series of 17 individual tests that provide information on visual perception, visual–motor and fine-motor performance, construction, tactile discrimination, tactile sensitivity, kinesthesia, vestibular functions including post-rotary nystagmus and balance, bilateral motor control, and praxis, including following verbal instructions, sequencing, oral–facial imitation, and imitation of body gestures. This test is predictive of academic function especially math and reading abilities (Parham, 1998).

- **Sensory Processing Measure (SPM)** (Miller-Kuhaneck, Henry, Glennon, Parham, & Ecker, 2007), for home and school, is an integrated system of rating scales that enables assessment based on parent and educational staff report of sensory processing issues, planning and ideas, and social participation in elementary school-age children.

- **Sensory Profile** (Dunn, 1999), *Infant/Toddler Sensory Profile* (Dunn, 2002), and the *Sensory Profile School Companion* (Dunn, 2006) are standardized questionnaires that focus on the student’s sensory processing performance patterns within the natural context.

Unstructured assessments may include direct observation of the child’s performance in a variety of tasks to analyze the sensory–motor and cognitive demands of the activities, the social and physical characteristics of the environment(s), the effectiveness of the student’s performance skills and patterns in those activities and environments, and assessments of neuromotor functions via clinical observations (Blanche, 2002; Wilson, Pollock, Kaplan, & Law, 1994) and play performance (Knox, 2008; Skard & Bundy, 2008).

**Intervention and Service Delivery**

The team determines services necessary for the child to access general education and benefit from special education on the basis of the child’s educationally related needs. Guided by the identified needs and IEP goals of the child, the occupational therapist working in collaboration with the student and the IEP team determines the most appropriate and effective interventions and service delivery models to address the goals. By definition, occupational therapy services are a collaborative process used for the benefit of
individuals, populations, and organizations (AOTA, 2008). Related to a child’s classroom placement, IDEA requires that “removal of children with disabilities from the regular educational environment occurs only if the nature or severity of the disability is such that education in regular classes…cannot be achieved satisfactorily” (34 C.F.R. 300.114(a)(i)).

Occupational therapy interventions can occur in a variety of settings to support the child’s success within the least restrictive environment (LRE). The context of service delivery can include locations at the school such as the classroom, playground, lunchroom, bathroom, or therapy room and off-site locations within the community. Interventions may include one or more of the following types of occupational therapy interventions, preparatory methods, purposeful activities, and occupation-based interventions, depending on the needs of the child and identified outcomes.

Occupational therapy services in schools include the application of specialized knowledge and skills to facilitate adaptive responses the children need to support their learning and behavior. Consultation and direct intervention are both aspects of the service. As related to the use of SI interventions, this may include education that reframes the understanding of the sensory-related concerns; recommendations that incorporate sensory–motor activities throughout the day such as before, during, and after school; and environmental modifications that assist the student’s school-related performance. Sensory activities directed by the occupational therapist can be embedded into the classroom routine that can be carried out by the teacher, instructional aides, or parent volunteers. It also may include direct intervention that address the underlying sensory, motor, and praxis concerns through therapeutic use of environment affordances such as mats and swings that provide opportunities for moving through space; climbing in, over, and under large equipment; falling safely onto matted areas; and rearranging the equipment.

Characteristics of the SI approach are outlined in the work conducted by several researchers on adherence to fidelity to the intervention (Parham et al., 2007). Table 1 provides examples of OT intervention approaches using a SI frame of reference. Table 2 provides case examples. The choice of interventions is guided by research regarding the effectiveness of the intervention related to the identified goals for the child.

Outcomes

The federal NCLB and IDEA are two of the most important federal laws relating to the outcomes of education for children with and without disabilities. NCLB seeks to improve accountability for the outcomes of education for all children, and IDEA ensures that children with disabilities will have individualized services to meet unique needs in order to benefit from and appreciate positive outcomes of public education. Both NCLB and IDEA endorse the need for an evidence-based education approach. NCLB stresses accountability as measured by the “use of effective methods and instructional strategies that are based on evidence-based practice” (Sec. 1114 (b)(1)(B)(ii)). IDEA 2004 states that the child’s IEP will provide “a statement of the special education and related services and supplementary aids and services, based on peer-reviewed research to the extent practicable” (Sec. 614(d)(1)(A)(i)(IV)).

