2023

Sensory-Based Universal Design Strategies For Head Start Students To Optimize Educational Engagement

Lexi Elizabeth Zahn

SENSORY-BASED UNIVERSAL DESIGN STRATEGIES FOR HEAD START STUDENTS TO OPTIMIZE EDUCATIONAL ENGAGEMENT

by

Lexi Elizabeth Zahn

Bachelor of Science, University of North Dakota, 2021

Occupational Therapy Doctorate, University of North Dakota, 2023

A Scholarly Project

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Occupational Therapy Doctorate

Grand Forks, North Dakota

May

2023

Zahn, L. 2023

APPROVAL

This scholarly project, submitted by Lexi Zahn in partial fulfillment of the requirement for the Degree of Occupational Therapy Doctorate from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Karriana Iseminger

4/17/2023

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PERMISSION

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Abstract

Purpose: This scholarly project aims to educate and enable early childhood education teachers on how children's sensory systems can be positively or negatively influenced to improve overall classroom experiences for all children. A teacher's resource guide was developed to inform early education teachers about the sensory system and sensory regulation so that they can better understand the sensory needs of their students. The guide provides them with universally designed, sensory-based strategies to implement in the classroom to increase the performance ranges of students in their educational pursuits.

Methodology: This scholarly project was completed in several key steps including a preparatory research phase, a comprehensive literature review guided by the ecology of human performance (EHP) model, extensive interviews with key stakeholders, and on-site observation which culminated in the development of a resource guide for early childhood education teachers. The process began in May 2022 when looking into sensory-based resources for classroom teachers. After months of research, interviews, and on-site observation, educational materials revealed a gap regarding resources on sensory aspects of universal design for early childhood education teachers. From January 2023 until April 2023 information was deciphered from the literature, interviews, and observation resulting in a final product that was disseminated for use.

Results: The teacher's resource guide provides early childhood education teachers with education on terminology commonly used when discussing sensory dysregulation and specific sensory-related topics such as sensory dysregulation vs emotional dysregulation and sensory seeking vs sensory avoiding. It also provides the teachers with sensory-based activities for all students and environmental recommendations to support the overall classroom context.

Conclusion/Significance: There is evidence that shows an inclusive sensory context can support overall educational engagement and success. The teacher's resource guide is intended to be a reference for teachers and staff at Head Start to fill this gap and utilize the information to provide more universally designed sensory-based activities to decrease dysregulation in the classroom context.

Chapter I

Introduction

Occupational therapy practitioners facilitate engagement in everyday life activities with individuals or groups, to enable participation in roles, habits, and routines in contexts such as the home, school, workplace, and community (American Occupational Therapy Association [AOTA], 2020). These everyday life activities are called occupations. Occupations defined by the American Occupational Therapy Association (2020) are any activity that falls within the categories of activities of daily living (ADLs), instrumental activities of daily living (IADLs), health management, rest and sleep, education, work, play, leisure, and social participation. This scholarly project focuses on the occupation of education and how sensory stimulation can positively or negatively influence a child's participation and engagement in it.

Since the idea of sensory integration was coined in the 1950s by A. Jean Ayres, occupational therapy practitioners have adopted the practices of sensory integration and utilized the practice to remediate the underlying sensory issues that affect functional performance in human beings (Smith Roley et al., 2007). Occupational therapy practitioners can target sensory interventions in many different ways, many of which will be discussed throughout this paper. McGaun (2015) suggests that evidence is accumulating for the idea that certain forms of learning, associative and perceptual, can drive stimulus-specific neuroplasticity changes in auditory, visual, olfactory, somatosensory, and gustatory systems, which are indirectly related to behavior. If occupational therapy practitioners can enable teachers with the knowledge, they require to provide a sensory-inclusive classroom, there is potential to initiate these desired

stimulus-specific neuroplasticity changes in the sensory systems of children whose bodies need it.

Background

In recent years, the idea of sensory processing and its influence on academic success and overall classroom experiences has grown and, in its path, left many questions. In the review of the literature, it became evident that experiences within the classroom highly influence the sensory system but that further research needs to be conducted on the overall impacts and standards of treatment (Pingale et al., 2020; Ata et al., 2012; McGann, 2015; Schaaf et al., 2018; Butera et al., 2021; Lavin, 2021; Park et al., 2020).

Imrie and Luck (2014) identify sensory as a component of UD and pose the question, "How can designers understand bodies in interaction with design, and what tools, techniques, and instruments may enable the multi-sensory nature of the body to be apprehended in ways whereby non-reductive, stereotypical, conceptions of the body are avoided?" (p. 1317). Universal design (UD) is one approach to consider when looking to create a sensory-inclusive context. The term "universal design" arose back in the 1990s but since then has grown into a bigger concept with a greater focus on education coining the phrase, "universal design for learning" or "UDL." UDL prompted a new way of thinking about how to create an environment with an expanded user base in mind.

Occupation-Based Model

The ecology of human performance (EHP) model was utilized to structure and guide the entirety of this scholarly project (Dunn, 2017). The model of EHP was chosen due to its emphasis on context and interdisciplinary teamwork. The model will be utilized to analyze the person, context, and task and to determine the strengths and limitations of the population's

overall performance range. The EHP model assumes dynamic interactions among the person, context, and task constructs which help break down and explain the occupational performance range of the identified population. For this scholarly project, the person is defined as children aged 3-5 from low-income households, the context is defined as early childhood education programming, and the task is engagement and success in education. Throughout this project, specific components of the identified person, context, and task will be broken down and analyzed to determine strengths and limitations to the population's overall occupational performance range.

Key terms, Concepts, and Constructs

- **Ecology of Human Performance Model** – This is an ecological occupational therapy model that is meant to be used by an interprofessional team. The model details the relationships between the "person, context, task, and performance" (Dunn, 2017, p. 210).
- **Occupational therapy** is "the therapeutic use of everyday life occupations with persons, groups, or populations to enhance or enable participation" (AOTA, 2020, p.1).
- **Occupational Therapy Practitioner**: A healthcare professional who practices occupational therapy aligning with the scope of practice and is responsible for the implementation of the occupational therapy process with 6 individuals to enable successful engagement in occupations (AOTA, 2020).
- **Sensory integration – "**the organization and processing of sensory stimuli required for the organism to make an adaptive response to the environment" (Polatajko et al., 1991).
- **Neuroplasticity changes –** the ability of the nervous system to change its activity in response to intrinsic or extrinsic stimuli (Puderbaugh & Emmady, (n.d.).

