Understanding Their World:
Forming Classroom Accommodations and Sensory Activities for Children with Disabilities

Supattra Wongvisate Andrade*
Go For Determination, U.S.A.

"You cannot punish a child who is acting out because of sensory overload"
Dr. Temple Grandin (A professor of animal science who is on the autism spectrum)

Abstract

Children learn by exploring, observing, discovering, experimenting, listening and asking questions. Daily activities can provide greater learning opportunities that allow children to enjoy trying a variety of sensations (e.g., such as dressing, brushing teeth, bathing with warm shower, climbing a tree, catching a ball, riding a bicycle, hugging a soft toy, or smelling the flowers). The more opportunities for children to explore sensory stimuli, the more benefits can be derived from developing cognitive, social, emotional, cognitive, physical, and motor domains more efficiently. However, some children have experienced challenges in their tolerance for sensory inputs and response. Children with disabilities who are associated with Sensory Processing Disorder (SPD) have neurological, biological, and sensory dysfunctions that affect how they perceive and respond to an environment unsystematically. SPD could have a negative influence on children's development of academic learning, social friendship, emotional and mental health (e.g., anxiety, frustration, or depression). Hence, the teachers' roles are important to support children's unique strengths, adaptation, and understanding of different sensory environment stimuli by accommodating classroom activities to meet with their individual needs.

The purpose of this article is to gain better understanding of children with disabilities' behaviors, who might also have symptoms of SPD such as Autism Spectrum Disorder (ASD) and other developmental disabilities, or Attention Deficit Hyperactivity Disorder (ADHD). The classroom accommodations and activities are also emphasized to promote children's success and achievements in learning. This article highlights three primary areas, including: (1) Understanding Sensory Processing Disorder (2) Subtypes of Sensory Processing Disorder

* **ผู้ประสานงานหลัก (Corresponding Author)**
E-mail: andrade.s@fordetermination.org

and (3) Classroom accommodations and activities for children with disabilities (sensory processing issues).

Keywords: Children with disabilities, Classroom accommodations, Sensory Activities

Introduction

I began my career as a special education teacher in 1997; since then I have experienced working closely with students with low functioning autism in the special education classroom. I was always curious about their most intense behaviors such as rocking in a chair, making weird noises, screaming, looking at fans, knocking on the desk, or walking around the classroom. For example, I would pin my focus on only the knocking on the desk and listening to the knocking sound of one student. When I told the student to listen to me and look at me, he just laughed at me very loudly and kept knocking on the desk. Another student, we would call him Moon, liked to flip his fingers with both hands. It was difficult to teach him how to hold the pencil and start writing even one letter from the alphabet. Sometimes, Moon screamed very loud, he acted like he was having a terrible headache. It was out of mind for me to help these students transition into the general classrooms. Eventually, I was able to spend more time working with these students; it showed me how their unique personalities and talents. I'd found that I had started off undervaluing my students' abilities because I had paid attention only to their strange behaviors. I became dedicated to studying more about their behaviors and it led me to be interested in functional behavior analysis and sensory integration for autism. I am writing this article because it is important to be open minded when understanding the world of children with autism or other disorders rather than to criticize or pass judgement on their strange behaviors.

An Autism Poem by Dr. Kerry Magro, Ed.D (A professional speaker and author who is on the autism spectrum)

"I need to have my strengths nurtured. I need extra help at times.
I need you to know that I am unique. I need you to know autism is a spectrum.
And I need you to know that I need to be accepted for who I am" (by Kerry Magro's Facebook).

The human brain organizes sensations into vision, sound, smell, taste, and touch to interpret the information through the senses and respond purposely within the environment. This sensory process is an automatic system to make most people use their body to response effectively and appropriately with others (Prestia, 2004). For example, hugging is a friendship response when we meet someone who is very close. However, hugging could be irritating to the skin for some children who have Sensory Processing Disorder (SPD). They may overreact

or show misbehaviors by interpreting the hugging as painful touch. Murray, Baker, Murray-Slutsky and Paris (2009) noted the article by Case-Smith (2005) that "SPD can be a disorder on its own, but it can also be a characteristic of other neurological conditions and is prevalent in nearly 100% of the children and adults diagnosed with ASDs" (p. 246). These children experience the process of sensory stimuli in different ways, so it is a significant challenge to manage their own behavior appropriately without adults' understanding and support.

