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# Supporting Students with Sensory Processing Differences in the Classroom: Development of Educational Resources for Teachers

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**Supporting Sensory Processing Differences in the Classroom:**

**Development of Educational Resources for Teachers**

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## CAPSTONE FINAL PAPER APPROVAL FORM

The Capstone Final Paper is the final product that the OTD students need to complete to report his/her Capstone Project and his/her Capstone Experience.

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We, the undersigned, recommend that the Capstone Final Paper completed by the student listed above, in partial fulfillment of the degree requirements, be accepted by the Georgia State University.

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## Abstract

Sensory processing differences (SPD) refer to a condition in which an individual has difficulty interpreting and responding to sensory information that they receive. Research has indicated that 5-15% of children may experience SPD and that can negatively impact their ability to participate in a school setting. Despite the impact on classroom participation, there is limited research regarding teacher training and awareness on this topic. This capstone project sought to expand elementary teacher knowledge of SPD and classroom-based supports. The project consisted of the development of educational resources for teachers. These resources were developed by a three-step process, consisting of literature analysis and synthesis, consultation with experts in the field, and an analysis of a private school that serves individuals with sensory differences. This process resulted in the creation of four infographics and an online training course for distribution to elementary teachers. Through this, teacher knowledge about supporting students with sensory processing differences was expanded.

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## Summary

**Background:** Sensory processing disorder, referred to in this paper as *sensory processing differences* (SPD) is defined as a condition in which an individual's brain has difficulty receiving and responding to information that is perceived through their senses (Goodman, 2023). The estimated prevalence of students with SPD ranges from 5-15% (Galiana-Simal et al., 2020). Research indicates that SPD can have a negative impact on a student's experience at school, leading to decreased attention and academic performance (Howe & Stagg, 2016; Ashburner, Zivani, & Rodger, 2008). To support educational participation, it is important to meet the sensory needs of students within their daily routines. Dunn (2007) emphasized the importance of providing children with sensory interventions within their natural environment to support the generalization of these strategies. School-based occupational therapists provide a variety of sensory strategies for students when their sensory processing is identified to interfere with their ability to participate in education, such as direct provision of strategies or training of school professionals (AOTA, 2015). Teacher consultation and education are of particular importance for supporting these students, as they are directly involved with them throughout their time in the educational setting. Dunn (2007) suggests that occupational therapists should emphasize consultation with teachers to analyze the challenging environmental aspects for the child and offer strategies for use within their daily routine. Current research has indicated that school professionals have limited training related to SPD and classroom-based sensory strategies (Miller-Kuhaneck & Watling, 2018; Quinn, Pedlow, & Bleakly, 2022).

**Purpose:** The purpose of this capstone project was to address the question, how can elementary teachers support students with sensory processing differences? Through investigation of this

question, the goal was to decrease the knowledge gap surrounding sensory processing differences in the school setting and to increase support for students with these needs.

**Specific Aims:** The goal of this capstone was addressed through completing an in-depth literature review, key-informant surveying, and an analysis of current practices utilized at the capstone site. The literature review provided background information regarding sensory processing differences and current "best practice" strategies for supporting students with sensory needs. An online survey was conducted with school-based occupational therapists that gathered information related to supporting sensory needs at school and collaborating with teachers. Furthermore, an analysis of current strategies utilized at the capstone site provided additional information related to the topic. Through these methods, the information gathered supported the development of educational resources for distribution to elementary teachers.

**Output:** The output of this project was the development of educational resources for elementary school teachers to expand their knowledge related to sensory processing disorder and how they can support students with these challenges. The resources include a PowerPoint presentation and infographics that can be distributed to elementary teachers.

**Significance:** This project expanded elementary teachers' awareness of sensory processing differences and classroom-based sensory regulation strategies they can utilize. Through this, the goal was to promote support for students with sensory processing differences in the school setting.

## Chapter 1: Literature Review

Participation in education is one of the primary occupations that children and adolescents engage in. In Georgia, elementary-aged children are required to spend a minimum of four and a half hours per day at school, for at least 180 days of the year (Education Commission of the States, 2018). However, according to national data, an even greater amount of time is typically spent within schools, averaging about six hours per day (U.S. Department of Education, 2008). Due to such a significant amount of time being spent at school, it is important to address any barriers a child might face regarding participation in education. With this in mind, legislative policies have been put in place over the last several decades to ensure that every child has equal access to education.

One such legislation is the Individuals with Disabilities Education Improvement Act (IDEA) of 2004. In this law, it is mandated that every child must be granted free, appropriate public education (FAPE), allowing them the use of special education and related services that will improve their ability to access the educational curriculum (IDEA, 2004). Students who meet eligibility criteria are granted an Individualized Education Plan (IEP) that outlines the services and supports the child requires to participate in education within the Least Restrictive Environment (LRE), which supports the inclusion of children with disabilities within general education classrooms (IDEA, 2004). Included within the related services offered to students is the provision of occupational therapy services (American Occupational Therapy Association, 2015). In the school setting, occupational therapists address areas related to a child's ability to learn and participate in educational activities (AOTA, 2015).

**Sensory Processing**

One area addressed by occupational therapists that may impact a child's participation in the school setting is their ability to process and integrate sensory information. Sensory processing and integration involve the interpretation of sensations and our response to these sensations (Dunn, 2009). These responses vary across individuals and can have an impact on behavior depending on how our brain organizes and responds to the stimulus (Dunn, 2009). There are eight sensory systems that allow individuals to interpret and respond to their environment: visual, auditory, gustatory, olfactory, tactile, proprioceptive, vestibular, and interoception. An overview of these systems is provided below (Dunn, 2009; Lane, 2020):

Visual: In this system, individuals receive light wave information through the retinal cells in the back of their eyes. This information is interpreted in the brain to provide information regarding spatial relationships, colors, and contrasts.

Auditory: This system allows the individual to detect sound waves through their inner ear system, providing information regarding direction, distance, and sound quality.

Olfactory: Through receptors in the nose, individuals are provided with information regarding smells within their environment. Scents are closely associated with emotions, arousal, and memories.

Tactile: Individuals receive tactile input through touch receptors on the surface of the skin. Through this system, information is obtained related to light touch, pain, temperature, and pressure.

Proprioceptive: Receptors related to this system are found within joints, muscles, and tendons. This system is responsible for relaying the position of body parts within space.

Vestibular: In this system, an individual is provided with information regarding their orientation within space. The receptors responsible for vestibular sensation are found within the inner ear and can detect linear or angular movement.

Interoception: This system involves the internal, physiological senses of our body. This includes sensations such as hunger, thirst, and the beating of our heart.

Regarding each of these sensory systems, there are varieties in individual responses to received input. Research has supported the use of Dunn's Model of Sensory Processing to describe individual differences in processing within these systems and how this impacts behavior (Dunn, 2007). In this model, Dunn describes four patterns of sensory processing that run along two continuums: low/high thresholds for sensory information and passive/active self-regulation in response to input (Dunn, 2007). An individual's sensory threshold describes the amount of input that is required to cause activation of the receptor. Individuals with low thresholds detect and respond to stimulus faster and individuals with high thresholds require stronger input and more frequently miss stimulus. Self-regulation refers to the strategy that the individual employs to respond to the input they are receiving. Passive self-regulation describes when individuals do not utilize strategies to modify their sensory environment, but rather react, such as becoming irritable. Active self-regulation describes when the individual attempts to control the input they are receiving. These two continuums are thought to intersect to form the four patterns of sensory processing, which are described below according to Dunn (2007):

Sensation Seeking: Individuals are characterized by a *high* threshold and *active* self-regulation. The individual enjoys and seeks out sensory experiences. An example of this is a child who frequently touches objects in their environment.

Sensation avoiding: Individuals are characterized by a *low* threshold and *active* self-regulation. The individual may find sensory input overwhelming and react by withdrawing from the environment. An example of this behavior is a child removing themselves from a crowded room where they are receiving too much tactile input.

Sensory Sensitivity: Individuals are characterized by a *low* threshold and *passive* self-regulation. The individual easily detects sensory input and does not remove themselves from the situation, but rather reacts to what is happening. This may look like a child becoming distracted by the sound of someone talking in the hallway.

Low Registration: Individuals are characterized by a *high* threshold and *passive* self-regulation. The individual has difficulty detecting sensory input, but they do not attempt to receive additional stimulation. An example of this is when a child does not respond when their name is called.

