

**Including Sensory Integration Materials in a Montessori Classroom to
Improve Behavior Outcomes**

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A Master's Paper
Submitted in Partial Fulfillment of
The Requirements for the Degree of
Masters of Science in Education - Montessori

Major Advisor's Signature

Date

University of Wisconsin - River Falls
2018

SENSORY INTEGRATION MATERIALS IN MONTESSORI CLASSROOMS

Abstract

The Montessori Children's House includes a variety of materials to meet the many different needs of children in the classroom. However, some children exhibit challenging behaviors in the classroom that make it difficult for them to attend to and complete work. These behaviors also disrupt the other children that are working and engaged in the classroom. The child who exhibits challenging behavior requires extra attention from the teacher, making it difficult for him/her to be independent and develop positive peer relationships. Sensory integration was defined by Jean Ayres as "the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment" (Ayres 1972, p. 11). Research has shown that sensory integration materials such as fidgets, mouth tools, rocking and bouncing tools, and noise blocking headphones help to calm children and improve focus in classrooms. In this case study of two children within a classroom of 25, we measured undesirable behaviors before and after the introduction of sensory integration materials. We also tracked the usage of the sensory integration materials by all of the children in the classroom. The data collected showed that over a period of seven weeks, the inclusion of these materials produced a slight improvement in behaviors of the two children in the case study. The study also showed that children in the classroom regularly utilized the sensory integration materials to help them focus on work in the classroom. While future study can expand on this work, based on the findings of the introductory research presented here, including sensory integration materials in the Montessori Children's House can reduce challenging behaviors and help children self-regulate so that they can better focus on classroom work.

Keywords: Montessori, sensory integration, challenging behaviors, independence, positive peer relationships

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Introduction

The Montessori Children's House is a mixed-age classroom with children 2.5 to 6 years old. The Montessori method of teaching is a child-centered approach to education based on the scientific observations of Dr. Maria Montessori, who developed this method of learning over one hundred years ago in Rome, Italy. The mixed-age classrooms allow for younger children to learn from older children, as the older children give lessons for the younger children in areas that they have mastered. Montessori classrooms offer children a block of uninterrupted work time during which the children choose activities they are interested in. Dr. Montessori created specially designed learning materials that are still relevant and used in classrooms today; students in the Children's House learn through experiences that involve sensory motor activities and provide experiences with sight, sound, touch, taste, smell, visual discrimination, and movement. After she completed medical school, Dr. Montessori started working with children who were disabled and institutionalized, and recognized quickly that these children needed stimulation and purposeful activities instead of being confined in empty rooms (Lillard, 1972). She observed that when children were able to learn using their senses, they were capable of academic success regardless of their abilities or economic status.

Sensory integration in the field of education has become a common topic of discussion in recent years. Children are arriving in classrooms with a variety of different needs, requiring teachers to observe, problem solve, and consult with other professionals in order to find ways to meet the children's needs. Many children do not qualify for additional classroom support if they do not have a diagnosis of some kind, leaving teachers to problem solve within their classrooms on how to best meet the needs of these children. Montessori classrooms naturally provide opportunities for movement and learning through the use of the senses; however, there are

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children that have needs that go beyond our typical approach of using Montessori materials in the classroom. Adding sensory integration materials into the Montessori classroom as a means of meeting challenging needs and behaviors could be beneficial to struggling children. This study looked at incorporating additional materials into the Montessori classroom to further support challenging children.

Literature Review

Montessori classrooms provide a rich sensory environment that can benefit children who may have sensory processing challenges. Montessori teachers are trained to meet the needs of individual learners who are at different developmental levels through the use of intentionally designed materials, incorporating movement and use of the senses. Montessori teachers work to help children self-regulate so they can direct their own learning and become independent in the classroom as well as in life (Noddings, 2017). Despite this, today we are seeing children who need more than what many teachers provide within the context of the traditional Montessori classroom. Many of these children are not diagnosed with a specific condition or special need, but are struggling in the classroom academically and socially due to underdeveloped neurological systems.

Sensory integration is the process in which people receive information through the senses and then process this information to participate in daily activities. Everyone experiences sensory input in a different way. Internal and external factors can influence sensory experiences. Sensory experiences are a shared common ground for how individuals understand the world around them (Dunn, 2001). The knowledge in regard to sensory integration has expanded greatly today, compared to when Dr. Maria Montessori studied and observed children (Turner, 1993). This increase in research and knowledge in regard to sensory integration as a means of meeting children's needs provides Montessori teachers with an opportunity to better meet the needs of the

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children in their classrooms. Research has shown that children have had success in classrooms with the incorporation of sensory integration materials that address sensory challenges (Roberts, King-Thomas, & Boccia, 2007).