This article highlights three primary areas, including: (1) Understanding Sensory Processing Disorder (SPD), (2) Subtypes of Sensory Processing Disorder (SPD), and (3) Classroom accommodations and activities for children with disabilities (sensory processing issues). Using sensory strategies can accommodate a variety of activities that lead to preventing segregation within the inclusive classroom environments. Children have opportunities to expose what their sensory and unique needs are in order to improve academic and social learning achievements in the general classrooms.

I. Understanding Sensory Processing Disorder (SPD)

Sensory processing refers to the competence of the nervous system to obtain delivery, organize, interpret information through the sensory systems, and respond appropriately (Murray, Baker, Murray-Slutsky & Paris, 2009). The brain perceives the incoming information through the senses, processes in order to operate in accurate perceptions, and forms a productive response with the circumstances and environments. All information comes in the body through various sensory systems that include seven senses: sight, sound, smell, taste, touch, vestibular (movement and gravity), and proprioception (body position) (Travnik & Krishnan, December 2019; Georgetown University Center for Child and Human Development, 2011; Richard, 2000). Murray, Baker, Murray-Slutsky and Paris (2009) explained the article by Dunn (2001) that noted, "Model of Sensory Processing, a person's response to sensation is a result of the interaction between two dimensions: neurological thresholds (the level of intensity in incoming stimuli required for the nervous system to notice or react) and behavioral self-regulation strategies (the manner in which the individual responds to such stimuli" (p. 72).

Sensory Processing Disorder (SPD)

The brain has a natural ability to process all sensory information by receiving, organizing, interpreting, and responding appropriately within the environment. An individual's senses receive information from the environment and send all data to the brain to process and perform a functional respond (Goodman-Scott & Lambert, 2015). On the other hand, Sensory Processing Disorder (SPD) is a neurodevelopmental disorder where the brain has difficulty or inability to attach meaning to these sensations normally. If the children have abnormal sensory systems, that can affect negative impacts on them to interact with the

environment, academic learning, emotional and social relationships, adaptive behavior, and motor (Murray, Baker, Murray-Slutsky & Paris, 2009; Richard, 2000). Another is the inability for sensory processing to be distributed normally in the development of children and their regular daily activities. For example, the typical child can recognize and aware of touching hot stove. As the same environment, the child with SPD can be touching a hot stove unaware of safety. Hence, the children with SPD may have trouble perceiving, processing environmental stimuli, and adapting a response after sensory stimulation.

According to Georgetown University Center for Child and Human Development (2011), it discussed the prevalence of children with SPD from one suburban public school in the United States, "Approximately 5% of children in early school age (kindergarten) were found to have a sensory processing disorder according to a parental perception survey (Ahn, Miller, Milberger & McIntosh, 2004)" (p. 1). Furthermore, it showed "...Other sources estimate the prevalence is as high as 10-13% in early school age children without other developmental disabilities (Anzalone, 2004). The number of children with a SPD under the age of 5 is not known. The prevalence of SPD in children with other developmental disabilities is thought to be higher than for children without disabilities" (p. 1). Goodman-Scott and Lambert (2015) also mentioned, "Sensory processing disorder is a complex neurological disorder affecting approximately 5–17% of the population, yet professional counselors often misunderstand and misdiagnose this disorder" (p. 273). Recent research also found sensory processing disorder is a significant concern on social behavior and communication for children with other diagnoses such as Autism Spectrum Disorder and other developmental disabilities, and Attention Deficit Hyperactivity Disorder (Travnik & Krishnan, December 2019; Preis & Mckenna, 2014). According to the National Research Council (2001), it noted, "...the developmental trajectory in sensory regulation significantly impacts the ability of a person with ASD to be socially engaged, attend to the most salient aspects of an interaction, and to appropriately regulate emotions and behavior, all of which directly affect social communication" (Preis & McKenna, 2014, p. 476). Lonkar (2014) mentioned that, "78% of children who are diagnosed with autism, also show symptoms of SPD; however, not all children who are diagnosed with SPD are diagnosed with autism" (p.18).

Seven sensory systems

Figure 1 explains the meaning of individual sensory systems which follows the seven human sensory systems, including: visual, auditory, olfactory, gustatory, tactile, vestibular, and proprioception.