Occupational therapy using SI theory and methods is designed to improve a person’s ability to interact adaptively in the environment, learn, behave, and to prevent future adaptive difficulties and thus improve quality of life. The efficacy of occupational therapy’s use of SI has been investigated by several researchers over the past 35 years. Critical review of the literature has provided evidence of efficacy as well as limitations in the design of several studies. Examples of studies supporting occupational therapy using SI theory and methods are provided in Table 3.

Through accurate functional baseline data, measurable student goals, and data collection to monitor a child’s successful participation in the natural environment, occupational therapists provide accountability for a child’s progress in occupational therapy intervention as it relates to education. Goal attainment scaling
Table 1. Approaches and Sensory Strategies for Occupational Therapy Intervention

<table>
<thead>
<tr>
<th>Occupational Therapy Approaches</th>
<th>Examples of Sensory-Related Strategies</th>
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<tbody>
<tr>
<td>Create, Promote Health and Participation</td>
<td>• Create a class for parents and/or educational staff to teach the relationships among sensory processing, learning, and behavior</td>
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<td></td>
<td>• Promote increased physical activity for students to improve physical and mental health and cognitive and social performance</td>
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<td></td>
<td>• Support installation of a variety of equipment available at schools and public playgrounds to promote a diversity of sensory play experiences</td>
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<td>• Design sensory-enriched classrooms with a variety of seating options, as well as opportunity for tactile, movement, and proprioceptive experiences throughout the day</td>
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<tr>
<td>Establish/Restore Performance Skills and Performance Patterns</td>
<td>• Design activities rich in tactile, vestibular, and proprioceptive information that increase body awareness needed during activities of daily living</td>
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<td>• Facilitate the development of appropriate SI and motor-planning skills needed for organizing materials, completing tasks within an appropriate time frame, and adapting to transitions</td>
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<td></td>
<td>• Establish/restore mobility needed for social and object play</td>
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<td></td>
<td>• Provide controlled sensory input through activities that require increasingly more complex adaptive responses to novel activity to support ability to engage in group activities with peers</td>
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<tr>
<td>Maintain Student Ability to Engage in and Cope With School-Related Activities</td>
<td>• Structure sensory environment to meet the student’s needs such as reducing distractions and improving attention to salient auditory and visual information</td>
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<td>• Teach sensory strategies for emotional, physiological, behavioral, motor, and social self-regulation</td>
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<td>• Maintain ability to organize behavior by providing scheduled sensory breaks and sensory accommodations such as changing the size, texture, and location of the desk</td>
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<td>• Maintain peer relationships by supporting and compensating for motor planning needs in age-appropriate games and sports</td>
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<td></td>
<td>• Maintain student productivity by providing compensation techniques for sensory and motor-planning deficits using study carrels, visual timers, weighted vests, alternate seating arrangements, modified writing tools, paper, and other assistive technology</td>
</tr>
<tr>
<td>Modify Activity to Help Student Compensate for Sensory, Motor, and Praxis Deficits</td>
<td>• Through collaborative consultation with education staff and parents, develop strategies for modifying the sensory, motor, or praxis demands of assignments to increase student productivity</td>
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<td></td>
<td>• Support student participation in general curriculum by modifying sensory and motor-planning (praxis) demands of activity</td>
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<tr>
<td></td>
<td>• Structure or modify the environment to support the student’s sensory, motor, motor-planning, and self-regulatory capacities and needs</td>
</tr>
<tr>
<td>Prevent Barriers to Participation and Improve Safety</td>
<td>• Prevent inattention, poor posture, and restlessness when sitting for prolonged periods by modifying seating options, allowing sensory breaks, and allowing student to work in various positions</td>
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<td></td>
<td>• Prevent social isolation by providing motor-planning and social strategies to participate with peers</td>
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<tr>
<td></td>
<td>• Prevent socially inappropriate behaviors and behavioral distress or disruption by detecting and meeting sensory and self-regulatory needs</td>
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<tr>
<td></td>
<td>• Prevent injury by providing ergonomic seating and safety strategies for students whose nervous systems fail to register sensory information</td>
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<td></td>
<td>• Prevent barriers to child participation by increasing the understanding of the school district staff regarding the role that SI and praxis play in influencing learning and behavior</td>
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Note. SI = sensory integration.
Table 2. Case Examples

The following vignettes are outlined relative to the *Occupational Therapy Practice Framework: Domain and Process*, 2nd Edition (AOTA, 2008) to illustrate occupational therapy using sensory integrative theory and methods in schools.