While there is research available on sensory processing challenges and the benefits of providing sensory integration techniques to improve focus and academic outcomes, there is little research available on using sensory integration materials and techniques to improve challenging behaviors. Devlin (2011) compared sensory integration therapy and behavioral intervention therapy in a group of students diagnosed with autism and exhibiting challenging behaviors. The practitioners who used sensory integration techniques with the children in this study reported three types of benefits observed with the children. There was an increase in ability to focus on relevant materials in different environments, including school, home, and social situations. There was also a reduced rate of self-injurious behavior and a general improvement in the function of the nervous system, resulting in higher cognitive activity. While these findings were reported by occupational therapists involved in the study, the researcher in this study concluded that there was not enough research to support these findings.

If improvements were noted using sensory integration techniques in children with autism, it would seem that children who only have sensory integration issues might have success with these techniques in the classroom. Through careful observation and the addition of materials that support children exhibiting sensory processing challenges, teachers can meet the needs of some of the challenging children in their classroom. Meeting these needs will help to normalize the entire classroom by decreasing the amount of negative behavior and improving children's ability to learn, focus, and develop positive peer relationships.

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Sensory Processing Challenges

In 1972, Dr. Jean Ayres first described the sensory processing theory. She developed the theory to “explain the relationship between deficits in interpreting sensory stimuli from the sensation body and the environment and difficulties with academic or motor planning” (Critz, Blake, & Noguera, 2015, p.710). This theory identified children who were having a difficult time integrating multiple sensory stimuli. Through research, Ayres noticed that children who had difficulties with daily living skills such as organization, handwriting, and motor planning were not efficient in organizing the sensory input received by the nervous system (Granke, 2007). The senses Ayres identified and researched were visual, auditory, tactile, gustatory, vestibular, and proprioceptive input. Proprioceptive input involves the body’s movement and position in space, and proprioceptive receptors are located in the skin, muscles, and joints, as well as the inner ear. Integrating sensory information impacts a person’s ability to regulate responses to stimuli around them. Poor self-regulation (the ability to calm yourself down when upset and cheer yourself up when sad) may exhibit in children as disruptive or aggressive behaviors, lower cognitive skills, and poor attention (Roberts et al., 2007).

Children are not born with a fully developed sensory system: it matures over time. By the time children reach the age of 6, they are typically proficient at integrating sensory information. Some children will take longer to develop these senses (Viola et al., 2007). Children who are having difficulties processing these senses can exhibit over-responsiveness or under-responsiveness to stimuli with one or more of the sensory systems. Children who display symptoms of avoiding experiences relating to the senses are under-responsive, and children who excessively seek out experiences relating to certain senses are over-responsive (Granke, 2007). Over-responsiveness can be referred to as hypersensitivity, while under-responsiveness can be referred to as hyposensitivity. The hyposensitive child's brain will register sensations at a lower

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level than what is typical; this child may appear to be high energy because she is trying to receive extra sensations so that she can stay alert and focused. The hypersensitive child receives too much stimulation from the environment; this child becomes overstimulated, causing the child to either act out or withdraw from situations (Noddings, 2017). A child may experience hyposensitivity in some of her senses and hypersensitivity in others, such as being hypersensitive to sound and hyposensitive to touch. Observing how children are responding to the environment through their senses will allow the teacher to better understand and support them in the classroom (Noddings, 2017).

Dr. Maria Montessori referenced reflecting on the environment when looking at the cause of challenging behaviors in the classroom. Children's behaviors, both good and bad, are a communication from the child (Granke, 2007). For trained teachers, observing and reflecting on behaviors in the classroom can lead to answers on how to meet individual needs of children. Preschool children can exhibit a wide range of behaviors that indicate sensory processing challenges. The child may have difficulty dressing, eating, sleeping, and delays in toilet training. Sensory-challenged children may tantrum often due to an inability to process the stimuli around them, and/or they may have difficulty transitioning from one activity to another (Critz et al., 2015). Other behaviors that can indicate sensory processing challenges in the classroom include throwing materials, physical and verbal aggression, touching other children or other children's work, bumping into furniture and other children, putting objects in the mouth frequently, inability to complete a work cycle, and delays in fine and gross motor skills (Roberts et al., 2007). Children exhibiting these behaviors can become socially isolated due to their inability to self-regulate in daily situations in the classroom. These behaviors in a Montessori classroom demand much time and effort from the teacher, making it difficult for the child to become independent and normalized. These behaviors are also disruptive to normalized children who are

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working in the classroom. Normalization is a term used in Montessori classrooms as children adapt to the environment. Standing (1957) listed Dr. Montessori's characteristics of a normalized child in the classroom as "having a love of order, a love of work, profound spontaneous concentration, attachment to reality, love of silence and working alone, and sublimation of the possessive instinct, power to act from real choice and not from curiosity, obedience, independence and initiative, spontaneous self discipline, and joy" (p.175-178). These characteristics indicate that a child is normalized in the classroom.

Teacher Attitudes Toward Sensory Integration Needs in the Montessori Classroom

A teacher's experiences can impact the child's success in the classroom. In a research study conducted among 200 Montessori teachers throughout the United States, a majority of teachers agreed that Montessori and special needs are an appropriate fit (Epstein, 1997).

Teachers who were unsure about special needs children fitting within a Montessori classroom had concerns over their own lack of training as well as concerns over not giving enough time and attention to children without special needs. In addition, there was concern about the overall classroom disruption that can occur with a special needs child (Epstein, 1997).