It is important to note that individuals may experience different sensory patterns with each of the different sensory systems (Dunn, 2007). This means that someone might be sensory seeking for vestibular input, but sensory avoiding for auditory input. Furthermore, these patterns of sensory regulation have been observed to some degree across the lifespan in both neurotypical and neurodivergent individuals. However, the patterns have been noted to be significantly different and present with more intense responses in individuals with disabilities, including attention-deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), and learning disabilities (Dunn, 2007). These more significant differences are sometimes referred to as "sensory processing disorder" (SPD), which is defined as a condition in which an individual's brain has difficulty receiving and responding to information that is perceived through their senses (Goodman, 2023). Research has indicated that sensory processing disorder may impact a

significant portion of students within Western cultures, with estimates of prevalence ranging from 5-15% of children expected to experience such challenges (Galiana-Simal et al., 2020). However, in this paper, the term *sensory processing differences* will be utilized as opposed to sensory processing disorder due to the lack of acceptance of SPD as an official diagnosis by the American Pediatric Association (2012). This terminology also promotes a strengths-based approach, addressing and supporting individual differences, rather than viewing sensory processing as a deficit to be 'fixed.'

**Sensory Processing and the Classroom**

In light that all individuals experience some degree of differences in sensory processing**,** is important to understand how this may impact a child's participation within the school setting. Sensory experiences are embedded within all our life routines and the school environment may pose several challenges for individuals with sensory processing differences. Individuals with ASD and co-occurring sensory processing differences have reported their perceptions of how sensory processing can affect their experience within the classroom (Howe & Stagg, 2016). According to Howe and Stagg's research (2016), participants reported that sensory challenges led to a reduction of concentration within the classroom, specifically regarding auditory sensations. Additionally, a common theme identified in this study was that sensory challenges caused physical discomfort and anxiety for these students within the classroom. The results of this study are crucial because they provide a firsthand account of students who have experienced sensory challenges within the classroom, emphasizing the need to promote a greater understanding of student sensory processing and implementation of strategies to encourage a better learning environment. Furthermore, Ashburner, Zivani, and Rodger (2008), investigated the influence of sensory processing on classroom outcomes for students with ASD. The results of

this study found a significant negative correlation between academic performance and attention to cognitive tasks with students who were under-responsive/sensory seeking and auditory filtering. Additionally, participants who had high levels of tactile sensitivity were found to be inattentive and hyperactive. Finally, participants with movement sensitivity had a negative correlation with oppositional behavior. This study provides further support that sensory processing challenges can have a negative impact on a student's ability to participate in the classroom.

**Supporting Sensory Differences at School**

In order to support educational participation, it is important to meet the sensory needs of students within their daily routines. Dunn (2007) emphasized the importance of providing children with sensory interventions within their natural environment to support the generalization of these strategies. School-based occupational therapists can provide a variety of sensory strategies for students when their sensory processing is identified to interfere with their ability to participate in education (AOTA, 2015). Occupational therapists begin by evaluating a student through a variety of different methods, including teacher or parent interviewing, student observations, and completion of assessments. Several different assessments may be utilized, including the Sensory Profile 2 and the Sensory Processing Measure: Main Classroom and School Environments (AOTA, 2015). Based on the results of this evaluation, they may provide a number of interventions, including the provision of sensory strategies with the student or a group, or by educating and training other school professionals (AOTA, 2015). Teacher consultation and education are of particular importance for supporting these students, as they are directly involved with them throughout their time in the educational setting. Dunn (2007) suggests that occupational therapists should emphasize consultation with teachers to analyze the

challenging environmental aspects for the child and offer strategies for use within their daily routine.

**Awareness of Sensory Challenges in Educational Settings**

Current teacher knowledge and training regarding sensory processing differences have not been thoroughly investigated through research. A systematic review by Miller-Kuhaneck and Watling (2018), intended to explore the role of occupational therapists in educating teachers and parents to support children with sensory processing differences. However, the researchers were unable to identify any current literature focused on teacher education surrounding this topic. This implies the need for further exploration regarding the role of occupational therapists in educating teachers on sensory processing in students. Furthermore, one study was found that investigated the current knowledge of special education needs coordinators (SENCOs) regarding sensory processing and sensory strategies (Quinn, Pedlow, & Bleakly, 2022). The results of this study indicated that only 40% of SENCOs had received training on sensory processing. Additionally, the majority of SENCO participants who reported receiving this training were occupational therapists, who are more likely to have knowledge regarding strategies to address sensory processing differences. Given this knowledge, it is likely that the number of general education professionals who have received training regarding sensory processing is even lower. It was also found within this study that 60% of participants identified that they had some knowledge of sensory processing difficulties, but that they felt there were gaps in their knowledge (Quinn, Pedlow, & Bleakly, 2022). Of the participants who identified that they had received sensory processing training, a positive correlation was found with their use of sensory strategy timetables, indicating that knowledge of sensory processing leads to greater implementation of strategies to address it. Participants who had received training also were more able to identify

signs of hyper-responsivity in students, however, there was a challenge across all participants with identifying students who may be hypo-responsive to sensory input. Through this study, the need for further teacher education regarding sensory processing challenges and sensory regulation strategies in order to support students within the classroom is emphasized.

A limited number of studies have investigated teacher perceptions of sensory strategies within the classroom. Mills and Chapparo (2018) investigated teacher perceptions of classroom-based sensory interventions. In this study, teachers reported that the use of these sensory strategies appeared to benefit their students' ability to learn and participate within the classroom and led to a reduction in negative, sensory-related behaviors. However, it was noted that the teachers experienced some difficulty in consistently implementing the strategies due to the lack of time, staff, and resources (Mills & Chapparo, 2018). The results of this study highlight that classroom-based sensory strategies may have the potential to positively impact student participation within the classroom, but that it is important to ensure that they are relatively quick and easy to encourage teacher implementation. Addressing the sensory needs of children with sensory processing challenges is crucial to supporting their ability to participate within the school system effectively. Further teacher and school staff member education is required to address this need.

Overall, research supports the idea that sensory processing differences can have a significant impact on a student's participation in education and that there is a lack of awareness of this topic within the school system. Through this, it is emphasized that there is a need to address sensory support within the classroom further to provide free, appropriate education in the least restrictive environment for students with sensory processing differences, as outlined in the IDEA law (IDEA, 2004). As Winnie Dunn stated, "When people understand their own and …

children's sensory processing patterns, they can create life routines that are consistent with [these] patterns, and thereby support successful participation" (Dunn, 2007).

## Chapter 2: Needs Assessment

A needs assessment was completed to identify the current gaps regarding the support of students' sensory processing differences in the classroom. This needs assessment consisted of a scoping review of the literature. To complete this review, journal articles were obtained using several databases via the Georgia State University library including AJOT and PubMed. The search terms utilized within this search included phrases such as "sensory processing" AND "schools;" "occupational therapists" AND "collaboration" AND "teachers;" and ["sensory strategies" OR "sensory integration"] AND ["elementary school" OR "teachers"]. Inclusion criteria were established, requiring that all articles included were peer-reviewed, published after 2005, and contained information pertaining to supporting children with sensory processing differences within the school setting. Articles not meeting these criteria were not included in the final review.

Through this literature review, it was identified that sensory processing differences can have a significant impact on a student's classroom participation, however, there is limited research relating to teacher training for supporting sensory processing differences in the classroom. Sensory processing differences have been reported to cause discomfort and anxiety for students and may lead to decreased attention and academic performance (Howe & Stagg, 2016; Ashburner, Zivani, & Rodger, 2008). Despite the negative impact on education, only one article was found that assessed the knowledge of sensory processing among school staff (Quinn, Pedlow, & Bleakly, 2022). However, this article exclusively focused on the awareness of special education needs coordinators (SENCOs), rather than teachers. Furthermore, a systematic review conducted by Miller-Kuhaneck and Watling (2018) aimed to uncover research examining the provision of sensory processing education to teachers by occupational therapists. However, they

were unable to identify any relevant literature on this topic, emphasizing the gap in research about teacher education on sensory processing. This needs assessment underscored the limited research concerning teachers' understanding of sensory processing differences. This emphasizes the significance of the current capstone project, which aimed to elevate teacher awareness of sensory processing differences, thereby facilitating better support for students in the classroom.

## Chapter 3: Capstone Experience Process

### Project Design

The primary objective of this capstone project was to design educational resources for elementary school teachers to increase their knowledge regarding students with sensory processing differences and useful classroom-based sensory strategies. To obtain this objective, several methods were utilized. First, an in-depth review of current literature and online resources related to sensory processing in the classroom was conducted. Second, a survey was conducted with school-based occupational therapists to gather information related to classroom-based sensory strategies and teacher collaboration. Finally, an analysis of strategies utilized at the chosen capstone site was assessed. These methods are discussed in detail below.