Case No. 1 Natasha: Preschool-Age Child

**Evaluation**

**Referral:** Natasha is a 3-year-old child enrolled in a special education preschool. The IEP team recommended an OT evaluation because Natasha has difficulty with classroom transitions and social interactions.

**Occupational Profile**

Natasha’s family and educational team are seeking OT services due to her difficulty with transitioning and coping in the classroom. Natasha is sensitive to noise, cries, and clings to the aide in the classroom. She performs well at skilled tasks. Additional information was gathered from her medical, developmental, educational, and occupational histories. The priorities listed by the teacher and parents include social interactions (friendships) and performance within the flow of the classroom (transitions).

**Evaluation and Analysis of Occupational Performance**

**Interview data:**
- *Speech and language therapist report:* Receptive language is below average and decreases when there is noise in the room.
- *Teacher report:* Natasha has difficulty adapting to the flow of classroom activities. She needs an exceptional amount of attention from adults in order to stay calm. Natasha is able to cognitively perform the tasks but is overwhelmed with the noise and movement in the room.
- *Parent report:* Natasha’s mother is concerned about her unhappiness at school and her inability to play and make friends.

**Observation data:**
- Natasha prefers to sit alone or next to an adult.
- Natasha needs extra cues to pay attention. Although physically capable, she does not complete the fine-motor preschool activity without adult direction.
- She does not initiate social interaction with other children and becomes irritable when children come near her.
- She cries when entering the lunchroom or when a group of noisy children run past her during recess.
- She does not like to go to lunch and refuses to eat anything but chips.

**Test data:**
- Infant/Toddler Sensory Profile demonstrates inefficient sensory self-regulation and sensory modulation, poor tactile discrimination, poor motor planning, and increased auditory sensitivity.
- Knox Preschool Play Scale shows immature play patterns.
- Adequate cognitive performance (from IQ measures).
- Adequate fine-motor performance.
- Miller Function and Participation Scales demonstrates delays in gross-motor and visual–motor skills.

**IEP Goals:**
- Natasha: Will transition between classroom activities independently 4 out of 5 transitions for 3 days.
- Will sustain adult-facilitated interaction with her peers during free play for 5 minutes during a 15-minute observation 4 out of 5 free play periods.
- Will carry out verbal instructions with visual cues 4 out of 5 opportunities with 80% accuracy.

**OT Intervention Plan Includes the Following Goals:**
- OT is provided within the classroom setting during routine activities. Natasha’s response to intervention in relation to learning, behavior, and adjustment to preschool will be monitored closely for progress and signs of a disorder in SI. Changes to the service delivery may be recommended, as needed, to the IEP team.

**OT Intervention Process and Strategies:**
- Natasha: Will regulate her responses to environmental stimuli to remain calm during routine class transitions.
- Client Level:
  - Increase sensory modulation through the use of heavy work activities.
  - Improve vestibular spatial body awareness through moving on swings and locating visual and auditory targets.
  - Improve adaptive responses and motor planning to increase competence when faced with dynamic activities and overall repertoire of play skills.
I.I. Statements

Table 2. Case Examples (cont.)
Case No. 1 Natasha: Preschool-Age Child (cont.)

Intervention (includes, but not limited to, the following ideas) (cont.)

- Will self-regulate her responses to tactile stimuli to sit next to several peers and focus on the activity during playground and eating activities.
- Will motor plan her body movements to engage in preschool play.
- Will improve spatial location of sound relative to the position of her body in the classroom with and without background noise.

Activity Level:
- Increase texture and weight of materials used during class activities.
- Use visual cues for improved independence during familiar sequences and routines.

Environmental Level:
- Before class, Natasha will arrive early and will enter classroom prior to other children to gradually adjust to the increased noise and pace of the day.
- Natasha will receive visual cues and tangible transition prompts such as a visual schedule to provide advanced notice of classroom activity changes.
- Natasha will be provided with a variety of seating options during circle time such as a bean bag chair, rocking chair, ball chair, or cube seat.
- Seating will be arranged near an adult.