While many children with sensory integration issues are not diagnosed or identified as special needs, they do require extra support and attention from the teacher. Paula Leigh-Doyle (2007) documented the success of including sensory integration work at the Montessori School at Holy Rosary in Ohio, where she works. Staff were trained to observe children for behaviors that might indicate the need for additional sensory integration support in the classroom. They were then given instructions on how to include materials and movements that provided sensory input to those children. The staff at this school felt that Dr. Maria Montessori's teachings on developing concentration and including movement and the use of the senses in learning aligned with including sensory integration work. They wanted to keep the Montessori principles of a

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prepared environment intact, and were cautious to not compromise the Montessori key materials when including additional sensory integration materials into the classroom. After 1 year of incorporating sensory integration materials and movements, the school decided to continue to support children with additional sensory integration materials and activities. In addition to the standard areas of the Montessori classroom, teachers and occupational therapists have observed that Montessori classrooms that added materials and movements with the help of an occupational therapist specializing in sensory integration found the added materials beneficial to the children in the classroom (Leigh-Doyle, 2007). This information can serve as a resource for teachers wanting to support challenging children in their classroom.

Sensory Integration Tools in the Montessori Classroom

Materials for sensory integration that can be incorporated into the classroom include balance boards, air stability cushions for the floor or a chair, weighted vests, noise-canceling headphones, chewy tubes or chewy jewelry, and hand fidgets. In addition to these materials, a quiet space can be created where a child can go to take a break. Movement activities such as jumping, wall push-ups, and yoga can also be utilized (Noddings, 2017). Through careful observation of sensory-seeking children, and including materials to meet the sensory-seeking needs, Montessori teachers can better support the children in their classrooms. Collaboration with other professionals, such as occupational therapists, was shown to be beneficial in supporting teachers who had reservations about special needs children in the Montessori classroom (Murata & Maeda, 2007). Through collaboration, observation and research, teachers can develop strategies to support the needs of sensory-challenged children who do not have a diagnosis and are struggling to normalize in the classroom. Though research has been done with sensory integration and sensory-based therapies, the American Academy of Pediatrics does not yet recognize sensory processing disorder as a diagnosis for children over the age of 3. The

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diagnosis of sensory processing disorder is used in conjunction with another diagnosis in children today; this means that children over the age of 3 who are struggling with sensory processing issues are not eligible for services in the classroom unless they have another additional diagnosis. With no diagnosis and no additional support, these children can struggle with academics, peer interactions, and general routines of the day. These children can also receive therapies outside of school, but these therapies are often expensive. While the American Academy of Pediatrics (2012) acknowledges that sensory-based therapies can be beneficial to some children, they report that there is not enough research to diagnose sensory processing disorder as a standalone diagnosis. Teachers need to be ready to support children who are experiencing only sensory integration challenges, since the opportunities for these undiagnosed children to receive additional support are limited.

Conclusion

Research has shown that when children with sensory processing issues are provided with materials and sensory input at school in an environment outside of the classroom, they return to the classroom more focused and able to participate (Roberts et al., 2007). Including sensory integration materials in the Montessori classroom could have a positive impact on the learning of individual children, especially children who do not have a diagnosis and are not eligible for professional services, and on the classroom as a whole. Allowing a child to learn to regulate themselves through the use of materials in the classroom may help promote independence and normalization, and allow the child to have a successful classroom experience both academically and socially. Dr. Maria Montessori's writings regarding the need to use movement and the integration of the senses to learn align with today's research and data on sensory processing challenges in children. This action research project hopes to show that through careful observation and the inclusion of sensory integration materials in the classroom, Montessori

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teachers can support children with behavior challenges and help them self-regulate and become independent learners. When these children are supported and find success in the classroom, the classroom as a whole will benefit.

Research Design and Methodology

The primary purpose of my action research was to see if there would be improved behavior outcomes in a Montessori Children's House classroom with the inclusion of sensory integration materials. Other questions I looked to answer included: Was there a decrease in undesirable behaviors during the work cycle when the sensory materials were available? Did this change the social dynamic of the classroom? Does the availability of the materials increase or decrease children's focus and concentration in the classroom? Were the children able to complete work successfully when the materials were available?

Participants and Setting

This action research project took place in a Montessori Children's House classroom with 25 students, one teacher, and one teaching assistant at a private, nonprofit school in an urban city in the Midwest. The school has three Children's House classrooms and three Toddler classrooms. The participants ranged in ages from 3 years old to 6 years old. None of the participants had any known diagnosis or developmental delays. This research project looked at two participants in a case study and how the introduced materials impacted their behavior. In addition, this project looked at how the introduction of these materials impacted the entire class. Parental permissions were obtained for the students in the classroom. A copy of the permission form is included in Appendix A. Data were collected from December 2017 to March 2018.