Sensory systems	Identifications
1. Visual system	This system is responsible for sense of sight to identify what we see around us. It processes information to understand and prepare the response.
2. Auditory system	This system is responsible for sense of sounds to identify what we hear around us. It receives and processes the sounds to understand the messages we hear.
3. Olfactory system	This system is responsible for sense of smells to identify what we smell and the different scents around us. It connects to the memories and experience for responding. For example, Smells from food can make us feel hungry. Connections Therapy Center (September 2016) noted that "...Our sense of smell is also closely tied with our sense of taste. Smell and taste can affect our memories, emotions, and behaviors"
4. Gustatory system	This system is responsible for sense of taste, and it's also associated to chewing, swallowing, and communication. Gustatory system works closely with sense of smell (Olfactory system). The textures, smell, and temperatures can be irritative or impact daily life on how people respond to different food.
5. Tactile system	This system is responsible for sense of touch to identify how we feel and respond when we touch something, and what we've touched. Touch sensations also associate to vibrations, temperature, movement, and pain through the skin.
6. Vestibular system	This system is recognized by sense of balance and movement to identify how the body is positioned in relation to gravity, how fast and how we are moving our body. The vestibular system is controlled by organs in the inner ear. This system is very important for body movement, body posture, bilateral integration, and muscle tone (Oxford Health, 2014).
7. Proprioception	This system is recognized by sense of body positon in space to identify where our body is in direction, and how it is moving and speed. Proprioception let us know how to move our body carefully without using vision (Oxford Health, 2014). Sensory information from joint capsules, muscles, tendons, and skin work together to develop body awareness.

Figure 1. Sensory Systems

II. Subtypes of Sensory Processing Disorder (SPD)

Sensory Processing Disorder (SPD) is divided into three main categories, including: (1) Sensory Modulation Disorder, (2) Sensory-Based Motor Disorder, and (3) Sensory Discrimination Disorder (Travnik & Krishnan, December 2019). Figure 2 is a Sensory Processing Disorder chart that exhibits subtypes of sensory processing disorders developed based on the article of Lonkar (2014), and Miller et al., (2007).

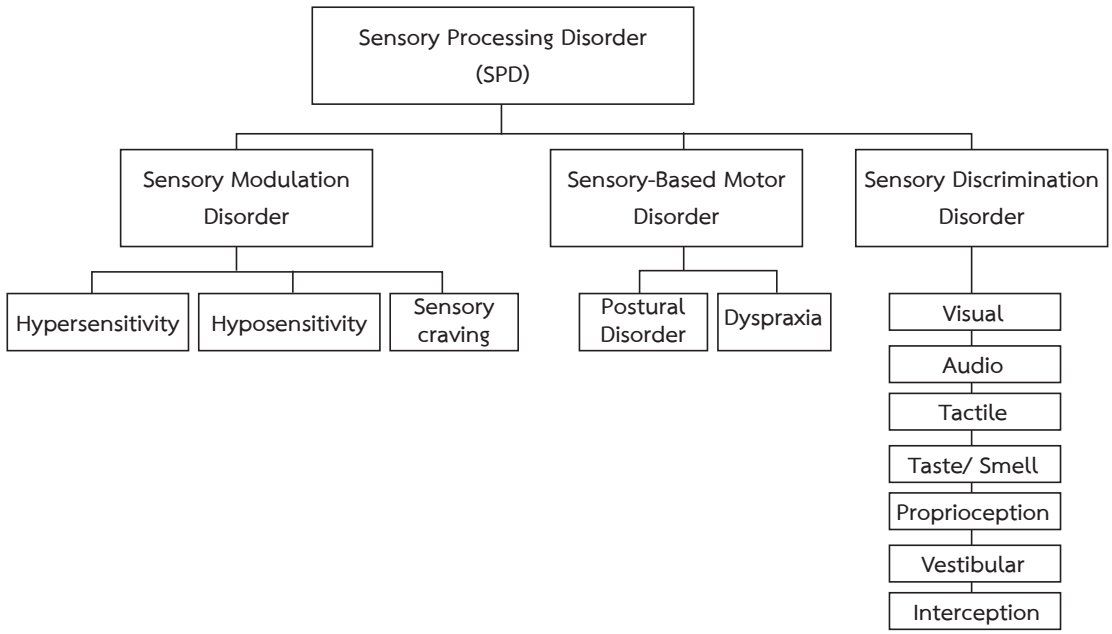

Figure 2. Sensory Processing Disorder Chart

The subtypes of SPD follow three categories:

(1) Sensory Modulation Disorder (SMD): ? "Sensory Modulation refers to the ability to provide an appropriate response to sensory stimuli" (Travnik & Krishnan, December 2019, p. 3). Hence, the children who have SPD draw into the category of Sensory Modulation Disorder; they can have trouble processing sensory input and respond to environmental stimuli inappropriately. These children may show higher sensitive to one or more sensations that SMD is categorized under three subtypes: (1) hypersensitivity (Sensory Over-Responsive: SOR), (2) hyposensitivity (Sensory Under-Responsive: SUR), and (3) Sensory craving.

- Hypersensitivity, when children are hypersensitivity or over-responsivity, they become more sensitive to loud noise and touch (Phelan, December 2019). These children often avoid sensory input; they may show some symptoms of anxiety, extremely upset, and/or discomfort to be within over stimuli in the environment (Lonkar, 2014). Here are some examples of common behaviors of hypersensitivity or over-responsivity:

- Avoid touching such as hugging, brushing teeth, or wearing certain cloths textures.
- Avoid eating certain foods textures or smelling (e.g., oranges, or milk).
- Avoid bright lights or sunlight.
- Avoid loud noises and cover their ears frequently.
- Avoid participating in the social activities and have difficulty in relationships.
- Keep the routine and show extreme aggression while transitioning or during unexpected changes.

● Hyposensitivity, when children are hyposensitivity or under-responsivity, these children have low energy, and low register sensory information of pain in their brain (Travnik & Krishnan, December 2019). Thus, they may take longer to response and unaware of danger (Lonkar, 2014). The children with under response may show some symptoms of self-contained, and quiet personality. There are some examples of common behaviors of hyposensitivity or under-responsivity which are listed the following:

- Late to the classes or late completing assignments/tasks.
- May not notice serious injuries or cry when getting hurt.
- May not notice noxious smells.
- Easily exhausted.
- Unaware of dangers.
- Unaware of the need to use the restroom.
- Slow respond.

● Sensory craving refers to "...when a child cannot get enough sensation in their environment" (Lonkar, 2014, p. 8). The children with sensory craving may often show some symptoms seeking out extra sensory input. Their behaviors attempt to overlook and enjoy intense sensory stimuli of touch, smell, taste, sound, and sight. Lonkar (2014) discussed the article by Miller (2006) that said "children who are sensory craving tend to be explosive or aggressive. Miller says that these children are often labeled as, "troublemaker," "bad," and even "dangerous," and their symptoms are easily confused with better-known, Attention Deficit Hyperactivity Disorder (ADHD)" (p. 8). There are some examples of common behaviors of sensory craving which are listed the following:

- Move or shake head or walk around during reading or writing activities.
- Enjoy eating certain strong flavors foods such as spicy, salty, sweet, sour, etc.
- May not notice the temperature such as go outside in the cold weather without waring a jacket, eat hot noodles without letting it cool drown, etc.
- Enjoy playing aggressive action such as crashing, bumping, and jumping, etc.
- Enjoy listen loud noise.

- Smell, lick, or chew on non-food or uncommon items such as pen, hair, pencils, clothing, etc.

- Become easily angry or upset when a child is told to sit still or stop what hi/she is doing.

(2) Sensory-Based Motor Disorder (SBMD): Sensory-based motor refers to ability to process and organize motor planning for body movement and position. Lonkar (2014) noted the Miller's statement (2006), "...the dysfunction that occurs when the "hidden" proprioceptive and vestibular senses that allow our bodies to move and sense our body position, are impaired" (Miller, 2006, p. 30). Thus, the children who have SBMD may experience difficulty or have trouble with controlling their body, coordination and motor skills. SBMD is categorized under two subtypes: (1) Postural Disorder (PD), and (2) Dyspraxia.