- **Universal design for learning –** a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn (CAST, 2018).
- **Performance Range** - The performance range is determined by the interaction between the person's factors (their skills, abilities, and motivations) and the context variables (the supports and barriers) (Dunn, 2017).

Project Design

The design and structure of this project were guided by five fundamental chapters. Chapter I presents key terms, concepts, and constructs. Chapter II presents the results of the comprehensive literature review. Chapter III presents the chosen methodology used to guide the project. Chapter IV presents the final product developed. Finally, Chapter V presents the summary of findings, overall conclusions, limitations, and practice recommendations.

Chapter II

Literature Review

Purpose

Over the years, classroom teachers have been prompted to use "universal design (UD)" and promote "inclusive classrooms", but what resources are available for them to promote the two vast approaches? For this review, the focus will be on targeting the sensory component of UD in the classroom. Imrie and Luck (2014) identify sensory as a component of UD and pose the question, "How can designers understand bodies in interaction with design, and what tools, techniques, and instruments may enable the multi-sensory nature of the body to be apprehended in ways whereby nonreductive, stereotypical, conceptions of the body are avoided? (p. 1317).

The sensory system can be influenced positively or negatively depending on how sensory input is received and processed in the brain. Some children experience difficulty processing certain sensory stimuli and may demonstrate adverse reactions as a response. These adverse reactions can present as a child having strong reactions to noise, texture, light, touch, etc. They can also present as a child screaming, kicking, hitting, pushing, and throwing things. The adverse reaction or response is dependent on the sensory trigger for that child and every child may have a different response. When these reactions or responses to sensory stimuli occur, they not only affect the child, but they can, and oftentimes do impact the people around them.

Universal Design

Universal design (UD) is a term that is believed to be derived from the architecture world as a response to the 1990 Americans with Disabilities Act (ADA) (Vanderbilt University, 2019, as cited in Leiberman et al., 2021, p. 20). When the idea of UD arose, the seven principles arose with it. The seven principles of UD were developed to define the concept of UD and prompt a

new way of thinking about how to design contexts with an expanded user base in mind (Leiberman et al., 2021). Shortly after the original seven principles were developed, the education and special education communities gravitated toward the concepts. The educational communities decided to create their spin-off of UD with an added focus on learning. The term universal design for learning (UDL) was coined and can be defined as:

> An instructional planning and delivery framework intended to increase meaningful access and reduce barriers to learning for students with diverse learning needs, including, but not limited to students with disabilities, English language learners, and those from diverse cultural and socioeconomic backgrounds. (Israel et al., 2014, p. 6)

With the rise of the new term and the backing of the educational communities, seven new principles, or "propositions" arose. In 2010, Dave Edyburn who wrote the original seven principles, proposed the idea of a "second decade." The "second decade" consisted of 10 new propositions with a greater focus on education and learning. Edyburn (2010) describes in the 10 new propositions that UD is much more complex than originally thought and UD outcomes must be determined based on enhanced student performance. Since the rise of the new propositions with a greater focus on education and learning, classroom teachers became a part of the conversation and were made more aware of UDL and its benefits for enhancing student learning. Over the years, more and more resources have emerged to support UDL, but there is still vagueness and uncertainty regarding its standard of practice.

Occupational therapy practitioners are equipped with the tools and knowledge to enable teachers to create a context that is suitable for all children's sensory needs. The ecology model of human performance (EHP) will be utilized to guide and structure this literature review (Dunn, 2017). The model of EHP was chosen due to its emphasis on context and interdisciplinary

teamwork. The EHP model assumes dynamic interactions among the person, context, and task constructs which explain the occupational performance range of the identified population. For this literature review, the person is defined as children aged 3-5 from low-income households, the context is defined as early childhood education programming, and the task is engagement and success in education. In this literature review the specific components of the identified person, context, and task will be broken down and analyzed to determine strengths and limitations to the population's overall occupational performance range.

Task Factors

Education and Learning

The primary occupation being addressed for the identified population is education. Education will be addressed through teacher education and the facilitation of an optimal sensory context to enhance all children's sensory experiences in the classroom. One way this can be targeted is through the implementation of a sensory diet. A sensory diet is a combination of sensory activities that are implemented throughout a child's day to facilitate improved participation in their daily activities. Pingale (2018) researched the effects of sensory diets in the classroom, specifically noting their effects on children's processing skills, psychosocial skills, and overall classroom engagement. The findings of the study suggest that the sensory diet was effective and brought positive changes to all the aspects previously mention for the children. Sensory diets can be a great resource, but they can require a lot of planning and time for implementation for the first few weeks. If the setting and teachers can accommodate that, they can be very helpful. Things such as time and planning have to be evaluated before the decision is made to proceed with a very routine, time-orientated option such as that of a sensory diet.

If a sensory diet is identified to be a poor fit for a classroom other things can be done to facilitate educational engagement. Crosland et al. (2012) identified specific strategies such as antecedent procedures, prompting strategies, delayed reinforcement, self-management programs, and peer-mediated interventions that can improve a child's engagement in education. Antecedent procedures involve manipulating some aspect of the context to promote a desired response or make an undesirable behavior less likely to occur before it happens. Prompting strategies to supplement the general instructional routine to elicit responses to academic or behavioral activities for children. Visual schedules are an example of a prompting strategy to increase predictability for children and allow them to anticipate the next thing in their routine to prevent dysregulation when they are prompted to move on from their current activity. Delayed reinforcement is simply positive reinforcement in a delayed time frame. With immediate positive reinforcement, you may see an immediate alter in behavior but with delayed reinforcement, you aim to see positive changes over a longer period. Self-management strategies include student lead actions. Students may set their own goals, review the consequences and actions of their own behavior, or identify their own reinforcement. Self-management strategies promote classroom independence by shifting the responsibility of behavior management from the teacher to the student. Peer-mediated interventions emphasize peer interactions as a means to promote socially appropriate actions. When utilizing peer mediation as a strategy it is common to see a peer deemed socially appropriate paired with a peer who is deemed socially inappropriate in hopes that the inappropriate peer will start following the actions of the appropriate peer. All aforementioned strategies can be implemented in replace of a sensory diet or in addition to sensory intervention to optimize educational engagement.

Person Factors

Psychosocial

Psychosocial factors can be described as the experiences a person goes through that influence the meaning they attach to different tasks or contextual items. They may influence the types of relationships a person develops or how they interpret social situations. For children aged 3-5 years old, psychosocial factors may include a child starting to interpret the emotions of others, such as identifying when someone is angry or upset. They may understand social rules and choose their actions according to others. They may start to become eager in helping others and take on responsibilities of their own. They also start using less physical aggression when they are upset (American Psychological Association [APA], n.d.).