Natasha:
- Will regulate her responses to environmental stimuli to remain calm during routine class transitions.
- Will self-regulate her responses to tactile stimuli to sit next to several peers and focus on the activity during playground and eating activities.
- Will motor plan her body movements to engage in preschool play.
- Will improve spatial location of sound relative to the position of her body in the classroom with and without background noise.

Outcomes

Outcomes were reported by members of the IEP team:

Performance Skills:
- Improvement noted in all skill areas: sensory–perceptual skills, motor and praxis skills, emotional regulation skills, cognitive skills, and social communication skills.

Performance Patterns:
- Easier transitions.
- Increased attention.
- Developed friendships.
- Sustained participation during classroom activities without withdrawing.
- Teacher and parent are pleased that Natasha is able to participate in her preschool program and appears happier at school.

Adaptation:
- Improved self-regulation and adaptation in the preschool routine.

(continued)
Table 2. Case Examples (cont.)

Case No. 2 Billy: Elementary School-Age Student

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<th>Evaluation</th>
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**Referral:** Billy is a 7-year-old student in a general education classroom environment. An OT evaluation was requested due to Billy's extremely poor handwriting.

**Occupational Profile**

Billy's guardians and educational team requested an OT evaluation due to his difficulty with writing, attention, and peer relationships. Information was obtained from the medical, developmental, educational, and occupational histories. Priorities include improving Billy's ability to meet state standards in Language Arts, that is, complete written work legibly, and to adapt to the social and prevocational expectations in first grade by engaging with peers and staying on task at school.

**Evaluation and Analysis of Occupational Performance**

**Interview data:**

**Teacher report:**
- Billy has above-average academic ability but completes less than half of his assignments in the proper amount of time.
- Billy does not interact with his peers.
- He expressed concerns that as the demands of school increased, Billy was going to fall further and further behind.
- Billy has poor use of his hands for tasks, such as opening his lunch containers and managing classroom tools.
- Billy's writing is illegible.

**Parent report:**
- He has no friends.
- He has difficulty comprehending simple verbal instructions.
- He has unusual habits and rituals.
- He has poorly established patterns of daily activities, such as getting ready to go to bed or mealtimes.

**Test data:**

Sensory Integration and Praxis Tests and clinical observations results:
- Visual–perception tests within normal limits.
- Visual–motor tests fall 1–2 standard deviations below the mean.
- Visual construction test scores fall in the high average range.
- Poor bilateral motor control.
- Poor oral praxis and postural praxis.
- Poor tactile discrimination.
- Poor posture and eye control.
- Decreased prone extension and supine flexion.

*Sensory Processing Measure–Home Form (Miller-Kuhaneck et al., 2007)* revealed definite differences in social participation, movement, tactile functions, body awareness, and ideas and planning.

*Sensory Processing Measure–Main Classroom Form* revealed definite differences in response to movement and body awareness; he is easily overwhelmed with auditory and visual activity in the environment.

Classroom handwriting portfolio was compared with peers to determine discrepancy.

**IEP Goals:**

**Billy:**
- Will be able to write 3 legible sentences in his journal during a 20-minute writing period 4 out of 5 opportunities.
- Will stay on topic and remain in his seat for the duration of a 15-minute social studies lesson 4 out of 5 opportunities.
- Will participate appropriately in a structured playground activity with

**OT Intervention Plan Includes the Following Goals:**

OT was recommended to improve visual–motor control and improve overall attention.

OT to be provided to student in a specially equipped environment, and consultation to be provided to the IEP team members

**Billy:**
- Will organize visual–motor information in order to write legible words.

**OT Intervention Process and Strategies:**

The OT will facilitate adaptive responses through provision of sensory and motor challenges through the following interventions:

**Client Level:**
- Use weight-bearing and heavy work activities to increase strength of Billy's trunk and upper extremities.
- Increase exploration of multiple textures, sizes, and shapes to improve sensitivity and stereognosis in his hands.
### Table 2. Case Examples (cont.)