Materials

An observation checklist containing undesirable behaviors was used to track the behaviors at different times during the morning work cycle over a period of 9 weeks. Copies of

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these forms are presented in Appendix B. As materials were introduced to the classroom, a record of the usage of materials was kept along with the behavior checklist. The types of material and order of introduction are presented in Table 1. Detailed descriptions of each of the materials are given below.

Table 1

Introduction of Sensory Integration Materials in the Montessori Classroom

Week	Material
Week 1	Noise-Canceling Headphones
Week 2	Disc Cushions
Week 3	Hand Fidgets
Week 4	Mouth Works
Week 5	Hand/Foot Wall Push-Ups
Week 6	Bean Bag Chair, Breath Ball, Hand Fidgets

Noise-canceling headphones. Noise-canceling headphones can help block out background noise that can irritate children who may be hypersensitive to sound. The headphones reduce background noise to help the child focus on work.

Disc cushion seats. These inflated, textured cushions help children stay seated by engaging their core muscles as the child tries to balance their weight on the cushion. This balancing and muscle engagement allows the child to focus on work.

Mouth work. The mouth work materials provide oral input for children who are constantly seeking input through their mouths. While most children pass through this oral phase during the toddler years, some children take longer to move through this developmental phase. Mouth work gives the child an appropriate outlet for their need to chew.

Hand fidgets. Hand fidgets allow children to engage their hands in activity while

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listening or focusing on something else. Hand fidgets can also provide a relaxing distraction to a child who needs a break from the work cycle.

Handprint-footprint wall push-ups and jumping activity. This activity provides children with proprioceptive input through movements that allow them to become more aware of where their bodies are in space, thus allowing them to move through their environment safely. There are many different types of proprioceptive input; this is one example.

Bean bag chair with breath ball and hand fidgets. The bean bag chair provides children with an opportunity to take a break if the classroom is too overwhelming for them or they just need quiet time alone. The hand fidgets and a breath ball were added to this area. The breath ball can be held by the child while they take deep breaths; a breath in makes the ball small in size, and while the child breathes out the ball expands in size. Children develop an awareness of their breathing, thus relaxing and becoming more aware of their bodies.

Procedure

A baseline of undesirable classroom behaviors was observed over 2 weeks in the classroom for the two subjects: A and B. Subjects A and B were chosen after observing that both of them showed signs of seeking out sensorial input, along with challenging behaviors that were disruptive to the classroom and required frequent teacher intervention. After common behaviors that occurred daily were noted, a checklist was created. This checklist was used to observe Subjects A and B for 2 weeks prior to the introduction of sensory integration materials in the classroom to get a baseline of behaviors during a typical work cycle. After the 2-week observation of Subjects A and B, a new sensory integration material was introduced each week for 6 weeks. Data were collected for a total of 7 weeks after the initial materials were introduced. The items remained in the classroom for the duration of the study once introduced.

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Figure 1. Noise-canceling headphones.

During week one, the noise-canceling headphones were introduced. Three sets of noise-canceling headphones were put in the classroom. The headphones were introduced during group time. The children were shown how to use them and where they were located in the classroom. Students were informed that the headphones were available if students felt the classroom was too loud and they were unable to focus on their work. Information was shared with the students on how the headphones were to be used when working alone. They were not to be used for small group work or when working with peers, as they would not be able to hear when they had them on.

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Figure 2. Disc cushions.

During week two, the children were introduced to the stability disc cushions during large group time. Three disc cushions were available in a basket in the classroom. The cushions could be used when sitting on the floor or sitting on a chair. The children could choose to use them during individual, small group, or large group work time. A lesson was given on how to take care of the cushions, explaining that they were for sitting on and not standing on, and that sharp objects could deflate the cushions, making them unusable.



Figure 3. Hand fidgets.

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During week three, the children were introduced to a basket of hand fidgets. A basket was on the Sensorial shelf that contained a stress ball, thinking putty, and a twisty hand fidget. The children were told that each item was a one-person work and they could use them at any point during the morning to take a break, or while working if needed. The hand fidgets proved to be very distracting during the work cycle and were removed as an individual work after 3 days. The stress balls and twisty hand fidgets were reintroduced to the children during week six to be used along with the bean bag chair. The children may have been too young to utilize the fidgets while working to stay focused. This approach has been successful with older school-age children.



Figure 4. Mouth work.

Week four introduced mouth work. There were two chewy tubes and two necklaces that had a rectangle brick that was made for children to chew on. This work was not introduced at work time or to the entire class; it was offered to children who were chewing on their hands, clothes, or other work during the morning work cycle. Concerns over the spread of germs throughout the classroom led to the decision to not leave this work on a shelf available to all children. Subjects A and B were offered this work, and they were told they could ask for it any

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time they needed it. It was offered whenever hands, clothes, or work objects were observed being put in their mouths while they were working.



Figure 5. Hand/feet wall push-ups.

Week five introduced the presentation of the wall push-up handprints and jumping footprints that provide children proprioceptive input. Children were shown how to stand on the footprints on the floor, place their hands on the handprints on the wall, and do wall push-ups. A basket of cards with ideas such as “do 5 wall push-ups and jump 5 times” was also presented to the children to use with the work if they chose to. Receiving input in the joints such as shoulders and knees can help to regulate the sensory system.