### Information Synthesis

To guide the development of sensory educational resources, information was gathered and synthesized through several sources of literature, including journal articles, online articles, books, and textbooks. Several journal articles that were gathered via the literature review and needs assessment process provided crucial background information that guided the development of the educational resources. These articles provided foundational knowledge related to sensory processing differences, as well as strategies for supporting children with sensory processing differences within the school setting. Furthermore, information was also gathered via online articles related to sensory processing differences and strategies for teachers. Inclusion criteria for these resources required that articles must be authored by individuals who have experience with sensory processing differences (i.e., occupational therapists, teachers, or self-advocates). It was also required that these articles address one of the following: the mechanism behind sensory processing, the impact of sensory processing differences on classroom participation, or strategies that can be used for sensory regulation. Finally, several books and textbooks were utilized to gain

further information on the topic. It was required that these books be published after 2005, be related to the field of occupational therapy or education, and contain information pertaining to sensory processing differences. Information gathered via these resources was condensed in combination with the additional methodology below to design educational resources as a product of the project.

**Key Informant Survey**

To further guide the development of educational resources, a study was conducted to gather information from school-based occupational therapists who have expertise related to this topic. In this study, an online questionnaire consisting of multiple-choice and short-answer questions was distributed to participants. Through this, quantitative and qualitative data related to supporting sensory processing in the classroom were collected.

Participants

In this study, 10 school-based occupational therapists were recruited to complete an online survey through convenience sampling. Inclusion criteria for the study required that participants were registered and licensed occupational therapy practitioners who have been providing occupational therapy services in a school-based setting for at least five years and have experience working with students with sensory processing disorder.

Procedure

Following approval from the Institutional Review Board at GSU, local school-based occupational therapists were contacted by email containing study information and digital recruitment flyers. Contact information was obtained via online staff directories at local school districts. Study recruitment information was also distributed through social media posts to reach additional school-based occupational therapists (Instagram, Reddit, Facebook). Participants were

screened for inclusion at the start of the survey by indicating their current profession, the setting they work in, and if they have had experience working with students with sensory processing differences. Individuals who met the inclusion criteria were invited to complete the entire survey. Participants completed an online survey through Qualtrics, which took no more than 30 minutes and consisted of multiple choice, Likert scale, and short answer questions. The survey instrument is attached in *Appendix C.*

Data Analysis

Quantitative data collected through multiple choice and scaled survey responses was descriptively summarized. Qualitative data gathered in the short answer survey responses was analyzed for thematic content. The results of the study were used to guide the development of the educational resources created as a product of the capstone project.

Confidentiality of Data

Data gathered in this study was de-identified and stored in an encrypted, electronic form on a password-protected computer. Only the student primary investigator had access to the data. A master list was created to assign unique ID numbers to each participant to protect their confidentiality. This master list was be kept in a password-protected file that only the investigator could access. The master list was kept separate from the data collected in the study. This master list was deleted after May 30th, 2024. If any identifying information about the participants or others was inadvertently collected during data collection, that data was not included or analyzed in the study.

**Analysis of Sensory Resources at the Capstone Site**

The final component of the capstone project protocol involved the analysis of sensory resources currently used at the capstone site. The site selected for this project was The Hirsch

Academy, a private school in Decatur, GA. The Hirsch Academy is a neurodiversity-affirming program that provides education to students ages 5-14 who have varying "sensory, regulation, learning, and communication differences" (The Hirsch Academy, 2024). This school was co-founded by an occupational therapist to provide academic and therapeutic support to students who may not be successful in traditional public-school settings. This school is also guided by a team of self-advocates from the neurodiversity community who provide consultation regarding school structure and practices. The mission of the Hirsch Academy is to "empower [their] neurodivergent students to be engaged learnings, organized movers, and powerful communicators – to explore, create, and be autonomous problem solvers in school and beyond" (The Hirsch Academy, 2024). The core values of this institution are leadership, presumption of competence, communication and collaboration, and reliability and trust (The Hirsch Academy, 2024). The staff at the site receive training related to "sensory integration, individualized learning strategies/accommodations, curriculum development, DIR/Floortime, trauma-informed supports, social/emotional supports, communication accessibility, and additional neurodiversity affirming techniques" (The Hirsch Academy, 2024). The Hirsch Academy was selected as the site for the capstone project due to their extensive experience providing education to students with sensory processing differences and their positive, neurodiversity-affirming approach.

Due to the prevalence of sensory processing differences in the student body at The Hirsch Academy, this institution has various resources in place to promote sensory regulation in the classroom. An analysis of these resources was completed throughout the capstone experience. The analysis was completed by assessing the sensory-friendly components of the classrooms and school grounds and documenting the sensory resources available for students to utilize. An overview of the resources was compiled and added as a component of the educational resources

created as the product of the project. This compilation of resources served to provide additional strategies for teachers at external schools to utilize with their students.

## Chapter 4: Results and Output

### Information Synthesis Results

The information synthesis process resulted in several useful literature sources that guided the development of the outputs of this project. Dunn's model of sensory processing (Dunn, 2007) was used to provide foundational knowledge of sensory processing differences. Research reporting on the impact of sensory processing differences on educational participation was also included in the outputs to emphasize the need for continued education on the topic (Howe & Stagg, 2016; Ashburner, Zivani, & Rodger, 2008). Furthermore, several online articles were also referenced in the development of the products, including articles from sites such as *The OT Toolbox*, *Neurodivergent Insights*, and *The OT Butterfly*. The books and textbooks identified to support the project included *Sensory Integration Theory and Practice 3rd Ed, Willard and Spackman's Occupational Therapy, The Why Behind Classroom Behaviors, Creating Sensory Smart Classrooms,* and *The Sensory Lifestyle Handbook*. These literature sources are included in the references page and were cited on the educational resources that they were utilized to develop.

### Study Results

The quantitative results of the questionnaire were gathered via Likert scale style questions and were descriptively analyzed. These results are listed in *Table 1.* The remaining questions consisted of multi-select, percentage-rating, and open-ended questions. The results of all questions were analyzed for thematic content, with five themes identified.

*Theme 1: Prevalence of Sensory Processing Differences*: Participants reported that an average of 48.6% of their caseload demonstrated sensory processing differences. They reported that the most common forms they observed were sensory over-responsivity, indicated by 40% of respondents, and sensory seeking, indicated by 80% of respondents. However, one participant

reported that sensory seeking is easily observed, and therefore it is most likely to be recognized in a school setting.

*Theme 2: Impact on Learning and Classroom Participation:* Participants indicated that sensory processing differences significantly impact the student's ability to learn and participate in the classroom, with 100% responding that they strongly agreed with this statement. The majority of participants also indicated that increased teacher knowledge of sensory regulation strategies would lead to increased classroom participation, with 80% of respondents agreeing or strongly agreeing. However, several participants wanted to note that not all lack of participation is due to sensory regulation, inferring the need to have a clear understanding behind the student's impaired participation before treating it as sensory.

*Theme 3: Current Teacher Awareness:* The majority of participants (80%) indicated that they do not believe teachers have a good understanding of sensory dysregulation. All participants rated that they believed teachers would benefit from specific training related to sensory processing differences. When participants were asked what they wish more teachers knew related to this topic, they reported that sensory strategies can be useful for anyone, even adults, and children often need more assistance to develop the ability to self-regulate. They also reported that it is important for teachers to understand how dysregulation can impact their readiness to learn and that these strategies can also be used as a preventative method. Participants believe that sensory needs can vary throughout the day, and it is important to be flexible in daily routines.

*Theme 4: Promotion of Classroom-Based Sensory Strategies:* Each of the 10 participants indicated that they felt comfortable providing sensory processing education to teachers, however, there were mixed results regarding their perception of how often teachers follow through with their sensory support suggestions. Participants reflected that the sensory supports are more often

utilized when they are quick and easy to implement. They also mentioned that there often isn't enough support in the classroom to carry out sensory strategies. The most common methods the OTs reported using to promote teacher implementation of sensory strategies included push-in demonstrations, educational instruction, and follow-ups with continued feedback.

*Theme 5: Useful Strategies:* Participants reflected on classroom-based sensory strategies that they frequently utilize and perceive to be most useful. These strategies included: alternative seating, noise-canceling headphones, fidgets, heavy work, sensory schedules, swings, movement breaks, deep pressure, self-regulation strategies, chewing devices, and functional movement breaks.

**Capstone Site Sensory Resource Results**

The sensory strategies and tools utilized at the capstone site, The Hirsch Academy, were documented across the capstone experience. The strategies were categorized by the specific sensory system they address are included in *Table 2.* The information obtained through site analysis was included in the final educational resources to provide additional information regarding potential sensory strategies.