#### Case No. 2 Billy: Elementary School-Age Student (cont.)

<table>
<thead>
<tr>
<th>Intervention (includes, but not limited to, the following ideas) (continued)</th>
<th>Activity Level:</th>
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<tr>
<td>one other child without leaving the activity or arguing with the child for 10 minutes during the recess or lunch break 2 out of 3 opportunities.</td>
<td>• Instruct teacher in kinesthetic and visual support method to re-teach fundamentals of handwriting.</td>
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<tr>
<td>• Will organize somatosensory input from his body to imitate and follow visual directions during structured playground activities.</td>
<td>• Use weighted pencils, pencil grips, and paper with highlighted areas.</td>
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<tr>
<td>• Will remain comfortably seated and regulate his attention during instruction so that he remains focused and on task during social studies.</td>
<td>• Allow Billy to do some of his work while standing, ball-sitting, or lying on his stomach.</td>
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<tr>
<td>• Will confidently access playground equipment and perform in recess and physical education games with peers.</td>
<td>Environmental Level:</td>
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<td>• Provide written text to copy rather than copying from blackboard.</td>
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<td>• Provide written instructions and pictures of daily sequences of activities, with times and locations.</td>
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<td>• Allow structured time for movement throughout the day as needed.</td>
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#### Outcomes

Outcomes that were reported by IEP team members:

**Occupational Performance:**
- Improved penmanship and Language Arts skills.
- Increased attention to topic.
- Increased amount of time spent focused and ready to learn, sitting still and upright in the chair.
- Increased self-determination and independent engagement in structured activities.
- Improved participation and organization of behavior in daily routines.
- Increased spontaneous peer interaction during academic tasks, lunchtime, and playground activities.

(continued)
Table 2. Case Examples (cont.)

Case No. 3 John: Middle-School Student

Evaluation

Referral: John is 12 years old and entering middle school. The IEP team requested an OT evaluation because he cannot organize his belongings and schedule or find his way around the middle school campus and is experiencing high anxiety, refusing to go to his new school. While psycho-educational assessments reveal adequate cognitive abilities, the IEP team members report escalating concerns related to his ability to keep up with his peers academically and physically.

Occupational Profile
John’s family and the educational team requested an OT evaluation due to his difficulty finding his way around his school and his resulting in anxiety and depression. Additional information from medical, developmental, educational, and occupational histories was reviewed. Team priorities include increasing John’s confidence and independence in performing school curriculum activities and ability to navigate around school without getting lost.

Evaluation and Analysis of Occupational Performance

Interview Data:
Parent reports that John:
1. Gets lost easily.
2. Works best in a self-contained classroom with group transitions; however, the middle school is not structured this way.
3. Demonstrates poor spatial abilities such as when aligning numbers in math.
4. Talks his way out of anything he finds difficult.

John reports that he:
• Has anxiety attacks.
• Feels sick during rides in the car.
• Feels stupid.
• Wants to be home-schooled.
• Spends most of his day in sedentary activities.
• Cannot tolerate backward movement of his head.
• Cannot play desired team sports at the skill level of his peers and as a result feels rejected and humiliated by other children.

Data From Record Review:
The elementary school file indicates that John is good in academics but rarely finishes written work on time in a legible or organized manner. He is well behaved and liked by peers.
• Teacher noted that John did not volunteer for classroom errands on the school grounds unless he could go with a peer.
• John often lost his completed assignments in the classroom, later to be found lost in his messy desk or in unlikely places in the classroom.

Observation Data:
• Below-age level on Beery Visual Motor Integration and Visual Perception
• Within normal limits on Beery (fine) Motor Coordination in tracing precision.
• Poor 2- and 3-dimensional construction ability.
• Poor balance with eyes closed.
• Self-reports of dizziness on playground swings.
• Poor disassociation of his head, neck, and body.
• Excessive talking to avoid performing during the evaluation observation.
• Inability to locate familiar landmarks such as office.

Intervention (includes, but not limited to, the following ideas)

IEP Goals:
John:
• Will arrive at all of his classes independently and on time, for 2 weeks.
• Will attend school and for 8 of 10 days with low levels of anxiety as noted by self-report.
• Will show increased tolerance for bus

OT was recommended for this student in his school setting.

OT Intervention Plan Includes the Following Goals:
John:
• Will identify a strategy out of 3 options (map, written sequence, or self-instruction) that works best for him to get to familiar places.