Figure 6. Bean bag chair.

In week six, a bean bag chair in a quiet space in the classroom was introduced to the children. The bean bag chair was available to children who wanted to be alone and needed space. Along with the bean bag chair, the fidgets and a breath ball were included to be used in the bean bag chair. Children were given a lesson on how to use the breath ball to calm themselves down. Children were told this was a work for only one person at a time.

Data Analysis/Results

Data were collected daily, tracking behaviors of Subjects A and B, sensory integration materials that Subjects A and B utilized, and sensory integration materials that other students in the classroom utilized. Total instances of behaviors along with total instances of materials that were utilized were graphed, and a trend line was added to analyze the results for Subject A and Subject B. The total number of sensory integration materials utilized by other children in the classroom was also analyzed using a bar graph and trend line.

Subject A was a 3-year-old male who started in the classroom in September of 2017. Subject A was in the Toddler Program at this school prior to starting in this classroom. Subject A

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was impulsive and often reacted negatively to peers by hitting or yelling at them. Although Subject A had made great progress since the beginning of the school year, he still struggled to find ways to work with peers and be aware of his body and actions in the classroom. Subject A occasionally put objects in his mouth while working. Subject A was often unaware of his body in space and therefore stepped on other children's work. Subject A frequently interrupted other children while they were working by trying to get involved in their work and moving into their personal space. Subject A loved to do jobs throughout the classroom such as watering plants, washing windows, and scrubbing tables, as well as other classroom maintenance activities. He also enjoyed participating in cooking activities. These types of activities are a regular part of the Montessori classroom in the Practical Life area.

Figure 7 shows the behaviors observed in Subject A daily before the sensory integration materials were introduced, and then shows the behaviors along with the sensory integration materials that Subject A chose to use after the materials were introduced. Subject A displayed mostly hyposensitive behaviors throughout this study. The behaviors observed in Subject A in the classroom were mostly physical in nature: pushing, hitting, and interrupting work by getting into other children's personal space. Based on the materials that Subject A chose, it appeared as though he sought out physical activities on his own. This information seems to indicate that Subject A had an awareness that his body needed physical activity during the morning work cycle. Subject A utilized the wall push-ups and jumping work often after it was introduced and continues to use them.

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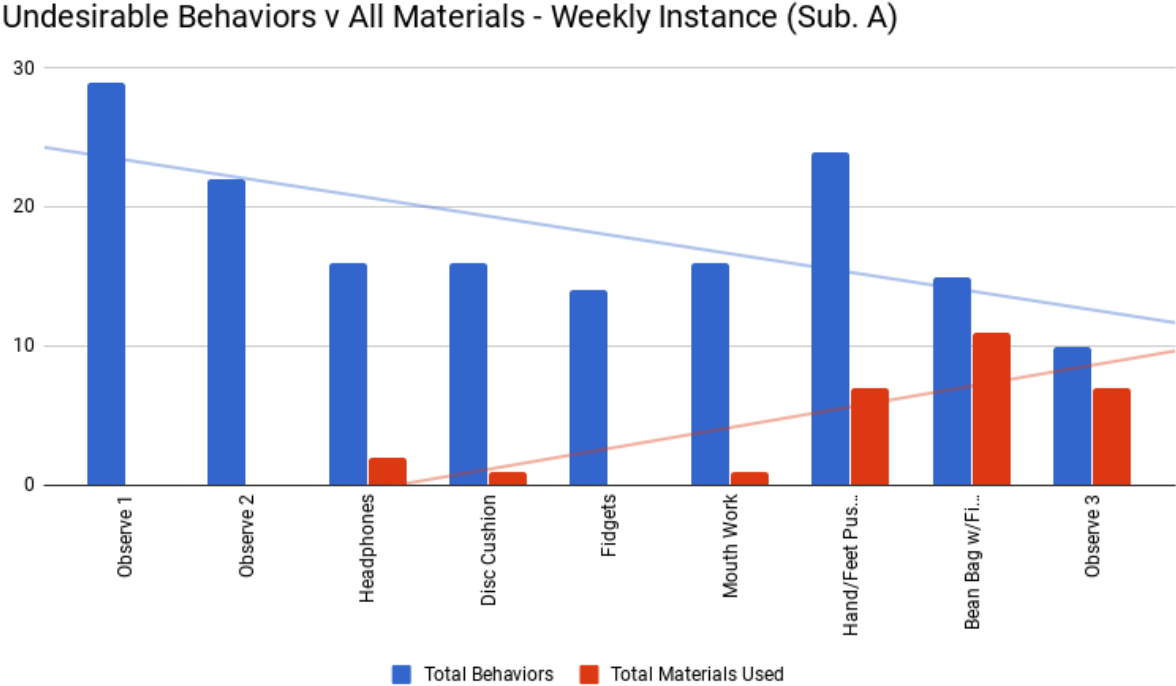


Figure 7. Undesirable behaviors v. all materials—daily instance (Sub. A).