Another way to describe an individual's psychosocial factors is through a term referred to as interoception. Interoception is a rather new term in the "senses" world, it is described as cues sent from inside the body that are crucial to maintaining basic drives such as hunger and thirst along with playing an important role in controlling the body's urges. In the last few years, it has even been referred to as the body's sixth sense. Harrison et al. (2019) confirms the important role interoception plays in controlling the body's urges and identifies that it also plays a role in human reflexes, feelings, drives, and different adaptive responses along with its role in cognitive and emotional experiences.

Sensorimotor

The term sensorimotor can be described as congruent stimulation between an individual's sensory system and motor system. An example of this congruent stimulation is an individual walking barefoot. While walking barefoot, an individual's sensory system is receiving sensory input from the bottom of the foot while also completing the motor movement of walking. Riemann et al. (2002) researched aspects of sensorimotor and identified just how important they

can be. Children engage in occupations every day that require sensorimotor integration, these activities include handwriting, picking up objects, dancing to music, eating, and many others. The slightest effect on the sensorimotor system can throw off a child's ability to write, pick up objects, or even affect the child's ability to tell where their body is in space.

Cognition

Cognition has many definitions and can be interpreted in many ways. For this review, cognition is described as someone's ability to obtain and/or understand knowledge through thoughts and experiences. According to the American Psychological Association (n.d.) typically developing children aged 3-5 years old present with cognitive abilities that enable them to think about objects, people, and events without having to physically see them. They present with the ability to use words to express themselves and use self-talk to control their behaviors. They start including the use of prepositions in their language and start talking about things that have happened in the past or those that are yet to happen. They start to decipher the difference between things that are real and things that are not real. For example, a drawing of a tree is not an actual tree. Finally, they start to see the relationship between cause and effect leading to a lot of why, how, and when questions (APA, n.d.).

In a general sense, sensory processing does not directly have an impact on overall cognition but can, and does, impact a child's educational participation. According to O'Donnell et al. (2012), there was no significant relationship between sensory processing deficits and an individual's cognitive function, which was assessed through different IQ testing. On the other hand, Butera et al. (2020) found that although sensory processing deficits do not affect quantitative IQ scores, they can indirectly affect school performance. Sensory processing deficits were seen to impact school performance on the premise that different sensory inputs result in

avoidant self-regulation patterns that can leave a child in distress. These avoidant self-regulation patterns then lead to limited engagement or opportunity to process information during classroom activities, impacting the child's educational performance range.

Contextual Factors

Physical Context

The physical context can be defined as all non-human components of context, for example, buildings, objects, tools, furniture, etc. (Dunn, 2017). As concrete as the physical context can seem, it is a very complex concept that has the power to influence the feelings and behaviors of those surrounded by it. Its power to influence feelings and behaviors is something that has been studied over the years, referred to as "environmental psychology." Ata et al. (2012) explains the importance of environmental psychology and the factors to consider when analyzing an environment for its influence on people's feelings and behaviors. The authors of this study looked at the physical contextual factors of space, lighting, noise, color, and air quality. In general, they describe the optimal physical context in terms of environmental psychology to be an open concept room, with lots of natural light, soft colors, low in materials (soaps, cleaning materials, toys, etc.), and low levels of sound. All the factors noted by Ata et al. (2012) that contribute to the optimization of a physical context have a sensory contribution, this is another reason targeting the sensory components of the physical context to optimize educational performance is so important.

From a UD standpoint, Liebermann et al. (2021) identified through their research the factors that should be taken into consideration when examining sensory aspects of a context such as a classroom. Factor one is comfort. Identifying that discomfort leads to distraction or distress, which inherently affects engagement. When targeting comfort, Rapp (2014) recommends

considering things within the context such as lighting, temperature, furniture, equipment arrangement, noise, and emotional climate (the way teachers and students converse), all of which have some sensory attribute. Factor two of Liebermann et al. (2021) UD standpoint is how school content and educational materials are presented to students. Different presentation styles commonly recommended include the use of text and pictures, demonstrations, examples, drawings, charts, 3-D models, or numbers to target all learning styles. Liebermann et al. (2021) last UD factor to discuss involves the incorporation of physical activity into the children's classroom schedule such as providing times of the day when the children can jump, stand, wave their arms, stretch, bend, etc.

According to literature from Ata et al. (2012) and Liebermann et al. (2021), an "optimal" sensory context does exist, but they do not do any subject testing to show how it could be transferred to real-life situations. Park. et al. (2020) tested this theory of an "optimal" sensory context and created what they referred to as a sensory "hub." The "hub" was an adaptable free-standing structure that consisted of the optimal sensory context for individuals with atypical sensory systems. They found that providing an optimal sensory context for children to go to was beneficial for not only the students but the teachers as well. Teachers in the study used the hub as a place to take students who were showing "signs of distress" to, "re-direct before escalating" (Park et al., 2020). The way the teachers utilized the sensory hub and the results they saw indicate that the optimal sensory context of "the hub" was therapeutic for children in distress.

Social Context

The social context can be defined as the people around an individual or that exist in a population. In the classroom setting, the social context of a child consists of their peers and their teacher. The social context can support or inhibit a child's sensory system due to the many

variables influencing the overall context. Thye et al. (2018) describes the inhibiting factors and note that when the social context becomes too stimulating, it overrides the body's ability to regulate sensory stimuli resulting in adverse reactions that impact academic engagement.

Although there are negative effects of the social context, there are positive ones as well. Thompson Noddings (2012) identifies some of the key positive factors of the social context noting that individuals within the social context, such as teachers, can positively influence children in many ways. They note the distinct role teachers have to be with these children all day and because of that, how they can learn the student's sensory triggers and prevent a reaction before it occurs. If teachers are empowered with the materials to make this judgment call, identify the trigger before it occurs, and potentially stop a reaction before it gets to an uncontrollable level. Therefore, teachers can make a difference in the children's social context if they are enabled with the resources to do so.

As discussed prior, the other key influence within the social context is peers. Peers are influential to one another in many aspects of day-to-day life. They can influence feelings, emotions, and attitudes, and provoke positive and negative responses. They can also be influential in educational pursuits. Zimmer and Toma (2000) note that one of the key aspects of peers is the influence they can have on the skills and abilities of those around them. They identify that one of the most influential relationships among peers is between those who are disadvantaged and those who present with higher ability levels. Noting that those with a higher ability level have positive effects on the development of their disadvantaged peers, supporting the ideas of Crosland et al. (2012) and their recommendation for utilizing peer-mediated intervention to promote socially appropriate behaviors.

