Helping Children with Attentional Challenges in a Montessori Classroom: The Role of the Occupational Therapist

by Barbara Luborsky

Barbabra Luborsky links the medical field and Montessori pedagogy to address atypical attention in children through the lens of the occupational therapist. She provides an overview of attention and sensory processing disorders and then informs about particular diagnoses, particularly ADHD and its comorbidity with other diagnoses. Her specific advice as to the role of a practitioner when faced with a struggling child is helpful to the individual teacher and to the entire school community, as addressing these challenges requires collaboration on the part of a number of adults. The second half of her article focuses on specific occupational therapy strategies to support children in a Montessori classroom and offers easily incorporated supplements and adaptations to the environment along with practical tools that can be used in any classroom by any practitioner.

This paper discusses the role of the occupational therapist (OT) in helping Montessori teachers understand and address the needs of students with attention challenges in their classrooms. In today's classrooms, Montessori teachers are encountering children with varying levels of challenge in regards to attention. One of the main points of this discussion is that attention challenges are complex and neurologically based and, therefore, successful management of these children requires a medical partnership for both evaluation

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and management. The OT perspective and body of knowledge has a great deal in common with the philosophy and methods of Maria Montessori and, as such, the OT is well positioned to be a supportive and successful collaborative partner in the Montessori classroom.

The OT Montessori collaboration can operate at two different levels to address varied needs. In a more general sense, the OT can share knowledge and information that expands the way the Montessori teacher prepares the environment, to broaden her understanding of the vital role of sensory motor opportunities in supporting the development of the child, overall. Carefully chosen sensory and motor-enhanced activities in the prepared environment of the Montessori classroom can have a significant, positive effect on the ability of some students to be successful. Other students' needs may have more complex needs, and supporting them for success in the classroom will require individualized evaluation and consultation from medical specialists. In this instance, the OT can function in a much more specific role, as a collaborative partner for the Montessori teacher in providing support, guidance, and modeling for the creation of a therapeutic educational setting that has been developed specifically to meet the needs of one individual child. Input from the OT is only one aspect of a comprehensive collaborative team approach including parents, staff, and medical specialists. Using this approach, the Montessori classroom can become a therapeutic educational environment for the child with attention challenges.

This medical/educational approach is based on an assumption that medical professionals are involved in an ongoing way, in evaluation and treatment planning as well as teacher support and education, parent support and education, and, when indicated, are providing direct therapy to the child. In addition, this approach advocates for the training of medical professionals so that they have a clear understanding of the many ways in which the Montessori method supports development. One such example is the way in which the Montessori method supports the development of executive skills, which are essential to a child's ability to attend. Our model postulates that successfully addressing the needs of these students requires teachers who have been trained to have a clear understanding of the medical perspective and medical specialists who have been trained to have a clear understanding of the Montes-

sori method. This improved mutual understanding will allow for the development, over time, of a sophisticated collaborative team approach that has as its main goal the preparation of the child to successfully engage in the Montessori classroom and in life.

Working toward this end, the initial goal is to prepare a program specifically for the child. This program is developed based on recommendations from all of the medical specialists involved in the child's care and the parent(s), in collaboration with the teacher, who is the expert on the prepared environment. The resulting individualized program is monitored by the teacher and overseen by the medical specialists. The program might include changes to the environment, to teaching, to materials, and/or addition of supplementary equipment and materials. This program evolves and changes with the child through ongoing communication and collaboration between the teacher, the parent(s), and the medical professionals. The goal is to provide supports to the child so he or she can achieve optimal functioning in the short term while continually moving toward more independence and less support in the long term. The level of support should incrementally fade away as the child gains competency, with the ultimate goal of successfully participating, as closely as possible, to the Montessori method, as designed for typical children.

Attention: What Is It and What Does It Mean to Have an Attention Deficit?

Attention is a basic element of cognition that affects our perception of the stimuli that surround us. It is basic to our biology and is present at birth. Our attention is limited in terms of how long we can maintain it and how many things we can focus on at any given time. Attention is selective, meaning that the things we choose to ignore are as important as those we choose to attend to. This allows us to experience a multitude of sensations while still focusing on just one element. In fact, at times, focusing attention on one thing can result in not perceiving a second input at all.