**Output**

The information obtained through information synthesis, key informant surveying, and analysis of the sensory resources at the capstone site was utilized to develop several products to be distributed as educational resources for elementary school teachers. These resources included infographics and a PowerPoint presentation training course. There were four infographics created with the following titles: *Understanding Sensory Processing Differences*, *About the Sensory Systems*, *Signs of Sensory Dysregulation in the Classroom,* and *Sensory Strategies for the Classroom.* These infographics provide a brief overview of sensory processing differences, their

impact on education, and strategies that can be utilized for each sensory system. The infographics can be viewed in *Appendix D*. Furthermore, the training course presentation titled *Supporting Students with Sensory Processing Differences.* This training course included an overview of the sensory systems, a description of sensory processing differences, signs that a student may be experiencing sensory dysregulation, and school-based strategies that they can implement to support their students. This course was presented to the staff at the capstone site at the completion of the capstone experience. The presentation was also recorded digitally to be viewed asynchronously so that the capstone site and external educators may continue to use it as a training resource. This recording was posted to YouTube for easy distribution to additional educators. The PowerPoint presentation is included in *Appendix D* along with a QR code to view the recorded presentation.

## Chapter 5: Discussion

The purpose of this project was to address the question, how can elementary teachers support students with sensory processing differences? Previous research has indicated that sensory processing differences can have a significant impact on a student's ability to participate in the classroom (Howe & Stagg, 2016; Ashburner, Zivani, & Rodger, 2008). It has also been identified that there is a gap in the knowledge of elementary teachers regarding this topic (Quinn, Pedlow, & Bleakly, 2022; Miller-Kuhaneck & Watling, 2018). The educational resources created as an output of this capstone project served to decrease the knowledge gap that exists regarding supporting students with sensory processing differences. These resources provide an overview of sensory processing, how to recognize sensory differences in the classroom, and strategies that teachers can implement for these students. These resources were created through synthesizing various sources, consulting with experts in the field, and analyzing strategies used by a school that specializes in students with sensory differences.

The educational resource outputs of this project will have a lasting impact, in both the short-term and long-term. As a short-term impact, the resources produced provided the staff members at the capstone site with immediate information regarding how they can support students with sensory processing differences. These resources will continue to impact the staff in the long term as they will be included in the educational information provided to new and recurring employees at the start of each school year. This will allow the site to continue to increase and reinforce their knowledge of sensory differences. On a larger scale, the resources will provide educators at external schools with sensory processing knowledge. These resources have been made publicly available on the internet via YouTube to increase the audience.

## Limitations

This study involves several limitations that must be considered. To begin, the questionnaire that guided the output of this project had a small sample size of only 10 participants. This limits the generalizability of the information obtained. Furthermore, participants included in the study only involved school-based occupational therapists. Future research would benefit from exploring this topic with participants who are elementary teachers and self-advocates with sensory processing differences. This would allow for a more in-depth exploration of how sensory needs can be met at school. Additionally, the methodology of the project included analysis of a small, private school. This school is uniquely positioned to support students with sensory processing differences due to their small student body and cost of attendance. The sensory strategies utilized at this site may not be generalizable to a traditional, public-school setting. However, it is important to document these strategies with the hope that public schools may begin to recognize the need for these supports in the future. Finally, the educational resources designed in this project only serve as an introduction to sensory processing differences. Educators would likely benefit from in-depth training and regular consultations with a school-based occupational therapist to ensure they are appropriately meeting their students' sensory needs. Despite these limitations, the product of this project successfully provides an overview of important information that many teachers will benefit from.

## Sustainability Plan

The educational resources designed in this project will be utilized as a method of teacher training by the capstone site each year. These resources will also be publicly available for external educators to access. To ensure the sustainability of the resources, the information will be bi-annually reviewed by the student primary investigator and updated as needed. The capstone site mentor will also review the resources and make any necessary changes prior to distribution

to staff at the capstone site. It is recommended that any external sites that adopt these training resources distribute them to their staff on an annual or bi-annual basis to ensure the reinforcement of knowledge to best support their students.

## Conclusion

Through this capstone project, several educational resources were created to increase the knowledge of sensory processing differences in schools. These educational resources were designed to provide teachers with an overview of sensory processing, its impact on education, how to recognize signs of sensory dysregulation, and strategies that can be utilized in the classroom. As a result of the creation and distribution of these resources, teachers can feel better equipped to support their students. These resources also serve to promote the occupational participation of students with sensory processing differences in the classroom. In the future, school-based occupational therapists can continue to promote increased teacher training and knowledge of sensory processing to further improve their ability to engage in a classroom setting.

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## Tables

***Table 1*. Descriptive Analysis of Questionnaire**

| | Mean | Median | Mode |
|---|---|---|---|
| Sensory dysregulation can impact a student's ability to learn and participate in the classroom. | 5 | 5 | 5 |
| I believe teachers have a good understanding of sensory dysregulation. | 1.8 | 1 | 1 |
| I feel comfortable providing education to teachers about sensory | 4.5 | 4.5 | 5 |
| Sensory regulation strategies can easily be implemented in the school routine. | 3.7 | 4 | 4 |
| Teachers would benefit from specific training related to sensory processing differences in students. | 4.8 | 5 | 5 |
| Teachers frequently utilize the sensory regulation strategies I educate them on. | 3.3 | 3.5 | 4 |
| If teachers knew more about sensory regulation strategies, students would have improved classroom participation. | 4.4 | 5 | 5 |
| I frequently provide education to teachers about sensory processing. | 4.6 | 5 | 5 |

*Note: The data above reflects a Likert scale questions, with 1 representing "Strongly disagree", 2 "disagree," 3 "neither agree or disagree," 4 "agree," and 5 "strongly agree.*

***Table 2.*** **Sensory Strategies at the Capstone Site**

| Sensory System | Strategy |
|---|---|
| Visual | Blinds on classroom windows<br>Dimmable overhead lighting<br>Minimal items on classroom walls<br>Visual timers<br>Written/visual schedules |
| Auditory | Noise cancelling headphones<br>Small class size (2-5 students)<br>Use of calming music during classwork |
| Tactile | Wobble cushions<br>Fidget toy options<br>Alternative seating (soft vs hard)<br>Opportunities for messy play (creek, mud, sand) |
| Vestibular | Intentional playground design (zipline, slides, swings)<br>Alternative seating (rocking chair, wobble stool, wobble cushion)<br>Frequent movement breaks in class sessions<br>Limited rules about sitting during class<br>Rock climbing wall<br>Yoga and fitness classes multiple times per week<br>Frequent outdoor breaks<br>Weekly walks<br>Swimming class weekly<br>Hiking biweekly |
| Proprioceptive | Weighted lap pads<br>Body socks<br>Alternative seating (cushions, wobble cushion, sitting on floor)<br>Brain Break videos<br>Yoga and fitness classes multiple times per week<br>Frequent outdoor breaks<br>Weekly walks<br>Hiking biweekly<br>Swimming class weekly |

# Appendices

## Appendix A: Learning Objectives

The following learning objectives were developed by the capstone student and the site mentor to guide learning related to the capstone topic. The product of several learning activities was not included in this capstone paper to protect the identity of the students and staff at the site (i.e. - results of sensory profile assessments, interviewing related to specific students). Rather, these tasks served as learning opportunity for the capstone student and allowed the student to contribute to the needs of the site. The outputs not included in this paper are indicated with an asterisk *.

**LTG 1:** Student will demonstrate the ability to identify students who experience sensory processing differences within elementary classrooms.

**STG 1:** Student will verbalize signs of sensory dysregulation that may be seen within elementary students.

Learning Activity 1: To consult the literature to understand what sensory dysregulation looks like within the classroom.

Learning Activity 2: To complete a training course on sensory processing disorder within schools as identified by the site mentor.

Learning Activity 3: To onduct a survey with at least 5 occupational therapists who have expertise regarding sensory processing differences.

Outcome Measures: To create a fact sheet and a module for an in-service training course for teachers regarding the signs of sensory dysregulation within the classroom.

Timeline for Completion: The creation of fact sheet and module will be complete by the end of week 3. The in-service training will be led prior to week 14.

**STG 2:** Student will complete a sensory evaluation on a minimum of 3 students at the site.

Learning Activity 1: To administer a screening assessment to teachers to identify potential classrooms with students with sensory processing difficulties.

Learning Activity 2: To conduct interviews with the identified student's teacher regarding their behavior within the classroom.

Learning Activity 3: To practice administering a sensory profile to at least 3 students at the site.

Outcome Measures: To complete a written report for each student regarding results of evaluation*. Student will present findings within in-service training to teachers*.