Temporal Context

The temporal context can be defined by factors such as chronological age, developmental stage, time of day, and health status (Dunn, 2017). For this review, the chronological age and developmental stage can be defined as children aged 3-5 years old in the toddler to preschool developmental stages. Relative to the population, a key factor of the temporal context is if the child was born preterm or not. Mitchel et al. (2015) noted through their research that infants born preterm (gestational age from 22 to 37 weeks and/or birthweight between 1 lb. and 6.5 lbs.) were at high risk of developing some level of sensory processing deficits. Meaning as children grow up, their bodies will not process sensory information like their peers, leading to the need or desire for a sensory-inclusive context. According to the World Health Organization (WHO) approximately 15 million babies are born preterm each year, that is approximately 15 million babies that are at high risk of developing some level of sensory processing deficit and who may one day require a sensory-inclusive context to thrive.

Regarding the time of day, Mills et al. (2021) identified the importance of a schedule, specifically, a sensory activity schedule. They found that a sensory activity schedule effectively improved students' overall attention during educational activities. The sensory activity schedule was organized so that activities were approximately 10 minutes each and took place before required class activities. The authors used visual schedules to facilitate engagement and independence in the sensory tasks. A few of the sensory tasks used in the study to facilitate participation included crashing into a ball pit, bouncing on a therapy ball, playing with fidgets, weight-bearing through extremities, and access to headphones for auditory stimulation (Mills et al., 2021). The sensory activity schedule can be another alternative to a sensory diet as the required times of the activities aren't as rigid and it is more flexible with different classroom schedules.

Cultural Context

The cultural context can be defined as values, beliefs, and/or activity patterns that surround a group or population. School systems are traditionally known for having particular social norms or activity patterns, for example, students are expected to raise their hands before they speak. According to Lee & Louis (2019), there are six key factors to a strong cultural context of a school. The factors include embracing high academic standards, the allocation of resources for student support, and the creation and sustainability of a positive, professional learning community. The authors found that students attending schools that embrace these six key cultural factors show better academic performance compared to those schools that do not. Therefore, ensuring schools are equipped with the key cultural values aforementioned, can set the foundation for children's academic success (Lee & Louis, 2019).

Conclusion

Universal design (UD) is a vast concept with limited guidance on its sensory standards of practice, even with the substantial amount of evidence supporting the claim that sensory stimulation can impact educational performance. There is yet to be a set of instructions or a guide on how to provide students with the most optimal sensory context to enhance performance in their educational pursuits. Whether the impact comes from fetal prematurity identified by Mitchel et al. (2015) or the physical context as identified by Ata et al. (2012), Liebermann et al. (2021), or Park. et al. (2020), occupational therapy practitioners are equipped with the tools and knowledge to enable teachers to create a universally designed, optimal sensory context that supports all children’s sensory needs for successful educational engagement. Following the review of the literature, it is evident that a resource for incorporating universal design sensory components into the classroom context is necessary and achievable.

Chapter III

Methods

Project Design

This scholarly project was completed in several key steps including a preparatory research phase, a comprehensive literature review guided by the ecology of human performance (EHP) model, extensive interviews with key community agency stakeholders, and on-site observation at the community agency which culminated in the development of a resource guide for early childhood education teachers. This teacher's resource guide is intended to support local Head Start teachers in implementing sensory-based universal design (UD) strategies in the classroom to increase the performance ranges of students in their educational pursuits.

The preparatory research phase was completed over approximately four months, from May 2022 until August 2022. In the preparatory research phase, databases such as Elsevier, PubMed, the School of Medicine and Health Sciences Library Resources, and Google Scholar were utilized to find scholarly articles and research studies relevant to the research questions. Relevant literature was also obtained from textbooks as well as publications from the American Occupational Therapy Association, the American Psychological Association, and the Centers for Disease Control. Common search phrases used within these research databases included "children OR child OR youth," "universal design OR inclusive classroom," "occupational therapy OR OT," "psychosocial OR social," "sensorimotor OR sensory," "context OR environment," "sensory interventions OR sensory-based therapy," "sensory diet OR sensory schedule," and "impacted sensory system OR sensory deficits OR sensory disorder OR diagnosis."

Additional information was gathered to inform each of the three constructs from the identified model of EHP through the generation of specific research questions to gather relevant research on each individual construct. Questions developed regarding the construct of the person involved breaking the broad construct down into its sub-constructs of psychosocial, sensorimotor, and cognition and researching the smaller sub-constructs. A similar strategy was followed for the remaining broad constructs of context and task. Questions developed regarding the construct of context involved, again, breaking down the broader construct into its sub-constructs of physical, social, temporal, and culture. Lastly, the broad construct of the task was chosen to be broken down into the sub-constructs of education, teaching, and activities of daily living.

Inclusion criteria were also generated during the preparatory research phase. The literature included in the review focused on children or youth with sensory processing difficulties in the school-based setting. Criteria were also set to include research studies that had been conducted within the last 10 years in order to ensure information was still relevant. Some literature beyond the 10-year mark was still included due to its importance to the project. If the literature was beyond the 10-year mark, it was disclosed in the final review. Research studies completed on adults, focused on children with specific diagnoses, conducted in the outpatient setting, or research older than 10 years (unless deemed necessary) were excluded from the review.

The next step was the completion of a comprehensive literature review where all the literature collected in the preparatory phase was reviewed in detail and synthesized to answer the research questions. This process began in August 2022 and was completed over the span of approximately five months, from August 2022 until December 2022. The model of EHP was

used to guide and structure the literature review as the review is synthesized by the constructs of the model.

The next step of the process was starting on-site at the identified community agency of Head Start in order to collect more specific data about the person, context, and task within the agency. Formal and informal interviews were conducted over a span of approximately three months from January 2023 until March 2023. Initial informal interviews were completed with different employees within Head Start such as the classroom teachers, speech pathologists, family services employees, the director, and additional social workers to identify roles and expectations. The initial informal interviews with staff consisted of conversations about each of the staff members' roles, the standards of practice at the facility, and the laws and regulations affecting the implementation of the project. There was not a set question I asked each team member other than asking them about their role at Head Start. Classroom teachers were also interviewed through a short survey sent via google forms to identify their perspective on sensory aspects in the classroom as well as insight into what they want to learn more about. All information gained from interviews was utilized in the production of the product and for implementation following the presentation of the product to the Head Start staff.