As was described in the literature review, children seeking big movements might have low registration, thus the need to feel more input to be able to function in daily activities. The data shown in Figure 7 indicate an overall decrease in negative behaviors for Subject A when he utilized the sensory integration materials. There also seemed to be more of a decline in behaviors when the frequency of sensory integration materials was increased. This would appear to indicate that when sensory integration tools were included in the classroom, Subject A was able to self-select materials that may have helped reduce the amount of negative behaviors. The trend line in the graph shows a reduction in the number of behaviors tracked when the child was using the sensory integration materials. With reduced negative behaviors, there were fewer instances of teacher intervention required to support Subject A. With fewer teacher interventions, Subject A

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was more independent in the classroom.

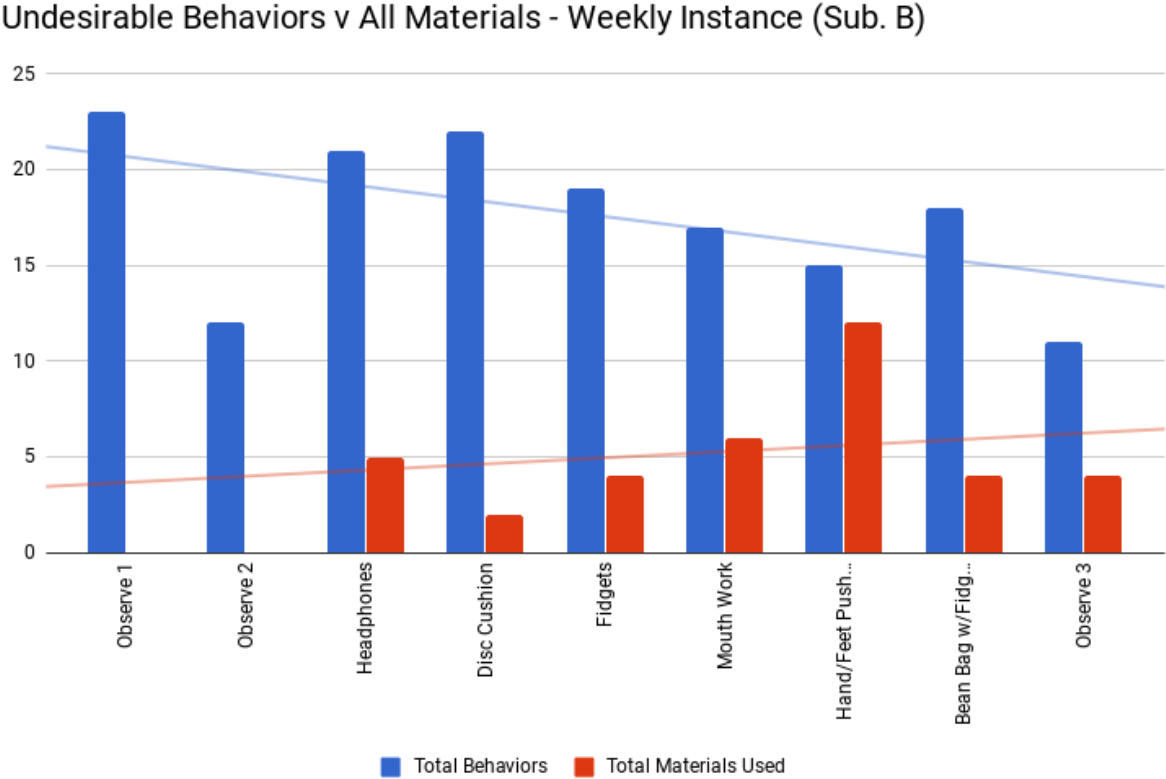


Figure 8. Undesirable behaviors v. all materials—daily instance (Sub. B).

Subject B was a 3-year-old female who started in the classroom in September of 2017. Subject B chewed on her fingers and toes regularly while working and during group time. Subject B enjoyed snack and would spend twice as long eating snack at the table as her peers did. This may indicate that the daily snack provided Subject B with much needed oral input. Subject B was particular about what clothing she wore, mostly loose-fitting shirts and pants. Subject B changed clothes often, as she felt uncomfortable if anything got wet or did not feel good on her body. Subject B enjoyed working with peers but was easily upset when something did not go the way she wanted, causing her to yell at and hit or push her friends. Subject B had a difficult time staying on task while working and often was distracted by social situations. Subject

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B also had a difficult time normalizing to the routines of the classroom; routines such as working on a rug and putting work away required reminders from the teachers, even at this point in the school year. Typically, children would have normalized to the routines of getting a work out and putting it away at this point in the year. However, this did start to change during the last 2 weeks of data collection. It is unclear if this change was directly related to the usage of the sensory integration materials.