It is normal for all children to be hyperactive or inattentive at some times. With attention deficit hyperactivity disorder (ADHD), these behaviors occur with more frequency and severity. Children

with ADHD have developmentally inappropriate levels of inattention, hyperactivity, and/or impulsive behavior; and they have a significant impairment in their daily functioning in at least two settings, that has lasted for at least six months in duration. There are three subtypes of ADHD: predominantly hyperactive-impulsive, predominantly inattentive, and combined hyperactive-impulsive and inattentive.

Adele Diamond, a developmental cognitive neuroscience researcher from the University of British Columbia identifies executive function (EF) as the control function needed for concentration and thinking. She describes three Core EFs: inhibition, working memory, and cognitive flexibility. She points out that having good EF is essential for school success, success on the job, in friendships and marriage, and long-term relationships. Furthermore, EF problems do not go away. In fact, they can become more problematic later in life (Diamond, "Activities and Programs").

Inhibition refers to what you choose not to do and not to attend to. It is essential for controlling behavior, attention, and emotions. Individuals with poor inhibition will tend to have less persistence, more impulsivity, and a poorer ability to regulate their attention and emotions. Research shows that in the long term (thirty years), these individuals will be less healthy, earn less money, be less happy, and commit more crimes than those whose EFs are working efficiently (Moffitt, et al.).

Working memory refers to the ability to hold information in mind and work with it mentally. This is crucial for understanding events as they unfold over time and relating them to what already happened. Working memory is necessary in order to understand cause/effect and for making sense of any linguistic information, whether it is heard or read.

Cognitive flexibility refers to the ability to see things from someone else's point of view or to shift one's perspective or see a problem in a new way. This allows one to have the flexibility to adjust behavior to meet changing demands or new priorities. It allows one to admit being wrong or to take advantage of an unexpected opportunity when it presents itself.

Dr. Montessori's training as a physician influenced her thinking about designing a curriculum to support development. She viewed the classroom as a place where children could embark on their own voyage of discovery, and the prepared environment provided the tools. Her understanding of education of typical children was influenced tremendously by her experiences with atypical children, most of whom lacked good EF. Montessori's educational approach supports development of executive, cognitive, and other academic foundation skills as well as motor, language, social, and sensory skills. Children in the Montessori classroom get a comprehensive neurophysiological workout in addition to academic curricula.

Differential Diagnosis and Comorbidity

Differential diagnosis is a process in which a medical professional assesses all of the possible causes of a child's symptoms and challenges in order to differentiate, with the greatest degree of certainty possible, the diagnosis that most precisely describes the child's issues. This is important because for each diagnosis, there is a body of information about causes, progression, treatments, and outcomes, which can be brought to bear on the treatment planning process for that child. For example, a metabolic issue might interfere with a child's ability to uptake nutrition from foods and this may make the child sluggish and inattentive. A learning difference may slow down a child's ability to process auditory information so that before the child has processed and understood the first sentence, the second one is already being delivered. This may cause the child to behave in a way that gives the impression that she is not listening, when in reality, she is struggling to keep up. Children with sensory processing disorder (SPD) may be unable to appropriately prioritize incoming sensory information so they may appear to be inattentive, when in fact they are simply not attending to the right things. Psychological and psychosocial issues are yet another class of challenges

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that can masquerade as poor attention. The child who has been kept awake because his parents were arguing may not only be sleepy but also be deeply troubled and confused. This will often present as lack of ability to attend.

In addition to differential diagnosis, one must consider comorbidity. Comorbidity refers to conditions that occur together. It is important to look at comorbidity issues because sometimes a child's difficulties are stemming from more than one problem simultaneously. If a child has multiple issues and only one is identified or addressed, it will appear that the treatment did not work, when in fact, it may simply be incomplete.

In the *National Study of Children's Health,* completed in 2007 by the National Institutes of Health, 61,779 children ages six to seventeen, including 5,028 children with ADHD, were examined. Overall diagnosed prevalence of ADHD per parent report was 8.2%. Most children with ADHD had at least one comorbid disorder. ADHD was found to be associated with substantially elevated prevalence of several other diagnoses. These comorbidities didn't vary by age or gender, but poor children with ADHD were 3.8 times more likely to have three or more comorbidities than the most affluent subjects (30% versus 8%) (Larson, et al.).