Skilled observation was another form of data collection utilized while on-site to inform the final product. Approximately eight to 10 hours were spent in each of the 10 classrooms over the span of approximately three months, from January 2023 until March 2023. The on-site observation facilitated relationships with classroom teachers and children, familiarity with classroom routines, insight into the physical context of the classroom and how each is set up differently, and finally informed the format, contents, and dissemination of the final product.

After the initial data collection phase, information from the literature review, interviews, and on-site observations was deciphered and utilized to start the development of the final product. The development of the teacher's resource guide was conducted over approximately three months, from February 2023 until April 2023. The teacher's resource guide was driven by the desire to enable and educate teachers on how the sensory system can influence overall classroom functions and experiences for children, specifically for this setting, children from low-income households. The final product consists of two parts, part one is a physical copy meant to be distributed in classrooms and the second is an electronic resource meant to be used when more information is needed.

Ethical Considerations

Institutional Review Board (IRB) approval was not required for this project, but ethical considerations were still taken into account throughout the completion of the project. Ethics that were considered include fidelity, nonmaleficence, and veracity (AOTA, 2020). Fidelity is the promise to respect all persons and proceed with discretion and respect (AOTA, 2020). The final appendix of the product includes photographs of children, therefore verbal and written consent was obtained from parents before proceeding, written consent can be found in Appendix B. Nonmaleficence is refraining from harm or discomfort (AOTA, 2020). Verbal consent was not only received by the parents but by the children as well.

Veracity is upholding relationships based on truthfulness, candor, honesty, and respect for others (AOTA, 2020). Respecting the time of the classroom teachers was a key factor in deciding how to proceed with product development and disbursement.

Chapter IV

Product

The idea for this final product emerged following the first meeting with Head Start staff in May of 2022. The director of Head Start expressed the need for information on sensory-based products, activities, and solutions stating, “We have all this stuff, but no one knows what it is or how to use it” (T. Johnson, personal communication, May 09, 2022). This led to the creation of the teacher's resource guide.

The creation of the final product, the teacher’s resource guide, was guided by the ecology of human performance (EHP) model. The model of EHP was used not only utilized to analyze the person, task, and context but to guide contextual recommendations. The model of EHP also promotes interdisciplinary dialect which is beneficial as the final product will be utilized by classroom teachers and other Head Start Staff rather than occupational therapy practitioners (Dunn, 2017). Recommendations were also made under the guidance of the sensory integration frame of reference (Parham & Mailloux, 2020).

Product Structure

The teacher’s resource guide project is broken down into two parts, a physical part, and an electronic part. Part one of the product is the physical piece that consists of four laminated handouts each covering a different topic relevant to the sensory system. These handouts are intended to be hung in the classrooms and utilized by classroom teachers as quick reference guides to help them make quick changes to the context in order to meet the children’s sensory needs at the moment. It was clear after just a few days at Head Start that whatever the product ended up being, it needed to be short and concise. The classroom teachers do not get a lot of time to their self and one of the main focuses of this project was to make their lives easier, not harder.

As previously mentioned, the guide is intended to be a quick reference therefore the goal was to keep it under approximately five pages, following feedback from staff four main topics were chosen equating to a four-page resource guide. The four main topics were chosen in collaboration with the classroom teachers via an online survey. Utilizing a survey and obtaining teachers' perspectives was decided upon as teacher buy-in is very important for product implementation and carry-over. The product is also for them, so their questions and concerns were a priority.

The four main topics that make up the four page physical handout were chosen to guide the final product are “Sensory Dysregulation vs Emotional Dysregulation,” “Sensory Systems,” “Sensory Red Flags,” and “Sensory-Based Activities/Environmental Recommendations.” Topic one, “Sensory Dysregulation vs Emotional Dysregulation” was chosen because there was a clear misconception or lack of understanding of the two terms and many questions asking how to tell the two terms apart. This information was displayed by first defining the two terms, followed by a ven diagram to assist in determining if reactions are due to emotional dysregulation or sensory dysregulation. Topic two, “Sensory Systems” was chosen to be included as there are not just five senses to consider, three additional senses must be considered, and since the focus of the project was on sensory inclusion, information on all sensory systems was deemed necessary. This information was presented in a diagram form displaying each sense, visual clip art that symbolizes that sense, followed by definitions of each sense. Topic three, “Sensory Red Flags” was included to define and provide education on two commonly used terms, “sensory seeking” and “sensory avoiding” and to provide common signs or symptoms associated with each to help teachers identify if a student is seeking or avoiding sensory input. This information was displayed as first defining the two terms, followed by a list of signs under the identified term that

is intended to assist teachers in recognizing the signs in their students. The fourth and final topic, "Sensory-Based Activities/Environmental Recommendations" is really the primary focus of the product. It includes evidence-based, sensory-based activities and recommendations for the teachers to incorporate into their classrooms to facilitate a sensory-inclusive classroom. As previously mentioned, the guide is intended to be a quick reference, so the activities and recommendations are presented in list form. This leads to the second part of the product, the digital appendices.

The electronic pieces of the final product is a digital appendix that was included to provide tips for implementation, pictures, examples, and explanations of the listed activities in handout number four. The tips for implementation were guided by the sensory integration frame of reference to ensure the utilization of the sensory-based activities were appropriate and evidenced-based (Parham & Mailloux, 2020). The appendix was designed so that if teachers needed more information than just the listed activities, they could reference it on an as-needed basis. It was decided not to include this information in the physical handout as the hope is that after teachers reference the appendix one or two times to learn more about unfamiliar activities, they won't need it anymore. The digital appendix is kept on a google drive controlled by my site mentor and shared with Head Start classroom teachers and staff.

Following the completion of the product, an in-service was held to disseminate the product to staff and give a presentation describing the product and its intended use. Follow-up consultations in the classrooms were completed through week 14 to answer any lingering questions.

The entirety of the product can be found in Appendix A.

Chapter V

Summary of Findings

This project aimed to educate and enable early childhood education teachers on how children's sensory systems can be positively or negatively influenced to improve overall classroom experiences for all children. This was done through the creation of the teacher's resource guide. As previously mentioned, the overall project was conducted over 11 months from May 2022 until April 2023 in several key steps including a preparatory research phase, a comprehensive literature review guided by the ecology of human performance (EHP) model, extensive interviews with key stakeholders, on-site observation, and the development of a resource guide for early childhood education teachers. The final product, the teacher's resource guide, provides early childhood education teachers with education on terminology commonly used when discussing sensory dysregulation and specific sensory-related topics such as sensory dysregulation vs emotional dysregulation and sensory seeking vs sensory avoiding. It also provides the teachers with sensory-based activities for all students and environmental recommendations to support the overall classroom context.