Subject B showed both hypo- and hypersensory behaviors: she showed a hypersensitive reaction to anything that touched her skin, yet she was very oral and was seeking sensory input in her mouth. Subject B chose the headphones and the disc cushions most often when choosing materials. The headphones would be for hypersensitive hearing, while the disc cushion would be allowing Subject B to receive more input but also keep her on task, as her body would need to focus on balancing on the cushion while she worked. Figuring out her needs was more complex, since she displayed both hypo- and hypersensitive behaviors. Based on a flatter trend line, she also had less of a decrease in behaviors throughout the study than Subject A. This may indicate that more observations and data collection of Subject B's behaviors are needed to figure out more information on what her needs are.

Table 2

Materials vs. Day of the Week

	Correlation Coeff.
Subject A	0.490
Subject B	0.193
All Others	0.536

Data showed that certain days of the week had an impact on the number of times

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materials were chosen. Subject A and other children showed an increase in materials usage later in the week. Subject B's use of materials was less correlated with the days of the week. This may indicate that children were able to self-regulate more as the week went on. It may also indicate that there was a greater need for sensory integration materials as the week went on. Further research is needed to support these findings.

Children would take breaks between work and do the wall push-ups and jumping work and then return to a work. The children enjoy taking breaks in the bean bag chair and have been very respectful of the fact that it is a one-person work. This may indicate that there needs to be a space in the classroom for children to go to be alone.

Limitations

Limitations to this research project included being unable to track behaviors of the other children in the classroom after materials were introduced. Collecting data while being responsible for the classroom proved to be challenging. Having a person who was only tracking that data could show different or stronger results.

Subject A and B both made improvements since the beginning of the year, as we would expect through normalization. It was difficult to differentiate what was normalization and what was the inclusion of the sensory integration materials.

Data were collected for 7 weeks; it would be beneficial to track this data for an entire school year and then look at the results. Although the results over 7 weeks showed slight decreases in behaviors with the addition of the materials, it is unknown at this time if those decreases would be more significant over a longer period of time.

Both Subjects A and B were 3-year-olds at the start of the school year, and they were the children with the most observed sensory seeking and avoiding behaviors that negatively impacted the classroom. These were some of the youngest children in the classroom, and their

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sensory systems could have been less developed than older children's, since this system develops with age.

Future Action Plan

Moving forward, sensory integration materials will continue to be included in my classroom environment. Documenting different sensory seeking/avoiding behaviors in my observations from the start of the school year will be helpful so that appropriate materials can be incorporated in the classroom to meet the needs of the children from the beginning of the school year. Those materials might be Montessori materials that are already in the classroom, such as Practical Life materials or materials from the Sensorial shelves, or they might be supplemental sensory integration materials that are not Montessori materials. Daily observations of children will continue at a deeper level after completing this project.

Another interesting point to look at in the future is the number of teacher interventions that occur before the introduction of sensory integration materials and then after the materials are in the classroom. While I did not track that in this study, my observations tell me that I had fewer interactions with Subject A and Subject B after the materials were in the classroom. I also observed that the other children in the classroom had fewer negative interactions with Subject A and Subject B when the students were using the sensory integration materials because they were more engaged with their work.

Discussion/Conclusion

Through my observations of incorporating the sensory integration materials into the Montessori Children's House classroom, I saw a majority of the children benefit from having the materials available. Montessori classrooms work to allow children to learn to self-regulate through the use of the materials and the structure of the open work cycle each day. Dr. Maria Montessori believed that in order for children to become independent, the classroom

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environment needs to be set up to allow the child to be successful. The sensory integration materials provided another tool for children to experience success, while not taking away from the integrity of the classroom. Dr. Maria Montessori frequently referenced “following the child” in her work with children, and she also discussed looking at the environment when there are undesirable behaviors in the classroom. I reflected on both of these while working on this research project. My intuition tells me that even though the sensory integration materials are not Montessori-based, they are meeting the needs of the child, so including them in the environment is “following the child” as Montessori recommended in her teachings.

Including the sensory integration materials did improve behavior outcomes slightly over the 7-week period when data were collected. Undesirable behaviors decreased in both Subject A and Subject B. Socially, the children became more aware of what focus and concentration looked like in the classroom and utilized the sensory integration materials to complete their work. Children showed an intrinsic desire to focus during the work period and recognized how the sensory integration materials could help to facilitate that focus and concentration. Through observation, I noticed several children who typically struggled to complete work successfully finishing work using the sensory integration materials. Those children continued to utilize the materials during work periods after the study was concluded. Except for the hand fidgets that were introduced separately in week three, the materials were not distracting to the classroom and the children’s efforts to work. When the hand fidgets were reintroduced in week six with the bean bag chair, they were not disruptive to the classroom and engaged children in a more age-appropriate way.

Introducing the sensory integration materials to the children as I have introduced other Montessori materials, as a classroom work, demonstrated that these materials were as important as the other materials on the classroom shelves. The children respected the materials and

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reminded each other how to use them in the classroom just as they did the Montessori materials. Children showed an increase in recognition and knowledge of what they needed to be able to be focused and engaged in the classroom work. The children also showed a desire to use the sensory integration materials to assist them in their work.