OT Intervention Process and Strategies:
The OT will facilitate and enhance performance through these interventions:
Client:
• Practice various strategies developed by the OT to improve awareness of the geography of the campus.
• Provide strategies to help John
Table 2. Case Examples (cont.)
Case No. 3 John: Middle-School Student (cont.)

<table>
<thead>
<tr>
<th>Intervention (includes, but not limited to, the following ideas) (cont.)</th>
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</table>
| • Rides as reported by child, guardian, and bus driver 4 of 5 days. | • Will identify, select, and participate in leisure and extracurricular physical activities.
• Will identify age-appropriate leisure time options that are within his ability and interest level such as individually oriented community sports and lessons (e.g., karate, yoga, swimming, chess, arts and crafts). | • Will learn to identify antecedents to the periods of his increased anxiety and utilize relaxation techniques to remain calm when transitioning from home to school and between classes. |
• Will explore junior high extracurricular activities and clubs |   |
|   | become aware of and identify his own sensory strengths, sensitivities, and preferences. |
|   | • Increase proprioceptive “heavy work” activities to improve sense of body in space. |
|   | • Avoid intense vestibular activities. |

**Activity Level:**
• Provide cues, landmarks, and signs that John can record as he walks to his class. |
• Enroll John in extracurricular activities such as karate, yoga, swimming, or rock climbing |

**Environmental Level:**
• Pair John initially with a peer to walk to class. |
• Make a list of visual details as landmarks, take pictures, or put room numbers on an index card color-coded for each of John’s classes to enable him to get to different classes. |

### Outcomes

Outcomes that were reported by IEP team members:

**Participation:**
• Self-confidence in his own ability to adapt to and meet the everyday spatial demands of school activities, greatly reducing stress at school. |
• Self-awareness and self-determination to seek advice in devising strategies to compensate for things that are uncomfortable or intimidating. |
• Arrives at class on time. |
• Able to finish and find 75% of his assignments independently. |
• No longer resists going to school. |
• Initiates participation in leisure activities with peers, such as school clubs. |

**Client Satisfaction:**
• John is confident that he can travel between classes without assistance. |
• Parents report that John is much happier at home and at school. |
• There are no further reports of depression or anxiety. |

*Note.* IEP = individualized education program; OT = occupational therapy; SI = sensory integration.
### Table 3. Occupational Therapy Service Continuum and Curriculum-Related Outcomes

The following table provides samples of studies supporting various SI-related methods and outcomes in school-based practice. It is not an exhaustive list of the available evidence.

<table>
<thead>
<tr>
<th>Examples of OT Focus Areas Using SI Theory in School-Based Practice</th>
<th>Projected Educational Outcomes</th>
<th>Examples of Resources and Evidence</th>
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</table>


**Table 3. Occupational Therapy Service Continuum and Curriculum-Related Outcomes (cont.)**

<table>
<thead>
<tr>
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<tr>
<td>Sensory functions and sensory–perceptual skills influencing the readiness to learn</td>
<td>This study analyzed which sensory test variable predicted response to therapy. Participants with hyper-responsiveness such as tactile defensiveness and gravitational insecurity and orienting to an air puff responded better than those with under-responsiveness or who failed to orient to sensory input.</td>
<td>Ayres, A. J., &amp; Tickle, L. S. (1980). Hyper-responsivity to touch and vestibular stimuli as a predictor of positive response to sensory integration procedures by autistic children. <em>American Journal of Occupational Therapy</em>, 34, 375–381.</td>
</tr>
<tr>
<td>Sensory–perceptual and fine-motor skills affecting penmanship and handwriting</td>
<td>SI approaches improved play and interactions with others and with toys and other objects, as well as tolerance for vestibular and proprioceptive sensations, and led to greater sensory exploration of the environment. Sensory exploration improves as a key feature of independent learning intervention when OT with a SI approach was used to address symptoms related to learning disorders.</td>
<td>Schaaf, R., Merrill, S., &amp; Kinsella, N. (1987). Sensory integration and play behavior: A case study of the effectiveness of occupational therapy using sensory integrative techniques. <em>Occupational Therapy in Health Care</em>, 4(2), 61–75.</td>
</tr>
<tr>
<td>Participation in play and leisure, including curiosity and independent learning</td>
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<td></td>
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</tbody>
</table>

(continued)
Table 3. Occupational Therapy Service Continuum and Curriculum-Related Outcomes (cont.)