The comorbidities examined in this study included:

	Prevalence in Neurotypical Population	Prevalence in ADHD Population
Learning disabilities	5% *	46%
Conduct disorder	2%	27%
Anxiety	2%	18%
Depression	1%	14%
Speech problems	3%	12%
* According to the CDC (Centers for Disease Control and Prevention) this incidence rate was updated in 2011 (http://www.cdc.gov/ncbddd/adhd/features/key-findings-adhd72013.html) to 11% which represents a 43% increase since an earlier CDC study in 2003.		

ADHD and Motor Development

Of particular interest to the OT is the question of comorbidity between ADHD and delays of motor development. A recent study examined the fine and gross motor skills, balance, body scheme, and spatial and temporal organization of 200 children, ages 5-10 years. 150 of them were diagnosed with ADHD and 50 were typically developing. Results indicated that while only 7.3% of the control group had measurable deficits in motor performance, 52% of subjects with ADHD were in the low or very low range for motor skills. The mean deficit (delay) in motor development for the ADHD group was 23.4 months (Neto).

In general, researchers have not yet definitively determined whether there is a common etiology (cause) or if these motor issues truly represent a separate and distinct disorder. However, functionally, it is clear that up to half of all children with ADHD have clinically significant delays in development of their motor skills.

Autism: ADHD Comorbidity

It is noteworthy that autism spectrum disorder (ASD) is not included on this list of diagnoses that were part of the NIH or the CDC studies referenced above. This is likely due to the fact that prior to publication of the *DSM-5 (Diagnostic and Statistical Manual of Mental Disorders)* in 2015, it was not permissible to diagnose both ADHD and ASD for the same child, so psychologists had to pick one diagnosis or the other. A 2014 survey (Leitner) of the medical literature found that estimates of comorbidity rates for ASD and ADHD vary widely depending on the study. There is, however, agreement that a significant percentage of children with ASD also have symptoms of ADHD. Rates range between 37% (Gadow, et al.) and 85% (Lee & Ousley) across studies conducted in the United States and Europe (Rao & Landa). In addition, current estimates suggest that two-thirds of individuals with ADHD show features of ASD (Davis & Kollins).

ASD is characterized by core social/communication dysfunction and a pattern of restrictive-repetitive behaviors. Many children with ASD will behave in rigid ways and be hyperfocused. So the child with both ADHD and ASD may have additional behavioral

challenges that need to be understood and addressed directly. For example, many individuals with ASD have restricted interests. This means that they focus almost exclusively on a narrow topic and may know a great deal about that topic. Montessori teachers should be aware that children with this tendency require a creative approach that is different from that which would generally be used for a typical child. It is our responsibility to meet students where they are. This is one of the core principles which differentiates a Montessori approach from that of the traditional classroom: *Follow the child.* If a teacher understands the chosen interests of the child with ASD (often referred to with the negative term "obsession"), these interests (which should instead be seen as "passions") can be a doorway into the child's mind.

For example, the child with ASD and ADHD inattentive type, who wants to spend all her time looking out the window in an attempt to see butterflies, might be convinced to go on a nature walk to see if some butterflies could be seen, to do some research about the lifecycle of butterflies, to do a science project explaining that life cycle, etc. Perhaps, eventually, the child might be introduced to other similar but different insects such as moths, cicadas, or dragonflies in order to compare and contrast their characteristics with those of the butterfly. While some might consider this approach indulgent, in fact, it may be the only way to truly secure this child's engagement in the educational setting. Certainly telling her not to be interested in butterflies or not to "obsess" about them will be neither helpful nor successful in gaining her trust and engagement.

ADHD and Sensory Processing Disorder

Another important diagnosis that was not looked at in the 2007 NIH study of comorbidities is sensory processing disorder or SPD. Comorbidity estimates for SPD and ADHD range from 40%-60% depending on the source. Some researchers maintain that SPD is a separate disorder with many symptoms that overlap with ADHD.