Timeline for Completion: The written report and general trends based on each student's evaluation will be complete by the end of week 6. The presentation of findings will be conducted prior to week 14.

**LTG 2:** Student will become proficient in identifying appropriate classroom-based sensory regulation strategies for elementary students with sensory processing differences.

**STG 1:** Student will verbalize evidence-based methods that can be utilized within the classroom to promote sensory regulation for students.

Learning Activity 1: To consult the literature regarding classroom-based sensory regulation techniques.

Learning Activity 2: To complete a training course regarding sensory regulation strategies within the classroom as identified by the site mentor.

Learning Activity 3: To distribute a survey to at least 5 school occupational therapists with questions regarding effective sensory regulation strategies.

Outcome Measures: To create a fact sheet and a module for an in-service training course for teachers containing classroom-based sensory strategies.

Timeline for Completion: The creation of fact sheet and module will be completed by the end of week 8. The in-service training will be led prior to week 14.

**STG 2:** Student will identify current resources available to the site that can be utilized for sensory strategies within the classroom.

Learning Activity 1: To interview staff members of site to obtain information of current resources that may be utilized.

Learning Activity 2: To observe at least 2 classroom sessions to determine the current strategies and resources being utilized.

Outcome Measures: To complete a written report regarding the current resources available to the site that can be disseminated to teachers and staff members.

Timeline for Completion: The written report will be complete by the end of week 7.

**LTG 3:** Student will develop increased competence in collaboration with elementary teachers regarding supporting students with sensory processing differences.

**STG 1:** Student will determine effective methods of collaboration between teachers and occupational therapists.

Learning Activity 1: To consult the literature regarding effective methods of collaboration between teachers and occupational therapists.

Learning Activity 2: To distribute a survey to at least 5 school occupational therapist with questions regarding effective methods of teacher/occupational therapist collaboration.

Outcome Measures: To complete a written report regarding the findings of the learning activities.

Timeline for Completion: The written report will be complete by the end of week 10.

**STG 2:** Student will demonstrate increased collaborative competence through provision of education regarding sensory processing differences and strategies through an in-service training session for teachers at the site.

Learning Activity 1: To complete research regarding effective teaching methods.

Learning Activity 2: To practice in-service presentation with site mentor.

Outcome Measures: The feedback* will be analyzed and reported to demonstrate the level of effectiveness of the training. Student will also report findings of research on effective teaching methods.

Timeline for Completion: The in-service training must be completed by the end of week 13 and the analysis and report by the end of week 14.

**Appendix B: Supervision Plan**

**Capstone Student Roles and Responsibilities:**

1. Understand and abide by the GSU program policies and procedures relative to the capstone.
2. Complete the 14-week (560 hour) capstone experience, with no more than 20% of the time completed outside the mentored practice setting. Student is responsible to ensure that missed hours are made up appropriately at the discretion of the site mentor and the capstone coordinator.
3. Complete tasks assigned by the site mentor to ensure success of the learning experience, alignment with chosen focus areas, and outcome of capstone.
4. Take initiative to communicate with the site mentor, occupational therapy faculty, and doctoral capstone coordinator when expected to do so or as needed to ensure success.
5. Demonstrate respectful interaction and communication with faculty, site mentor, doctoral capstone coordinator, and other individuals who may be part of the capstone experience.
6. Provide appropriate feedback to the site at the formal midterm and final evaluation.
7. Utilize constructive feedback from faculty, site mentor, and doctoral capstone coordinator for personal and professional growth.
8. Demonstrate a professional approach to the capstone, including but not limited to time management, observing deadlines, and maintaining communication with the capstone team.
9. Be self-directed throughout the capstone process, including developing, planning, and completing the capstone experience and project.
10. Take initiative to finalize all documentation with the site mentor, faculty mentor, or doctoral capstone coordinator.
11. Complete and disseminate a culminating capstone project within the time frame determined by the academic program.

**Site Mentor Roles and Responsibilities**

1. Orient student to capstone site, policy and procedures, expectations, other personnel, and stakeholders.
2. Assist student as needed to perform specific learning activities consistent with the student's learning objectives.
3. Demonstrate expertise in given area through providing the student with training, resources, and connections with additional experts in the field.
4. Collaborate with capstone team to create specific mentorship responsibilities.
5. Provide supervision/mentorship through the duration of the experience.
6. Grant the student access to the site's resources that are related to the topic of the capstone experience, as appropriate.
7. Provide insightful, constructive feedback on student's performance during the experience.
8. Collaborate with capstone team to develop and maintain system for documenting student's experiential hours on-site and track tasks and activities accomplished during that time.
9. Collaborate with capstone team to guide the capstone student through needs assessment component of the project proposal.

10. Provide guidance on the logistics of completing the work-related requirements at the capstone site, which could include workflow at site, general hours of operation, and access to workspaces.
11. Proactively communicate with capstone team regarding any potential concerns.
12. Provide formal evaluative information on students' performance and ability to achieve the learning objectives throughout the experience (midterm and final at the minimum).
13. Regularly communicate with capstone team either in-person, virtually, by phone or email, for feedback on implementation and documentation.
14. Provide meaningful and timely feedback on drafts of the capstone project as needed.

**Scheduled Meetings:**

The site mentor and student will establish a routine supervision via weekly, 45 minute in-person meetings to review the student's progress in relation to the capstone experience. The schedule of these meetings will be established prior to the start of the capstone experience. The student will be expected to submit any scheduled deliverable components to the site mentor prior to the meeting for review. The student will complete a log of each meeting completed, the topics covered within the meeting, and any deliverables that were submitted. The student and the site mentor will initial the log after each meeting and sign the log at the completion of the capstone experience. The student may interact with and meet with the site mentor additionally throughout the week as needed and as scheduling permits.

| Week | Time and Date | Topics Covered | Deliverables | Student Initials | Mentor Initials |
|---|---|---|---|---|---|
| Week 1 | | | | | |
| Week 2 | | | | | |
| Week 3 | | | | | |
| Week 4 | | | | | |
| Week 5 | | | | | |
| Week 6 | | | | | |
| Week 7 | | | | | |
| Week 8 | | | | | |
| Week 9 | | | | | |
| Week 10 | | | | | |
| Week 11 | | | | | |
| Week 12 | | | | | |
| Week 13 | | | | | |
| Week 14 | | | | | |

Student signature _____

Mentor signature _____

**Communication Methods:**

The student and the site mentor may communicate in-person or via email, phone call, text message, and online virtual meetings. The student is expected to initiate and maintain regular communication with the site mentor.

**Specific Requirements of the Project:**

The student is expected to complete a 14-week capstone experience in which no more than 20% of the time can be completed outside of the mentored practice setting. A total of 560 hours must be completed. A time log will be developed by the student to track achievement of the required hours. This time log will be initialed by the student and the site mentor at the end of each week. The total hours completed will be documented at the bottom of the chart at the completion of the capstone experience and both the mentor and the student will sign off on the completed hours.

The student is also expected to produce deliverable materials as a result of the capstone experience. The students will develop a timeline in which deliverables are expected to be submitted for review by the site mentor. Each deliverable will be expected to be completed on the Friday of the assigned week. The site mentor is expected to provide either written or verbal feedback regarding each deliverable within the weekly scheduled meetings. The site mentor must provide this feedback within one week of submission of the deliverable. The student and site mentor will initial this log upon the completion of each deliverable item and sign the bottom of the log in the final week of the capstone experience. At the completion of the capstone experience, the student is expected to disseminate these deliverables in accordance with the policies of GSU's OTD program. In the event that the student does not complete the deliverables by the scheduled date, the student will have a one-week grace period to submit the task. If the student does not complete the deliverable within this one-week period, she will be required to schedule a meeting with both the site mentor and the faculty mentor to discuss any barriers to completing the deliverable. Within this meeting, the student and the mentors will establish an action plan to ensure that all required components of the project are completed by the final deadline.