Implementation

To ensure the efficacy of this project, it is recommended that the product be utilized by early education teachers at Head Start to promote engagement and support children in their educational pursuits. The product is meant to be utilized for education but also gives specific activities and ideas to be implemented throughout the day at the teacher's discretion. All activities can be used in a group setting and ideally will be used with most of the class. Per the sensory integration frame of reference, it was recommended to never push a student to do a sensory-based activity, and to let the child lead after the activity has been introduced (Parham &

Mailloux, 2020). Ideally, the product would be implemented at the beginning of the school year so teachers could start utilizing the product right away and the children could start to use some of the tools independently.

Limitations

Limitations of this project include that the guide was developed for a specific population. This guide was developed specifically for the early childhood classroom teachers at Head Start in Grand Forks, ND. It was developed to be universal in its contents, but the subjects were chosen in collaboration with the Grand Forks Head Start staff, therefore decreasing the product's transferability.

Another limitation of this project is the time of year. The product was designed to improve classroom engagement and facilitate positive experiences for children in their educational pursuits. The final product was not completed until the last quarter of the school year so the time for implementation and carryover is very little. If the final product was implemented at the beginning of the school year when the bulk of teachers are stressing the importance of emotions and feelings, teachers could tie the sensory-based activities into that discussion and teach kids to utilize the activities on their own based on what their bodies are feeling. This would increase the independence of the students and decrease sensory and emotional dysregulation throughout the rest of the year.

Future Recommendations

In the future, it is recommended to continue the evaluation of Head Start classrooms to improve aspects of the overall context, this could be completed by an occupational therapy student or an occupational therapist. Head Start classrooms are required to follow specific design standards determined by the Creative Curriculum and general Head Start performance standards

but tend to get very busy very quickly. Many teachers requested a design recommendation for how to set up the classrooms following all the standards that they are required to but also that are considerate of visual stimulation.

Conclusions

After 14 weeks of collaborating with the identified community agency, Head Start, this scholarly project resulted in the creation, presentation, and disbursement of a teacher's resource guide to be utilized by the classroom teachers of Head Start. The overarching goal of the product is to educate and enable Head Start teachers so that they can enable and facilitate a positive learning environment focused on sensory inclusion for all children.

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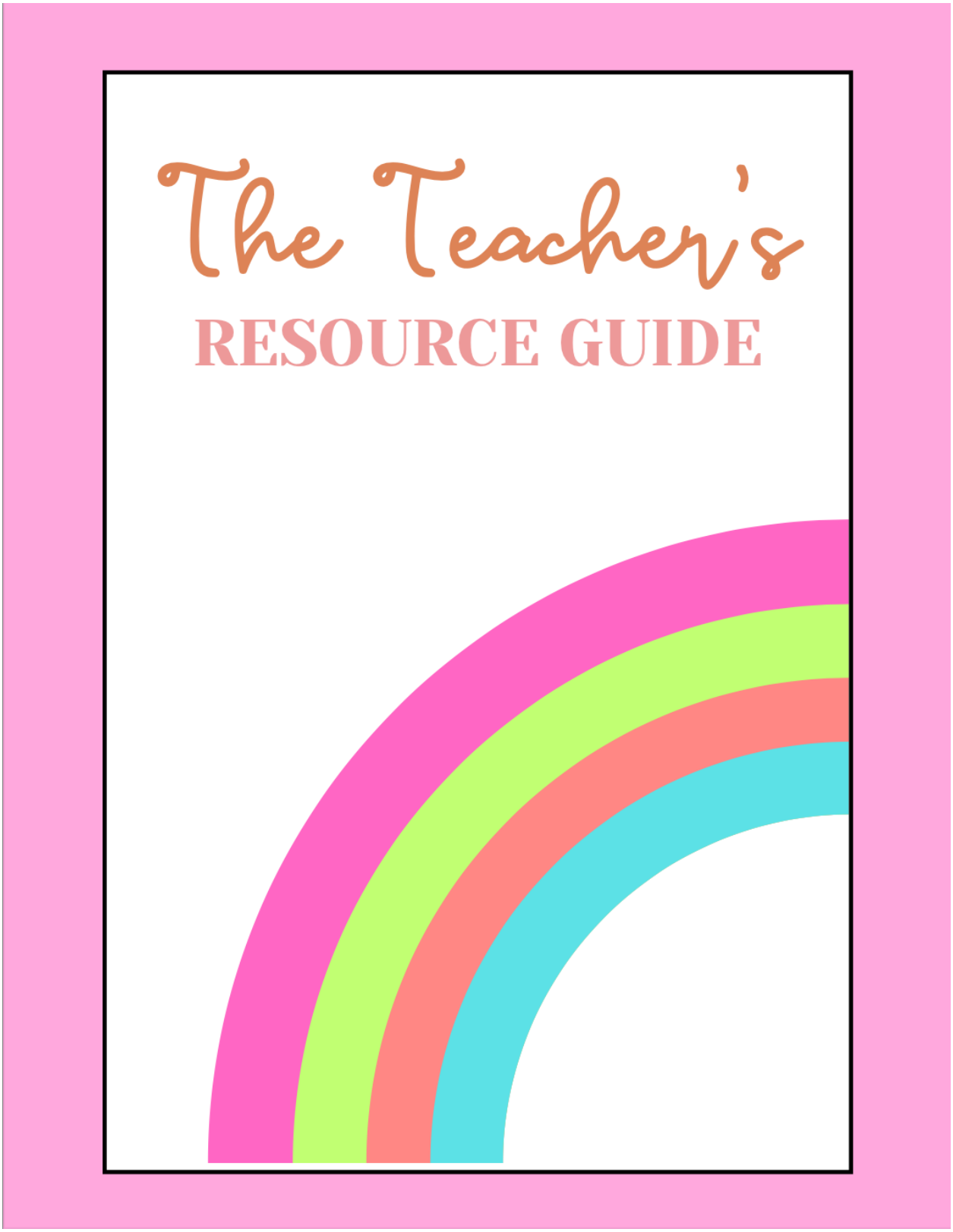
Appendices

Appendix A: FINAL PRODUCT



SENSORY DYSREGULATION VS. EMOTIONAL DYSREGULATION

Sensory Dysregulation

"A mind or body state that occurs when the body is out of balance due to sensory experiences" (Beck, 2022)

Emotional Dysregulation

An experience elicited by a want or desire; behavior generally ends when satisfaction is achieved

SENSORY DYSREGULATION VS. EMOTIONAL DYSREGULATION

Emotional Meltdown

- Driven by a want
- Driven by attention
- Behavior ends when the child gets what they want
- Goal of satisfaction
- No nervous system response; no sweating, shaking, etc.