The Practical Life area is an area that offers children opportunities to meet sensory needs through scrubbing, lifting, and both fine and gross motor movements. This is one of the many benefits of a Montessori classroom. Had Subject A not had the Practical Life activities from the start of the school year, I would predict his behaviors would have been more significant and his need for teacher intervention much greater than it was. The Sensorial area of the classroom was also utilized as a way to create purposeful movement for both Subject A and Subject B. Careful attention needs to be paid to the children's behaviors and the materials in the classroom.

I was surprised to see students who were not necessarily on my radar for behavior issues, or even concentration and focus issues, really take to the materials such as the headphones and disc cushions to deepen their focus and concentration. The older children in the classroom used the materials while working on challenging academic materials, showing that they wanted to focus and complete their work. There was much more discussion in the classroom in regard to children wanting to focus and concentrate. Some children would let other children know that they were trying to focus on their work, or they would walk over to the headphones and say that they needed them so they could concentrate on their work. I also observed that the bean bag chair was utilized by children after they had completed a challenging work. This may indicate the children were aware that they needed to take a break after completing the challenging work. The bean bag chair was also used by two children each morning as they entered the room. They would start in the bean bag chair and work with the fidgets and then move on to choose their work for the morning. It appeared as though the children were centering themselves before they

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started their work cycle.

While the data showed a slight decrease in behaviors in both Subject A and B with the addition of the sensory integration materials, what I observed most was the children's ability and desire to self-regulate while in the classroom. The children found the added materials helpful in allowing them to focus and concentrate during the work cycle.

Another interesting occurrence was the feedback that I received from parents of children in my classroom during this research project. Parents of several children reported their children asking for headphones at home so they could "concentrate." Some children also asked for a quiet area like the bean bag chair area. This may indicate that children were recognizing when and how they needed to self-regulate and that they wanted to be able to self-regulate at school and at home.

More extensive research needs to be completed in the area of incorporating sensory integration materials into the Montessori Children's House classroom to obtain greater results.

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Appendix A

Permission Letter

Dear Classroom 1 Families,

As some of you may know I am currently in the process of completing my Master's Degree in Montessori Education from the University of Wisconsin River Falls. As part of my program and to better inform my own classroom practice, I will be conducting an action research project in our classroom. I will not be doing anything that would not be part of my normal classroom teaching. As part of best classroom practice I am looking more closely and reflecting on ideas I have to better meet the needs of students in Classroom 1. My action research project will be looking at incorporating Sensory Integration materials into the classroom and looking at whether it impacts individual children and the classroom as a whole behaviorally and socially.

To conduct my research I will be recording and observing behaviors and peer interactions during small and large group work time before introducing Sensory Integration materials and then after introducing Sensory Integration materials. Sensory Integration materials will include noise blocking headphones, hand fidgets, disc seats, chewy tubes, and general movement throughout the classroom and playground.

In order to conduct this research I will need your approval for your child to participate. Families can choose to withdraw from the research at any time during the study. All information gathered in this process is confidential. My final research will be submitted to the University of Wisconsin River Falls Graduate Studies and will be placed in the UWRF Intellectual Output Repository. My research findings will also be presented to university peers, and may be submitted to the American Montessori Society Action Research Repository. Melina Papadimitriou is my University advisor and can be contacted if there are further questions at melina.papa@uwrp.edu, or call Melina at 715 220 2466. You can also contact Diane Bennett, Ph.D., Director of Grants and Research University of Wisconsin- River Falls, diane.bennett@uwrp.edu or 715 425 3195 with any questions.

Please feel free to contact me with any questions as well.

608 332 5210

Thank you for considering to allow your child to participate in this exciting action research project! I will gladly share the findings of this project with anyone that is interested.

Please sign and return this letter as soon as possible.

Sincerely,

Jennifer Hoyt

I give permission for my child _____
to participate in the action research project that Jennifer Hoyt will be conducting in Classroom 1
involving incorporating Sensory Integration materials into the Montessori Classroom during the
2017/2018 school year.

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Parent Name _____

Parent Signature _____

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Appendix B

Classroom Behavioral Log

Classroom:
 Reviewer:

Date:
 Time Period:

		SUBJECT A	SUBJECT B	CONTROL A	CONTROL B
Interrupting Work	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hitting	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pushing	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mouthing Work	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Putting Hands In Mouth	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Yelling / Negative Talk	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spilling/Dropping Materials	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Breaking/Wrecking Materials	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Running In The Classroom	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other Behaviors	<i>Instances</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>Notes:</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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Works Uses		SUBJECT A	SUBJECT B	CONTROL A	CONTROL B
Headphones	<i>Instances</i>				
	<i>Notes:</i>				
Disc Cushion	<i>Instances</i>				
	<i>Notes:</i>				
Fidgets	<i>Instances</i>				
	<i>Notes:</i>				
Mouth Work	<i>Instances</i>				
	<i>Notes:</i>				
Hands / Feet Pushups	<i>Instances</i>				
	<i>Notes:</i>				
Bean Bage Chair Quiet Space	<i>Instances</i>				
	<i>Notes:</i>				
Other Notes	<i>Instances</i>				
	<i>Notes:</i>				