SPD, sometimes also referred to as sensory integration or SI, is based on the theory of sensory integration, originally proposed by A. Jean Ayres (1920-1989), an OT and developmental psychologist. She postulated that there is a constant stream of sensory informa-

tion coming into the central nervous system from the internal and external environments, which must be processed and prioritized in order for the individual to respond "adaptively." This means being able to meet the demands of any situation appropriately. Filtering out and being able to ignore the sound of papers rustling or the fan overhead in order to focus on the sound of the teacher's voice would be one example. Being able to move through the classroom without bumping into anyone or stepping on anyone else's work would be another. Inefficiencies in neurological processing lead to difficulties with regulating responses and organizing behavior and learning. So the child who is having difficulty paying attention to the sound of the teacher's voice may be having trouble efficiently processing and prioritizing auditory inputs. The child who bumps into classmates and steps on their work mats may not have developed an accurate body scheme or body map due to inefficient tactile processing or lack of integration of information from his visual system. He may be having difficulty judging where his body is in relation to objects and peers in his environment because he has not been able to successfully integrate information from his eyes with information from his balance and movement sense (visual-vestibular integration).

PANDAS

PANDAS stands for Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections. This is another important differential diagnosis. A child may be diagnosed with PANDAS when obsessive compulsive disorder (OCD) and/or tic disorders suddenly appear following a strep infection (such as strep throat or scarlet fever), or when symptoms of OCD or tic symptoms suddenly become worse following a strep infection. The symptoms are usually dramatic, happen "overnight and out of the blue," and can include motor and/or vocal tics, obsessions, and/or compulsions. In addition to these symptoms, children may also become moody, irritable, experience anxiety attacks, or show concerns about separating from parents or loved ones.

Children with PANDAS often experience one or more additional symptoms in conjunction with their OCD and/or tics, including:

- ADHD symptoms (hyperactivity, inattention, fidgety)

- Separation anxiety (child is "clingy" and has difficulty separating from his/her caregivers; for example, the child may not want to be in a different room in the house from his/her parents)
- Mood changes (irritability, sadness, emotional lability)
- Sleep disturbance
- Night-time bed wetting and/or day-time urinary frequency
- Fine/gross motor changes (e.g., changes in handwriting)
- Joint pains

Some doctors are not convinced that this diagnosis is valid and may refuse to order the appropriate tests. If this happens, be persistent and seek more information. Contact the International OCD Foundation or the PANDAS Network to find a doctor who is knowledgeable about PANDAS (http://www.nimh.nih.gov/health/publications/pandas/index.shtml).

What Do I Do If I Have a Student Who Is Struggling?

It is helpful to have a plan in place ahead of time and to outline your school's policy for how to address the needs of the student who is struggling. Identifying medical professionals in your community who are interested in partnering with your school to form a resource team is a good starting place. There may be some medical professionals already associated with your school as parents or in the role of service providers to current or former students. Would any of these professionals be interested in being part of your team? Develop a timeline for addressing issues involving students who are struggling. Decide how long you will try to address the problem before contacting the parents. Create data collection forms and use them to gather information about the problem. Once the parents are contacted, what will the next step be? Are there screening tools that can be used by your staff to gather data and clarify the issues? When you meet with parents to discuss the situation, have the names and contact information of appropriate professionals for them to contact. A helpful next step could be trying to set up opportunities

for these professionals to come observe the child in the classroom to add their perspective to the discussion. It is never easy to broach the subject of challenges with parents. That said, it is important to share information with parents as clearly and objectively as possible, being extremely mindful of confidentiality, and sensitive to how difficult this will be for the parents. However, you can make the process easier by being supportive, objective and nonjudgmental, and providing the parent with some ideas for possible solutions and next steps.

It is essential that you work to include children with attention challenges in your classroom and find ways to help all children be successful. It is a violation of the federal ADA law to simply ask parents to remove their (challenging) child from your school before you try to accommodate their needs.

> It is illegal under the ADA to discriminate against children with disabilities. Just like public schools, private schools must make reasonable modifications of policies to permit children with disabilities to participate fully in the programs they offer. (Perez)

What's your obligation under ADA?

- All businesses and nonprofits, regardless of size, must comply with ADA.
- You can't discriminate on the basis of disability or exclude a child on the basis of disability except in cases of a direct threat to the health and safety of others. The only other exception is for situations in which meeting the needs of that child would require "fundamental alteration" of the program.
- You are required to make "reasonable accommodations" unless doing so would constitute a fundamental alteration.
- The premises must be physically accessible.
- You can ask a family to assist with costs of accommodations that go beyond ADA requirements.