Time Log:

| Week | Monday | Tuesday | Wednesday | Thursday | Friday | Total | Student Initials | Mentor Initials |
|---|---|---|---|---|---|---|---|---|
| Week 1 | | | | | | | | |
| Week 2 | | | | | | | | |
| Week 3 | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Week 4 | | | | | | | | |
| Week 5 | | | | | | | | |
| Week 6 | | | | | | | | |
| Week 7 | | | | | | | | |
| Week 8 | | | | | | | | |
| Week 9 | | | | | | | | |
| Week 10 | | | | | | | | |
| Week 11 | | | | | | | | |
| Week 12 | | | | | | | | |
| Week 13 | | | | | | | | |
| Week 14 | | | | | | | | |

Total hours: _____

Student signature _____

Mentor signature _____

Timeline of Deliverables:

The timeline may be adjusted following initiation of the capstone experience due to the needs of the site under the discretion of the site mentor. All deliverable components must be completed by the 14th week.

| **Week** | **Deliverables** | **Completed?** | **Student Initials** | **Mentor Initials** |
|---|---|---|---|---|
| Week 1 | | | | |
| Week 2 | | | | |
| Week 3 | Signs of sensory dysregulation fact sheet<br><br>Signs of sensory dysregulation training module | | | |
| Week 4 | | | | |
| Week 5 | | | | |

| | | | | |
|---|---|---|---|---|
| Week 6 | Written report of student evaluations | | | |
| Week 7 | Classroom sensory strategies fact sheet<br><br>Site sensory resources written report | | | |
| Week 8 | Classroom sensory strategies training module | | | |
| Week 9 | Written report of teacher/occupational therapy collaboration methods | | | |
| Week 10 | | | | |
| Week 11 | | | | |
| Week 12 | Provision of in-service training course to staff | | | |
| Week 13 | | | | |
| Week 14 | Written report of results of in-service training | | | |

Student signature _____

Mentor signature _____

**Collegiality/Resolving Disputes:**

Throughout the capstone experience, the student and the site mentor will maintain an open and collaborative relationship regarding achieving the goals of the capstone project. Both parties are expected to maintain respectful and professional interactions during the capstone experience.

In the case that a conflict arises during the student's time at the capstone site, the student and site mentor will schedule a meeting to discuss the conflict. Open communication will be maintained between the mentor and the student to ensure that conflicts are addressed as they arise and to collaboratively identify potential solutions. The topics covered within this meeting will be documented along with the identified solutions. In the event that the student and site mentor cannot agree on a solution, the student and the site mentor will schedule a meeting with the faculty mentor or capstone coordinator to further discuss potential solutions.

| Date of Meeting | Individuals in Attendance | Conflict Discussed | Solutions | Student Initials | Mentor Initials | Additional Initials |
|---|---|---|---|---|---|---|
| --/--/---- | | | | | | |
| --/--/---- | | | | | | |

Student signature _____

Site Mentor signature _____

Faculty mentor signature _____

Capstone coordinator signature _____

**OTD Program Curricular Design:**

The student's capstone project will be designed in line with GSU's OTD program curricular design as listed below:

1. **Understanding and utilizing occupation to promote health and wellness.**

   School-based sensory strategies will be utilized to promote students' health, wellness, and ability to participate within their daily occupations within the context of school.

2. **Use of evidence-based practice to support the doctoral capstone project.**

   The student will consult the most current literature regarding sensory strategies within the classroom while designing the capstone project.

3. **Understanding and using professional ethics and values.**

   The student will demonstrate understanding of and uphold the values and ethics of the profession while designing and implementing the capstone project.

4. **Enhancing advocacy and leadership skills**

   The student will enhance her ability to advocate for students who require sensory supports within the classroom. The student will demonstrate leadership skills through this advocacy and through collaboration with teachers and other school faculty members to ensure proper support for students.

5. **Lifelong professional growth and development.**

   The completion of the capstone experience will allow the student to expand her professional skills and further develop as a clinician. The skills obtained within the capstone experience will further prepare her to enter the workforce upon graduation.

6. **Enhancing diversity, inclusion, and cultural competence.**

   Through implementation of the capstone project, the student will promote increased awareness of diversity and inclusion of students at the site regarding their differences in

sensory processing. The capstone student will ensure to consider the cultural background of the students at the site while completing the project to promote increased cultural competence.

# Appendix C: Study Questionnaire

## Informed Consent

**Informed Consent**

**Title:** Supporting Teacher's Knowledge of Sensory Processing Disorder: Development of an Educational Resource Based on Expert Opinion

Principal Investigator: Sutanuka Bhattacharjya
Student Principal Investigator: Morgan Bouwkamp

**Procedures**
You are being asked to take part in a research study. If you decide to participate, you will be invited to complete a brief online survey that will last no more than 30 minutes. The survey questions are related to the impact of sensory processing differences on student participation in the classroom and sensory strategies that can be utilized in the classroom. At the completion of the survey, you will be invited to contact the Principal Investigator if you are interested in participating in an additional live interview to further discuss this topic. Participation in the interview is not required. The purpose of this study is to support the development of an educational resource for elementary school teachers to expand their knowledge related to sensory processing differences and how they can support students with these challenges.

**Voluntary Participation and Withdrawal**
Participation in this study is voluntary. If you do not wish to participate in this study, you may choose "I do not consent" below and you will exit the survey. If you choose to agree to participate in the study by selecting "I consent," you can withdraw at any time by skipping questions or ceasing to complete the survey.

**Contact Information**
Principal Investigator: Sutanuka Bhattacharjya, sbhattacharjya@gsu.edu
Student Principal Investigator: Morgan Bouwkamp, mbouwkamp1@student.gsu.edu

**Consent**
If you are willing to participate in this study, please select "I consent" below and you will be directed to the remainder of the study. If you are not willing to participate, please select "I do not consent" below and you will exit the study.

- ◯ I consent
- ◯ I do not consent

## Inclusion Criteria

Thank you for consenting to participate in this study.

The following four questions are intended to determine if you qualify for the study. You will be directed to the end of the study if you do not qualify.

1. Are you a licensed occupational therapist?

- ◯ Yes
- ◯ No
- ◯ Unsure

2. Do you currently provide occupational therapy services in a school-based setting?

- ◯ Yes
- ◯ No
- ◯ Unsure

3. How long have you been providing occupational therapy services in a school-based setting?

- ◯ Less than 5 years
- ◯ 5-10 years
- ◯ 10+ years

4. Do you have experience working with students with sensory processing difficulties in a school-based setting?

- ◯ Yes
- ◯ No
- ◯ Unsure

**Survey Questions**

You have qualified for the survey. Please click the arrow to begin.

How much of your caseload would you estimate to experience sensory processing differences?


Do you observe any presentation of sensory processing differences more frequently than others (i.e., sensory overresponsivity, underresponsivity, seeking, etc)?

## Survey Likert

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| Sensory dysregulation can impact a student's ability to learn and participate in the classroom. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| I believe teachers have a good understanding of sensory dysregulation. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| I feel comfortable providing education to teachers about sensory processing differences. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| Sensory regulation strategies can easily be implemented in the school routine. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| Teachers would benefit from specific training related to sensory processing differences in students. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| Teachers frequently utilize the sensory regulation strategies I educate them on. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| If teachers knew more about sensory regulation strategies, students would have improved classroom participation. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

Please answer the following questions based on your clinical experience within the school-based setting.

| | Strongly Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| I frequently provide education to teachers about sensory processing. | ○ | ○ | ○ | ○ | ○ |

Additional comments (not required):

**Survey Cont.**

Please indicate any tools/strategies that you have utilized to promote improved sensory regulation for students on your caseload:

- ☐ Alternative seating
- ☐ Noise cancelling headphones
- ☐ Fidgets
- ☐ Heavy work activities
- ☐ Sensory schedules
- ☐ Swings
- ☐ Movement breaks
- ☐ Deep pressure
- ☐ Self-regulation strategies
- ☐ Chewing devices
- ☐ Other (please specify below)