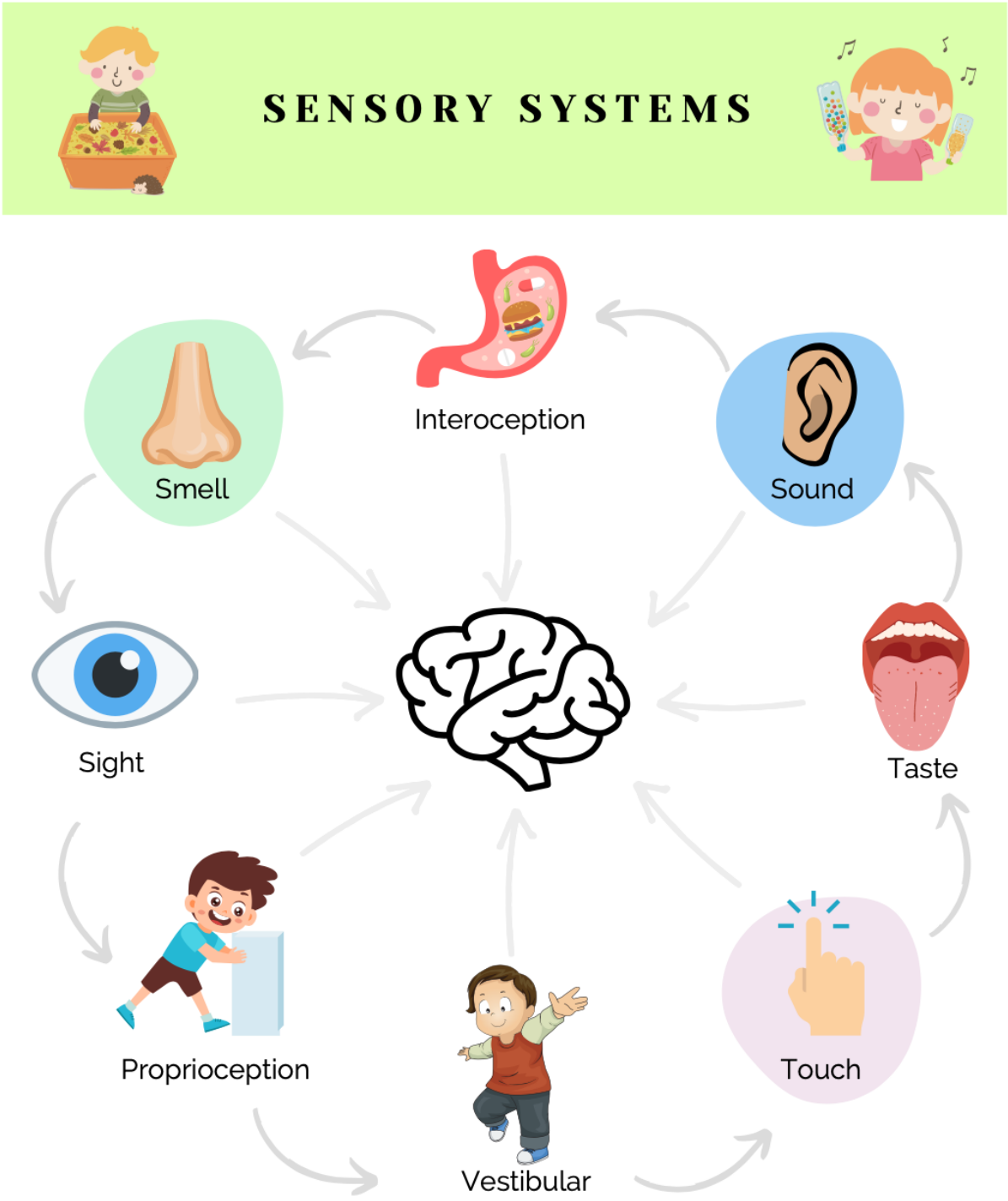
Both

- Kicking
- Screaming
- Biting
- Throwing
- Hitting

Sensory Meltdown

- A response to overload or feeling overwhelmed
- Child does not care if anyone is paying attention
- Behavior continues with or without an audience
- There is no goal; behavior will end when body calms down
- Autonomic nervous system response; sweating, redness, pupil dilation, etc.

(Beck, 2022)


SENSORY SYSTEMS
Interoception
Smell
Sound
Sight
Taste
Proprioception
Vestibular
Touch

Show the Inspector

SENSORY SYSTEMS DEFINED

Interoception: physiological senses of the body; helps identify when you are hungry, thirsty, have to go to the bathroom, etc.

Taste/Smell: commonly put together since they are so closely related; generally you smell something before you eat it, which then determines whether you eat the item or not

Sight: anything you see; far away or close-up

Proprioception: an internal sense that allows you to know where your body is in space through input from your joints, muscles, ligaments, and other connective tissues

Vestibular: located in the inner ear, allows the body to determine gravitational position; i.e. are we laying down, standing, sitting, etc.

Sound: hearing or listening

Touch: anything you touch or feel

(Greutman, 2018)

SENSORY RED FLAGS

Sensory SEEKING

Or "under responsive"; higher than normal threshold for sensory input; requires more input to reach threshold therefore child actively seeks out sensory input

Sensory AVOIDING

Or "over responsive"; lower than normal threshold for sensory input; threshold reached faster than normal therefore child avoids sensory input after threshold has been reached

(Thompson & Raisor, 2013)

SENSORY RED FLAGS

Sensory SEEKING

- Demonstrates excessive or repeated body movements
- Touches everything
- Makes noises/sounds often
- Licking/chewing on nonfood items
- Likes rough play
- Fidgets with things often
- Active and excitable

Sensory AVOIDING

- Covers ears in response to noise
- May hide to get away from stimuli
- Avoids touch
- Picky eater
- Complaints of uncomfortable clothes
- Startles easily
- Bothered by tags on clothing
- Easily distracted by environment

(Thompson & Raisor, 2013)

SENSORY-BASED ACTIVITIES

Tip!
Complete activities prior to a seated task for optimal success
Example: Bear crawl to the carpet before large group

- Animal walks (bear crawl, crab crawl, gorilla walk, frog jump, etc.)
- Wall pushups
- Elephant stomps
- Lemon squeezes
- Lay on belly during floor time (when able)
- Play with a fidget
- Tactile bin (fill a box with beans or dried rice)
- Squeezing/pulling playdough or puddy
- Sway on an exercise ball
- Yoga (video online or have a yoga ball handy)
- Deep, slow breathes
- Familiar, repetitive tasks (stringing beads, put pom poms in a jar)
- Weighted blankets/stuffies

(Thompson & Raisor, 2013)

SENSORY-BASED RECOMENDATIONS

Environmental Recommendations

- Low/soft lighting
- Quiet voices
- Gentle/quiet music
- Limited scents/smells/odors
- Appropriate space (for individuals and groups)
- Neutral tones with pops of bright color

(Ata et al., 2012)

APPENDICES

Tips for implementation!