For a more complete treatment of this topic, look at the question and answer paper on the ada.gov website (http://www.ada.gov/childqanda.htm).

Accommodating a child's needs may mean making changes to the way you present work or modifications to the work itself. It may involve changes to the method, the materials, the environment, and/or incorporation of additional supports per recommendations from the medical specialists. Keep in mind that the goal is to assist all children in being able to engage in the Montessori classroom using the materials in the usual manner; it's just that some children will need supports, which act as stepping stones, along the way to getting there. This is the essence of what is referred to as medical pedagogy.

The Montessori Method Is Scientific Pedagogy

Dr. Montessori was not afraid of experimentation or change. As she worked on developing her ideas and her method, she would prepare the environment with a variety of materials and would then observe the children as they explored and interacted in that environment with those materials. If children were not interacting with a specific material, she would change the material. She engaged in an ongoing process of observation, modification, and experimentation until she felt that she had materials that engaged the full personality of the child in deep, concentrated work. She wanted materials that would incite engagement, exploration, repetition, and learning. Alterations were based on experimental observations of children interacting with materials. Everything she did was done for a reason.

In our culture today, many children are distracted and are exhibiting symptoms of poor attention. Our children are spending more time in front of screens and less time running, climbing, and exploring in nature. Given that reality, it is incumbent on us to enrich the sensory and motor opportunities in the classroom and in the outside environment. Outdoor and indoor play opportunities that allow children to run, jump, climb, crawl, roll, and just move, in general, deserve special attention as our physical environments are designed. Montessori recognized the vital role of movement

in learning and now more than ever, we must make sure that our learning environments offer those opportunities for children. The last section of this paper describes ways to accomplish this and offers many ideas in each sensory area, for ways to incorporate more sensory motor experiences into the Montessori classroom.

Using a resource team approach to address the needs of children with attention challenges requires each team member to communicate and collaborate with other team members about his area of expertise. For the teacher, that area of expertise is the development and needs of the typical child within the Montessori classroom and the Montessori method. Each medical professional has expertise in a specific area, such as speech/language development for the speech language pathologist, gross motor development for the physical therapist, and fine motor/eye-hand coordination/sensory development for the OT (to name a few, see page 302 "Multidisciplinary Evaluation" for a more complete discussion of potential medical specialists who

may be necessary team members). The medical professionals may observe the child in the classroom and identify roadblocks to the child's success. This is when they may recommend that activities be modified to be more accessible to the child. These modifications are intended to support the child being successful with a specific work, but they are also a way of incorporating skill practice that supports therapy goals within the Montessori work cycle. If a medical professional suggests a modification for a student in your class, you can work collaboratively with that professional to "negotiate" how that modification should be carried out. Analyze how changes affect the Montessori works and how you present them. Modifications should be carefully introduced and should be only for the specific student for whom they are intended. The therapist(s) and the teacher must creatively collaborate to find a way to incorporate the changes into the Montessori work or supplemental activities in a way that respects the child's goals as identified by both medical therapist(s) and the Montessori teacher.

If the medical specialist recommends a support that requires a change to Montessori materials or method, the Montessori teacher needs to understand the goal of the modification and the reasoning behind it. Next, consider the ramifications of such changes on the qualities and properties of the particular work. There may be recommendations that you initially feel uncomfortable with or unable to make. In such circumstances, a discussion with the specialist who made the recommendation is warranted. Express your concerns and explain your thinking. Ask if there might be an alternative way to accomplish the same end. If not, this might be something that would best be addressed in a separate resource room, during individual therapy sessions, or through the use of specific OT equipment or supplemental activities.

For example, in the case of a student with challenges in the visual-spatial area, the Constructive Triangle work may present significant difficulty. You may be asked to implement visual support in the form of pictures, showing the child how to match shapes in order to complete the work. This may seem like it completely destroys the intent and value of the work. However, if this is the only way that this child will be able to engage with this work, then the modification should be made. The pictures must be reserved

only for that student. If care is taken that everyone else in the class continues to engage with this work in its original form, the integrity of the work will be preserved overall. Even for the intended child, this visual support will be faded (removed from use) as soon as they are within reach of independence.