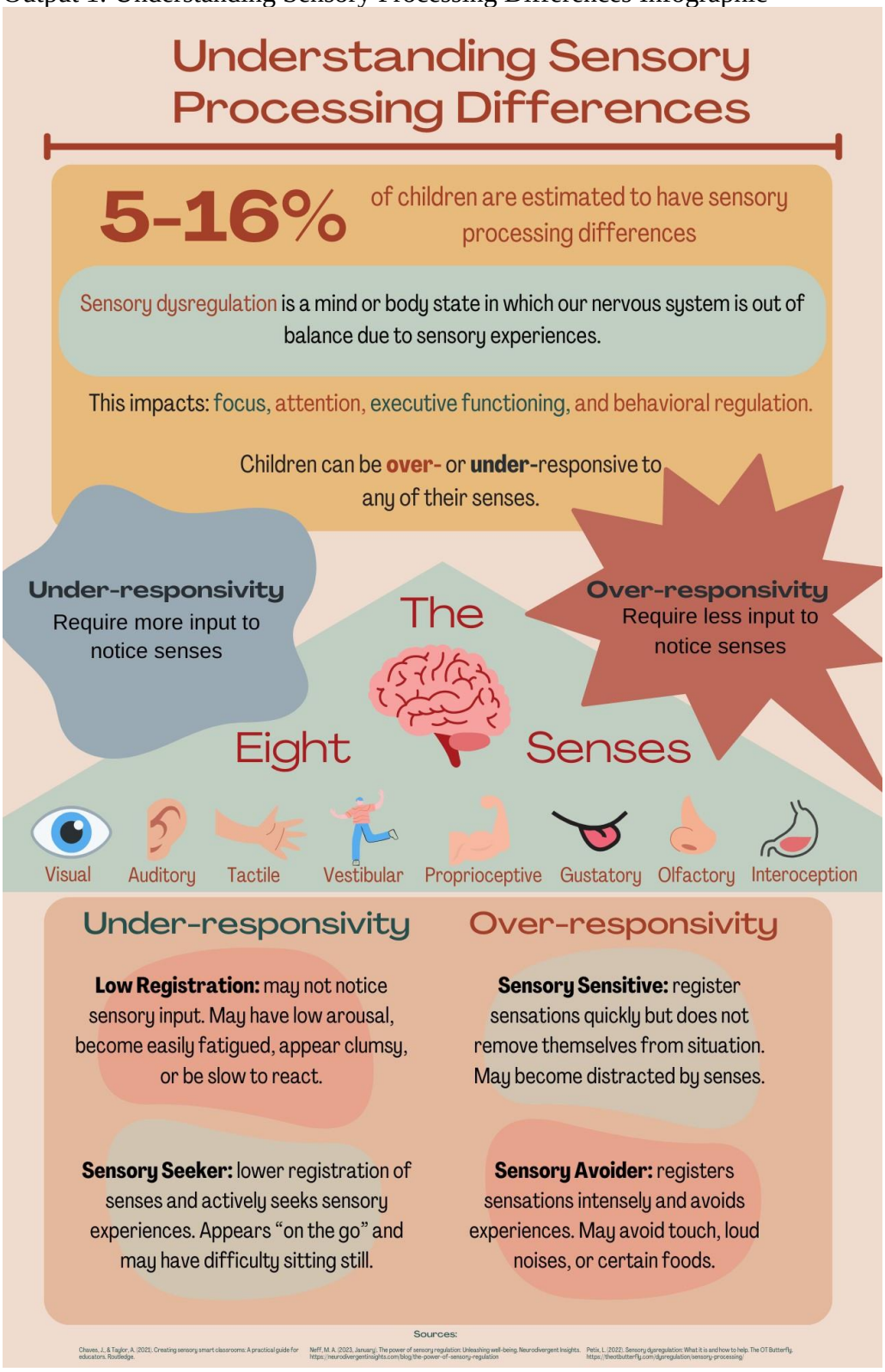
Additional sensory strategies/tools I have utilized:
(if none please skip)

In the past, how have you promoted teacher implementation of sensory strategies in the classroom?

What do you wish more teachers knew about sensory processing differences?

## Appendix D: Outputs

Output 1: Understanding Sensory Processing Differences Infographic

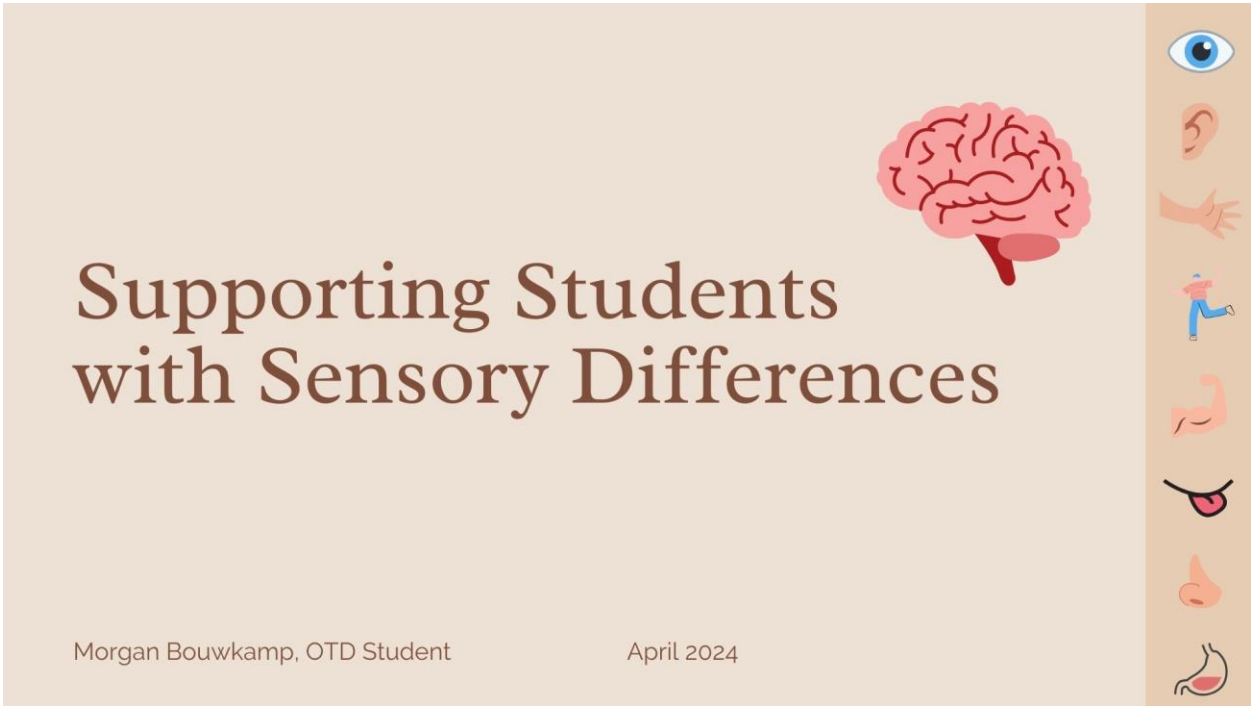


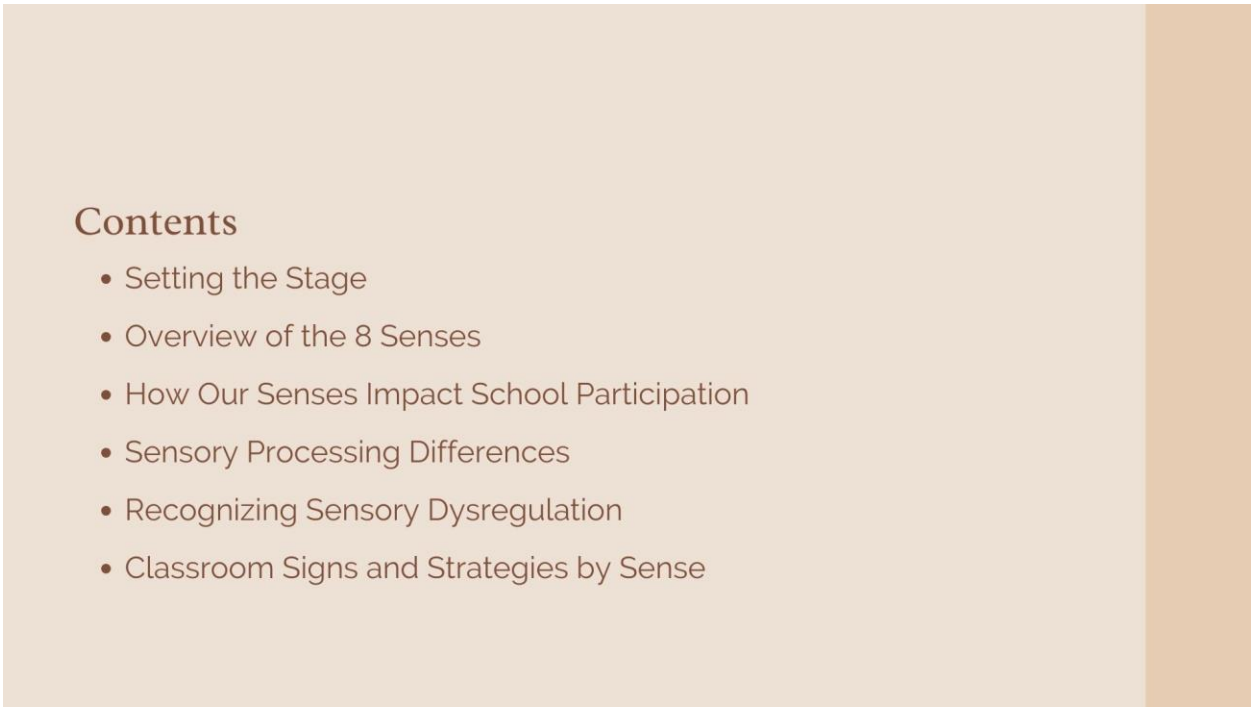
Output 2: Signs of Sensory Dysregulation in the Classroom Infographic