- Incorporate activities prior to seated tasks or during seated tasks!
- Recommend to utilize only 1 - 2 activities at a time, children have a very short attention span and you want to get the most out of the activity!
- You can introduce the sensory-based activities but then let the child lead from there

(Thompson & Raisor, 2013; Parham & Mailloux, 2020)

Animal Walks

Example: Have all the kids crab walk to the sink to wash their hands prior to lunch

Facilitates deep pressure as well as the proprioceptive and vestibular systems

Wall Push-ups

Example: Prompt the kids to complete x8-10 wall push-ups prior to free play

Facilitates deep pressure as well as the proprioceptive

Elephant Stomps

Example: Have the kids elephant stomp to the carpet for large group

Facilitates deep pressure as well as the proprioceptive

Lemon Squeezes

Example: Have all the kids complete x10 lemon squeezes once seated on their carpet square

Facilitates deep pressure and proprioceptive input

Lay on Belly

Example: Have children lay on their belly during large group or carpet time

Facilitates deep pressure and proprioceptive input over a large surface area as well as muscle use

Fidget

Example: Allow children (who are having a hard time sitting still) to play with a fidget during carpet time

Facilitates tactile input and supports attention

Tactile Bin

Example: Allow children the option to play in a tactile bin during free play (fill bins with rice, sand, water, and beans and change up every once in a while)

Facilitates tactile input

Puddy

Example: Allow children to play with play dough or puddy and encourage pulling and pushing the play dough or puddy

Facilitates deep pressure and proprioceptive input

Exercise Ball

Example: Children may roll back and forth on a ball in the large gym

Facilitates proprioceptive and vestibular input

Yoga

Example: Put on a yoga video during free play or do it as a warm-up to carpet time

Facilitates deep pressure as well as proprioceptive and vestibular input

Deep Breathing

Example: Have children do 5-8 deep breathes once seated for carpet time

Facilitates calmness and supports attention

Repetitive Tasks

Example: Have children string beads or layout pom poms in rows and have children place one by one into a cup as a free play task

Supports attention to task and calmness

Weighted Object

Example: Allow children (who are having a hard time sitting still) to sit with a weighted animal on their lap or allow the excited/active student to sit with it in a more one on one setting but remember let the child lead!

Facilitates deep pressure and supports attention

Appendix B: SIGNED PHOTO RELEASE

GRAND FORKS HEAD START CONSENT FORM

Information shared with a Head Start employee may be shared as necessary with other Head Start team members for the purpose of providing and referring services.

1. I give permission for Head Start, along with the elementary school my child will attend next year, to exchange any information concerning my child.
2. I give permission for my child to participate in field trips and school related activities. I release Grand Forks Head Start from any liability while my child is participating on a field trip.
3. I give permission to the Grand Forks Head Start Program to release any pictures, feature stories or news articles, which have taken place in my child's classroom, to the news media.

   Yes X No _____ Other _____
4. I give permission for my child to have emergency health care, medical examinations, laboratory tests, and treatments from the physicians, dentists, public health personnel, Head Start staff, ND Health Tracks, and other health personnel as deemed necessary by Head Start.
5. I give permission for my child to receive vision, hearing, speech, language, social-emotional and developmental screening from Head Start or the Grand Forks Public School Specialist.
6. Mental health consultation services are available to all children enrolled in the program and may include assessment, observation and consultation with teachers, staff and parents/caregivers. I give permission for mental health consultation services for my child by Head Start mental health staff.
7. I give permission to the Head Start Staff to transport my child home, to appointments, or to child care when parents/guardians are not available.
8. I give permission to the Head Start Staff to apply the following as deemed necessary:

   Lip Balm (individual packet) X Toothpaste X Sunscreen X

   Bug Spray X Lotion X Antibacterial First Aid Ointment X

   Other _____

This consent form is in effect from my child's enrollment in Grand Forks Head Start through his/her kindergarten transition process.

The activities and screenings available to my child as identified on this form were explained to me. I understand the nature and purpose for them and give my permission.

[redacted] _____ [redacted] _____

CHILD'S NAME **PARENT/GUARDIAN SIGNATURE**

_____ 6/9/22 _____ 6/17/22

WITNESS (Head Start Staff) **DATE**

GRAND FORKS HEAD START CONSENT FORM

Information shared with a Head Start employee may be shared as necessary with other Head Start team members for the purpose of providing and referring services.

1. I give permission for Head Start, along with the elementary school my child will attend next year, to exchange any information concerning my child.
2. I give permission for my child to participate in field trips and school related activities. I release Grand Forks Head Start from any liability while my child is participating on a field trip.
3. I give permission to the Grand Forks Head Start Program to release any pictures, feature stories or news articles, which have taken place in my child's classroom, to the news media.

   Yes ✓ No _____ Other _____
4. I give permission for my child to have emergency health care, medical examinations, laboratory tests, and treatments from the physicians, dentists, public health personnel, Head Start staff, ND Health Tracks, and other health personnel as deemed necessary by Head Start.
5. I give permission for my child to receive vision, hearing, speech, language, social-emotional and developmental screening from Head Start or the Grand Forks Public School Specialist.
6. Mental health consultation services are available to all children enrolled in the program and may include assessment, observation and consultation with teachers, staff and parents/caregivers. I give permission for mental health consultation services for my child by Head Start mental health staff.
7. I give permission to the Head Start Staff to transport my child home, to appointments, or to child care when parents/guardians are not available.
8. I give permission to the Head Start Staff to apply the following as deemed necessary:

   Lip Balm (individual packet) ✓ Toothpaste ✓ Sunscreen ✓

   Bug Spray ✓ Lotion ✓ Antibacterial First Aid Ointment ✓

   Other _____

This consent form is in effect from my child's enrollment in Grand Forks Head Start through his/her kindergarten transition process.

The activities and screenings available to my child as identified on this form were explained to me. I understand the nature and purpose for them and give my permission.

[redacted] _____ [redacted] _____

CHILD'S NAME **PARENT/GUARDIAN SIGNATURE**

_____ 8-10-22

WITNESS (Head Start Staff) **DATE**