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<td>Reading</td>
<td>Smooth eye pursuits, which are important in developing reading skills, improved in this study, which demonstrated a reduction in the number of saccades for the intervention cohort and reduced time necessary to accomplish smooth pursuits.</td>
<td>Horowitz, L. J., Oosterveld, W. J., &amp; Adrichem, R. (1993). Effectiveness of sensory integration therapy on smooth pursuits and organization time in children. Pediatrie und Grenzgebiet, 31, 331–344.</td>
</tr>
<tr>
<td>Academic skills</td>
<td>SI intervention methods proved equally as effective as tutoring in improving academic and motor skills with maintenance of gains in motor-skills development. This randomized clinical trial compared OT using SI with tutoring to improve academic and motor skills. Although the SI group did not make greater gains in the initial study, at follow-up 2 years later only the SI group maintained their gross-motor skills.</td>
<td>Wilson, B., Kaplan, B., Fellowes, S., Gruchy, C., &amp; Faris, P. (1992). The efficacy of sensory integration intervention compared to tutoring. Physical and Occupational Therapy in Pediatrics, 12, 1–37.</td>
</tr>
<tr>
<td>Emotional regulation skills resulting in positive behavior</td>
<td>Parents reported increased ability to advocate for their child based on improved understanding of their child’s behavior and validation of their parenting efforts. At the clinic site, waiting room interactions allowed parents time to share experiences and resources with others and expand their understanding of their children.</td>
<td>Cohn, E. S. (2001). Parent perspectives of occupational therapy using a sensory integration approach. American Journal of Occupational Therapy, 55, 285–294.</td>
</tr>
<tr>
<td>Health and wellness</td>
<td>Supporting behavior in preschool-age child, including increased engagement, decreased aggression, less need for intense teacher direction, and decreased mouthing of objects. Using a single-case study design, the researchers found that the child benefited from classic Ayres Sensory Integration, affecting his preschool performance.</td>
<td>Roberts, J. E., King-Thomas, L., &amp; Boccia, M. L. (2007). Behavioral indices of the efficacy of sensory integration. American Journal of Occupational Therapy, 61, 555–562.</td>
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<tr>
<td>Quality of life</td>
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<tr>
<td>Self-advocacy and parent advocacy</td>
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<td>Quality of life</td>
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<td>Positive behavior</td>
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<td>Increased engagement</td>
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<td>Independent work</td>
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### Table 3. Occupational Therapy Service Continuum and Curriculum-Related Outcomes (cont.)

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<tr>
<td>Play</td>
<td>Research suggests that learning is enhanced by emotion, spontaneity, and play, which are the essential ingredients in a SI approach used within OT. Physiological data shows increased cortical blood volume during performance of novel integration activities in a spontaneous, playful manner.</td>
<td>Peyton, J. L., Bass, W. T., Burke, B. L., &amp; Frank, M. (2005). Novel motor and somatosensory activity is associated with increased cerebral cortical blood volume measured by near-infrared optical topography. <em>Journal of Child Neurology</em>, 20, 817–821.</td>
</tr>
</tbody>
</table>

*Note: OT = occupational therapy; SI = sensory integration.*
is a promising method providing therapists the possibility to measure achievement towards customized goals (Mailloux et al., 2007).

Summary

AOTA recognizes SI as one of several theories and methods used by occupational therapists and occupational therapy assistants working with children in public and private schools. Regardless of the theories and methods utilized, occupational therapy practitioners work within the framework of occupational therapy toward the desired outcome of health and participation through engagement in occupations that allow participation in a child’s daily life (AOTA, 2008). When children demonstrate sensory-related deficits that interfere with their ability to access the general education curriculum, occupational therapy using a sensory integrative approach is appropriate.

References


THE REFERENCE MANUAL OF THE OFFICIAL DOCUMENTS OF THE AMERICAN OCCUPATIONAL THERAPY ASSOCIATION, INC.

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This document replaces the 1997 Sensory Integration Evaluation and Intervention in School-Based Occupational Therapy and the 2003 Applying Sensory Integration Framework in Educationally Related Occupational Therapy Practice (previously published and copyrighted by the American Occupational Therapy Association in 2003 in the American Journal of Occupational Therapy, 57 (652–659).

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