Output 3: About the Sensory Systems Infographic

Output 4: Sensory Strategies for the Classroom Infographic

Output 5: Supporting Students with Sensory Processing Differences Training Presentation



## Setting the Stage

"At times, children with unique learning needs engage in behaviors that look oppositional, defiant, lazy, or disengaged" [1]

## The 8 Senses

The 5 basic senses we all are likely aware of:

Vision

Hearing

Touch

Smell

Taste

## The 8 Senses

3 additional senses you may not have heard of:

**Vestibular**

**Proprioception**

**Interoception**

## The 8 Senses

3 additional senses you may not have heard of:

**Vestibular** [2, 3]

- Acceleration/deceleration
- Linear/rotary movement
- Head position
- Balance
- Coordination
- Visual stability

**Proprioception** [2, 3]

- Body movement
- Body position
- Force modulation
- Deep pressure
- Vibration

**Interoception** [2, 4]

- Hunger/satiety
- Need for bathroom
- Tiredness
- Internal aches/pains
- Emotions

## How our Senses can Impact School Participation

**Visual**
Reading/Writing
Attention
Environment navigation
Hand-eye coordination

**Auditory**
Following directions
Attention in class
Communication

**Tactile**
Tolerance of writing utensils
Sitting/standing near others
Manipulation of items

[2]

**Vestibular**
Sitting upright in a chair
Attention in class
Recess/PE
Reading/Writing

**Proprioception**
Sitting upright in a class
Writing
Hand dominance
Recess/PE

**Additional**
Meeting body needs
Emotional regulation
"Smelly" environments

## Sensory Processing

- **Sensory Processing:** How we take in, interpret, and respond to sensory information
  - Maintaining an appropriate level of arousal [5]
- **Sensory Dysregulation:** A mind or body state in which our nervous system is out of balance due to sensory experiences [6]
  - Impacts: focus, attention, executive functioning, and behavioral regulation
- **Sensory Processing Differences:** When an individual's brain has difficulty receiving and responding to sensory information
  - Estimated 5-16% of children [7]
  - Leads to reduced concentration [8]
  - Can cause physical discomfort and anxiety [8]
  - Negative correlation with academic performance and attention [9]

## Sensory Processing Differences

Sensory processing differences = differences in **response** to sensory input

**Under-responsivity** [2]
Needs more input to notice a sensory stimulus

**Over-responsivity** [2]
Needs less input to notice a sensory stimulus

How much sensory input do they need to "fill their cup?"

**Under-responsivity** **Over-responsivity**

## Sensory Processing Differences

Under-responsivity

Over-responsivity

Passive

**Low Registration:** may not notice sensory input.[10]

**Sensory Sensitive:** register sensations intensely but does not remove themselves from situation.[10]

**Sensory Seeker:** lower registration of senses and actively seeks sensory experiences.[10]

**Sensory Avoider:** registers sensations intensely and avoids experiences.[10]

Self-regulation

Active

## Classroom Signs and Strategies by Sense

2, 5, 6, 11, 12

### Vision

- Prefers to look at moving pictures
- Flaps hands or objects in front of eyes
- Doesn't notice when someone enters or leaves room
- Likes bright colors
- Needs help to find objects

→

- Highlight important information
- Promote use of colored writing utensils
- Have sit at front of class
- Use of videos in learning activities
- Physical tools to guide reading
- Physical prompting

- Avoids bright lights
- Squints/rubs eyes
- Difficulty focusing on detailed pictures
- Skips problems on worksheets
- Distracted by visual stimuli

→

- Privacy shields/barriers during desk work
- Limit written information and increase whitespace on handouts
- Cover/fold paper so that only current question is visible
- Use natural or dim lighting
- Minimize visual clutter

## Classroom Signs and Strategies by Sense

2, 5, 6, 11, 12

### Auditory

- Does not respond to name
- Must use touch to get their attention
- Makes noises in quiet environment
- Asks for volume to be turned up
- Talks loudly
- Doesn't respond to alarms

→

- Headphones with music
- Visual schedules or visual cues
- Provide with a whisper phone
- Physical prompts/cues (such as tapping on shoulder)

- Covers ears
- Easily upset in loud environments
- Makes noises to drown out other sounds
- Asks others to stop talking
- Easily distracted by sounds/background noise

→

- Seat away from doors/windows and students who tend to be louder
- Play calming music/sounds
- Implement quiet corners
- Headphones
- Snacking/chewing gum may help filter sounds

## Classroom Signs and Strategies by Sense

2, 5, 6, 11, 12

### Tactile

- Seeks touching things
- Difficulty maintaining personal space
- Holds/fidgets with objects
- Loves touching many textures
- Enjoys "messy play"

→

- Use of fidget toys
- Place Velcro or stickers under desk
- Textured pencil grips
- Manipulatives during learning
- Sensory bin breaks

- Avoids messy textures
- Anxious when near others
- Prefers front/back of line
- Prefers not to be touched

→

- Place cushions on seats
- Soft pencil grips
- Avoid tactile cues
- Distance seat from other students
- Offer gloves or paper towels during messy activities
- Allow to stand in front/back of line

## Classroom Signs and Strategies by Sense

2, 5, 6, 11, 12

Vestibular

- Difficulty remaining still
- Does not seem to get dizzy
- Decreased balance
- Low muscle tone
- Leans on objects/people
- Difficulty with hand-eye coordination
- Decreased safety awareness

→

- Intermittent standing breaks
- Alternative seating options (wobble cushion, theraball, etc.)
- Chair stretches/neck rolls
- Classroom tasks that provide movement

- Prefers sedentary activities
- Prefers not to climb play structures
- Clings to people/objects in environment
- Avoids sitting on unstable surfaces
- May get upset if someone bumps into them

→

- Ensure feet touch the ground while seated
- Allow extra time for movement activities
- Allow to lie on floor during independent work

## Classroom Signs and Strategies by Sense

2, 5, 6, 11, 12

Proprioception

- Slouches in seat
- Always jumping/bouncing
- Loves crashing into things
- Seeks hugs/squishes
- Writes hard
- Fatigues easily
- Breaks writing tools or toys

→

- Alternative seating
- Theraband around chairs
- Carry heavy backpacks
- Weighed lap pad
- Heavy work (pushing/pulling tasks)
- Animal walks

Less common as proprioceptive input is typically calming and regulating

- Avoids jumping
- Pushes away from hugs
- Writes lightly
- Difficulty with handwriting

→

- Kids are not usually over-responsive to this input
- Proprioceptive input is usually calming and can be used for all students prior to classwork

# Thank you for listening!

Sensory Handouts

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April 2024

## References

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QR Code to Recording of Presentation:

Appendix E: GSU IRB Approval Letter

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
Atlanta, Georgia 30302-3999
Phone: 404/413-3500

In Person: 3rd Floor
58 Edgewood
FWA: 00000129

November 30, 2023

Principal Investigator: Sutanuka Bhattacharjya

Key Personnel: Bhattacharjya, Sutanuka; Bouwkamp, Morgan P

Study Department: Georgia State University, Department of Occupational Therapy

Study Title: Supporting Teacher's Knowledge of Sensory Processing Disorder: Development of an Educational Resource Based on Expert Opinion

Submission Type: Exempt Protocol Category 2

IRB Number: H24254

Reference Number: 377420

Determination Date: 11/30/2023

Status Check Due By: 11/29/2026

The above-referenced study has been determined by the Institutional Review Board (IRB) to be exempt from federal regulations as defined in 45 CFR 46 and has evaluated for the following:

1. Determination that it falls within one or more of the eight exempt categories allowed by the institution; and
2. Determination that the research meets the organization's ethical standards

If there is a change to your study, you should notify the IRB through an Amendment Application before the change is implemented. The IRB will determine whether your research continues to qualify for exemption or if a new submission of an expedited or full board application is required.

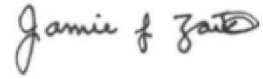
A Status Check must be submitted three years from the determination date indicated above. When the study is complete, a Study Closure Form must be submitted to the IRB.

This determination applies only to research activities engaged in by the personnel listed on this document.

It is the Principal Investigator's responsibility to ensure that the IRB's requirements as detailed in the Institutional Review Board Policies and Procedures For Faculty, Staff, and Student Researchers (available at gsu.edu/irb) are observed, and to ensure that relevant laws and regulations of any jurisdiction where the research takes place are observed in its conduct.

Any unanticipated problems resulting from this study must be reported immediately to the University Institutional Review Board. For more information, please visit our website at www.gsu.edu/irb.

Sincerely,



Jamie Zaikov, IRB Member