● Postural Disorder (PD): Postural disorder refers to inability to control muscle balance, because the perception of body position is dysfunction. The children with PD may experience poor development of movement patterns, and lack of muscle tone, lower core strength and stability when compare to other children (STAR institute for sensory processing disorder, 2017). Lonkar (2014) noted the Miller's statement that identify a child with PD, "...messy handwriting because they lack the muscle tone in their shoulders and upper bodies to stabilize themselves in an upright position while their fingers keep a just-right grip on a pencil " (Miller, 2006, p. 35). There are some examples of common symptoms of PD which are listed the following:

- Unmotivated to move or active (e.g., jump, run, or hop).

- Show difficulty of body simultaneously/ incoordination and motor skills by using both hands (e.g., riding the bike, hitting or catching a ball, or climbing).

- Show poor balance and fall over easily.

- "Inefficient vestibular (awareness of where he is in space) and proprioceptive (awareness of position of muscles and joints) processing" (Collins & Miller, 2012, p. 47).

● Dyspraxia: Dyspraxia refers to inability to process motor planning, concentration, and/ or execute movements. The children with dyspraxia may have difficulty of using oral skills, fine motor skills and/or gross motor skills that can be disturbed their functional daily activities. Here are some examples of common symptoms of dyspraxia:

- Has poor hand writing and slow to complete writing.

- Show trouble with self-care daily activities (e.g., dressing, buttoning a shirt, or combing hair).

- Has a difficulty chewing and swallowing food.

- Has trouble and get easily upset learning new motor skills due to poor motor skills (e.g., riding a bicycle, or climbing).

- Show slow movements (e.g., walking, running, sitting, or crawling).

(3) Sensory Discrimination Disorder (SDD): Sensory discrimination refers to the ability to recognize, interpret, and understand information of sensory stimuli within the environment such as objects, people, and places. (STAR institute for sensory processing disorder, 2017). Indeed, when children have sensory discrimination disorder, they may have significant challenge to categorize, interpreting information and comparing various details. Travnik and Krishnan (December 2019) identified that "...Children with Sensory Discrimination Disorder (SDD) are able to recognize that there is a sensory stimuli however are unable to differentiate the stimuli or intensity from others..." (p. 4). SDD can be fall off any combination of sensory systems (Miller & Collins, 2012).

- Visual system:
  - Has difficulty reading, recognizing letters and symbols.
  - Has trouble judging the distance between oneself to others.
  - Has difficulty following directions.
- Audio system:
  - Unnoticed and indistinguishing between different sounds.
  - Has difficulty when talking (e.g., too loud, or soft).
  - Seems to ignore conversations with others.
- Tactile system:
  - Has difficulty to categorize what is touching and which parts of body.
  - Has difficulty to analyze what is the right temperature (e.g., foods, or rooms).
  - Has difficulty distinguishing the difference between soft or hard touch, or dime and a quarter.
- Olfactory/Gustatory system:
  - Unable to distinguish the difference between sweet or salty food.
  - Unable to tell the difference between foods which are cooked or burned.
  - Unrecognized familiar smells.
- Proprioceptive system:
  - Has unusual body movement or performs awkward/clumsy.
  - Poor body posture.
  - Trouble distinguishing how much force to use (e.g., throwing the ball, pulling the door, or pushing the table).
- Vestibular system:
  - Poor body movement awareness in space, and gravity.

- Lacks sensation of protecting himself/herself (e.g., falls over, or stumbling easily).

● Interoceptive system: "Many functions of daily life depend on sensory messages from our body organs" (Miller & Collins, 2012, p. 33).

- Unable to recognize how own body feels (e.g., good, worry, upset, or happy).
- Unable to recognize being hungry or too full.
- Has difficulty explaining when body gets sick (e.g., upset stomach or headache).

III. Classroom accommodations and activities for children with disabilities (sensory processing issues)

It is a challenge for teachers to modify accommodations and manage the classrooms that meet the needs and benefits of diverse students in the general classrooms. For children to grow and develop academic, social and emotional learning capacity, teachers need to provide an appropriate learning within a sensory-friendly environment for supporting all individual's needs especially children with disabilities who are associated with sensory processing disorder. The goal of this section is to provide some techniques and strategies for children's sensory needs that teachers may utilize for creating classroom accommodations into the inclusion.