Another example would be the recommendation to allow a student to do more than one work at a time. This issue came up in my work at a Montessori school, and when I presented this idea, it was rejected as "non-Montessori." It was explained to me that allowing a child to work in this way would contradict the training that the children had been given to complete and clean up each work throughout the work period. There were many discussions during which the issue was revisited, and I shared my perspective that allowing a child with significant attention challenges to have two or three works out simultaneously would allow her to move from one to the next when she was ready. For a child with attention challenges, this might mean spending only 30-45 seconds at one work before moving on to the next. However, given the opportunity to move at will between the works, I hypothesized that she would gradually increase her time spent at each work and eventually, instead of three works at a time, it could be two. Eventually, doing one work at a time would be possible. This was my hypothesis; it was a way of scaffolding the child's attention until it developed enough to follow the "method" in a more typical way.

Together, the Montessori directress and I worked out a plan for implementing this approach in a way that was mutually agreeable. The teacher provided name tags that could be placed with each work so everyone would know that these were the work of the one student who was not finished. It was decided that everyone in the class would have a name tag and that anyone who wanted to have snack but was not finished with a work could put their nametag on it and go have snack and come back to complete their work. The teacher provided a lesson to the whole group, explaining how the nametags would be used so everyone understood. I continued to monitor the specific student for whom it had originally been implemented and assisted the teacher with deciding when to pull back the support and have the child move to only doing two works at a time and ultimately, she was able to do one work at a time like everyone else.

Working together, we had hypothesized, collaboratively designed, and implemented with support, the scaffolding and stepping stones to help a child approach a more typical path.

Multidisciplinary Evaluation

It is clear that attention difficulties can stem from a variety of causes and that for many children, there may be more than one active diagnosed condition. Understanding the underlying causes as well as comorbidities will contribute significantly to determining appropriate medical and educational management techniques. Attention difficulties are a real disability and are not simply a matter of bad behavior. These challenges can express themselves in disordered behavior. For this reason, it is imperative to secure a comprehensive, multidisciplinary evaluation for a student whose difficulties are impairing their ability to successfully function at home and/or at school. If, after providing an enriched sensory environment with opportunities for the child to access and engage in enhanced sensory experiences throughout the day, you continue to observe that the child is unable to focus, is highly distractible, is disrupting the attention and focus of other children, or is otherwise unable to successfully engage in the classroom, an evaluation should be sought.

Communication with the child's family should be initiated. Classroom observations and staff concerns should be shared in as clear and objective a manner as possible. The family should be encouraged to consult with their pediatrician to make sure there is no medical problem driving the child's behavior. In some instances, the pediatrician will reassure the parents that everything is fine and encourage them to wait and see if things fall into place. If this happens, you need to keep observing and documenting the challenges you see the child facing and after 4 to 6 weeks, if your concerns persist, you will need to contact the family again to let them know.

Assisting the family in getting a comprehensive evaluation can be a challenge. In some areas of the country, there will be an option for a complete developmental evaluation at the local children's hospital or university hospital/research center. In that case, if the parents call for an appointment, they will likely go through an intake process that will help to identify the members of the evaluation team. The

makeup of the evaluation team will vary depending on the specific challenges the child is experiencing, but the team should be led by a developmental psychologist specializing in assessment, with other possible members including OT, speech language pathologist (SLP), developmental pediatrician, audiologist, physical therapist (PT), and behavior specialist/certified behavior analyst (BCBA). In some instances, it may be appropriate to include a nutritionist, nurse, and /or social worker as well.

If you do not live in proximity to a center that offers this type of comprehensive developmental evaluation, or if the idea of this type of evaluation is too threatening to the parents, the recommendation would be to have the parents consult with a developmental pediatrician or pediatric neuropsychologist. This recommendation in itself may be threatening to some parents. If this is the case, and there is a clear delay in some specific area such as language development, it may be less threatening to the parents to begin by having a speech and language evaluation with the SLP. This may lead to a recommendation for audiology testing, evaluation by the psychologist, and/or the OT.

In some cases, having the OT evaluation first is appropriate. The OT will evaluate fine and gross motor skills and can assess the possible role of sensory processing difficulties in the child's behavior and can then recommend further evaluations to include other disciplines.

Based on the issues outlined above, one can see the value of having a team of professionals who have an ongoing relationship with your school and a working knowledge of the Montessori method. A Montessori school partnering with a team of medical professionals can make the whole process of identification and evaluation easier and less stressful for everyone.