Sensory Systems	Examples of classroom accommodations & activities for SPD (Rohman, December 2019; Seymore, 2016)
1. Visual system	• Remove unnecessary hanging art work or provide specific space free from visual sense over-sensitivity. • Close the door to reduce distractions. • Make sure to not allow too bright a light in the classroom. Teachers may let only sunlight to come in through the windows or dim the lights. • Allow children to wear light sunglasses, if he/or she is very sensitive to the brightness. • Reduce amount of items on a page to decrease visual information. • Use a visual cue or schedule.

Sensory Systems	Examples of classroom accommodations & activities for SPD (Rohman, December 2019; Seymore, 2016)
Should 2. Audio system	• Close the door to minimize sound distractions, and/or provide preferential seating away from noise sources (e.g., away from playground, or hallway). • Help children be aware of anticipated loud noises. • Allow children to wear head phones or ear plugs when needed. • Provide quiet spaces and control classroom volume. • Help children get attention before listening to directions or instructions.
3. Tactile system	• Do not force children to touch materials that are very sensitives. Children may stop learning or interested in new experience, if they are forced too hard. • Provide a different sensory touch experiences within the classroom, and help children explore a variety of tactile senses. • Begin with different tactile activities before teaching motor tasks (e.g., playdough, bean, rice, or sand). • Guide children to be your helper for helping carry something. • Allow children to use tools for avoiding interaction with undesired texture (e.g., spoon, fork, or glove). • Teach children to clean their hands when they feel uncomfortable with undesired texture.
4. Olfactory/ Gustatory system	• Do not force children to eat or take a bite of any foods. • Teachers can be model to help children get familiar with foods by interacting. • Allow children to drink water through a straw. • Be patient, help children to learn slowly and provide opportunities for new choices. • Prepare an appropriate plan, if children need to leave the room due to smells. • Provide social opportunity for children to have lunch or snack with their typical peers.

Sensory Systems	Examples of classroom accommodations & activities for SPD (Rohman, December 2019; Seymore, 2016)
5. Proprioception	• Provide movement breaks or recess during class activities. • Provide free play and a variety of equipment that encourages and allows children to have enjoyable movement. • Allow children to change position or move body frequently such as hands and knees, crawling, or standing up, etc. • Provide sensory supports such as weighted vest, weighted lap pad, weight blanket, or pressure vest, etc. • Provide frequent heavy work or play throughout the day. Teachers may ask for help, so children can have a chance to improve muscles and joints (e.g., pushing chairs, pulling carts, carrying books/ materials, re-arrange classroom furniture).
6. Vestibular system	• Create sensory space for children to explore their senses such as mini trampoline, swing, rocking chair, or sand box, etc. • Provide movement breaks throughout the day. • Build movement into learning opportunities. • Modify tall desk or counter to stand and work. • Provide visual cue of various movements that are acceptable in classroom.

Tips for general sensory strategies
(Morin, December 2019; The American Occupational Therapy Association, 2015).

(1) Classroom Planning, Schedules, and Routines:

- Provide clear daily routine, it can change as little as possible.
- Remind with advanced warning of routine changes.
- Build break time for body movement and relaxation throughout the day.
- Provide visual schedules, directions, class rules and expectations to help children understand easily and clearly.
- Provide clear starting and ending times for each task, or provide another extra time, if needed.
- Provide visuals cues of sensory input choices.

(2) Building self-regulation skills:

- Provide private space or a quiet work area, if needed.
- Allow children to have alternative choices and make their own decisions.

- Allow children to work in different positions (e.g., sitting on the floor, or standing up).
- Teachers should develop sensory and behavior plans and consults with the Occupational Therapist (OT).

(3) Building social participation:

- Provide group work opportunity through social interaction and incorporate peer modeling.
- Promote children leisure skills to enhance enjoyment of classroom activities and daily living.
- Encourage children to develop self-help skills throughout daily activities (e.g., dressing, eating, or cleaning).

(4) Giving instructions and assignments:

- Use clear voice when giving instructions.
- Allow extra time for writing or submitting assignments, if needed.
- Allow children to use pencil grips or raised-line paper for writing.
- Use a highlighter or sticky notes to help children focused.
- Allow children to use speech-to-text software or a computer, if children are nonverbal.
- Allow children to listen to relaxation music while working.
- Reduce some assignments, if they require too much handwriting.

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