The Medication Question

Determining if there is a need for psychopharmacology intervention (medications to treat ADHD) and then deciding whether or not to use them is a complex issue. It is important to remember that ADHD is a neurophysiological disorder and as such, should be treated as any medical condition would be treated. The decision whether or

not to prescribe these medications is always a complex calculation, trying to balance the potential benefits against the potential risks (side effects), which must be handled by a trained physician. Every child is unique and every medication has its own side effects. Some of the persistent questions that doctors think about are:

- Is it really safe to have preschool children take medications?
- What are the dangers of not medicating?
- How do we weigh the benefits against risks intelligently?

In any case, it is always prudent to begin by providing supports in the classroom, and then if the child's challenges persist, conversations with the parents must begin. The next step should be evaluation, preferably by a multidisciplinary team. Any recommendations for therapy made by those professionals should be implemented. Finally, if all efforts prove unsuccessful in improving the child's functioning, a medication trial, under the direction of a pediatric psychiatrist, who specializes in psychopharmacology, may be warranted.

Once the child has been assessed and put on a medication trial, if there is no significant positive change, one of several things may be going on: 1) the correct dosage may not have been identified, 2) it may not be the correct medication, 3) the diagnosis is incorrect, or 4) there is an unidentified comorbidity. In part two [of this conference lecture], Dr. Murphy-Ryan will address these issues in a more comprehensive manner, including more focus on the differential diagnosis and issues of comorbidity.

Most Students Who Need Medication Also Need Nonpharmacological Interventions

The idea of using nonpharmacological strategies and medications together can be unfamiliar to many families. Some people believe that simply giving a child the medication will fix the problem. In most cases, medication alone does not solve everything. Even in cases where medication has been helpful, the child will continue to struggle with specific issues. In such instances, other therapeutic interventions will be needed in addition to the medication. Alternately, a child getting supports such as speech therapy and OT, who

is demonstrating improvement but is still having some difficulties in the classroom, may need medication in addition to his therapies. Even if the underlying issue is completely due to a chemical imbalance that is addressed by the appropriate medication, the child will need help to build skills they missed developing during the time prior to being on medication. For example, a child with learning differences may have trouble with reading and math, a child with SPD may have trouble with self-regulation, and a child with ASD will continue to have communication and social challenges. Each of these children may benefit from use of medications but will also need skills training and therapeutic support in order to develop missing skills or to learn compensatory strategies in order to be successful in the academic setting. Generally, across diagnoses, children who have been struggling for any extended period of time with ADHD prior to being put on medication, will suffer from poorly developed executive skills to a greater or lesser degree. This also highlights the importance of early diagnosis and intervention.

OT and Montessori Collaboration

OTs and Montessori teachers can work together to facilitate success for the student with attention challenges in the classroom. There are many commonalities between these two disciplines and they are mutually beneficial. Occupational therapy focuses on maximizing independent function, enhancing development, preventing disability, and helping individuals accommodate to their disability.

The OT addresses the following areas of functional skills development:

- Activities of daily living (ADL)
- Fine motor, gross motor, visual-motor integration, ocular-motor skills development
- Sensory processing skills
- Cognitive, social, and leisure skills development
- Functional mobility and functional communication skills

The name "OT" is itself confusing to many people when they first hear it. Occupational therapy is about restoring and maintaining occupational roles as well as using occupation as a tool for therapy. There are many occupational roles for any individual and there may be multiple ways that an individual would engage within the contexts of those roles. For example, many of us are wives, mothers, sisters, friends, daughters, workers, coworkers, etc. When an individual suffers a stroke or has an accident that causes disability, the individual is unable to function in her occupational roles as she used to. The OT might assist a patient who has lost her ability to function in the kitchen following a stroke, so she could resume her occupational role as her family's preparer of food. So one meaning of "occupation" in the OT context is to help someone regain functional capabilities that have been lost in order to engage successfully in an occupational role.

Another meaning of the word "occupation" is how one enjoys spending time, how one engages with the world. The OT might learn that prior to injury, this same patient enjoyed painting and would then use painting as a therapeutic modality. This means having the patient paint a picture in order to help her gain strength and to develop better ability to move her arms and hands with control and precision. Engaging this patient in an art project would be far more motivating than simply putting some weights on her wrists and having her raise her arm over her head repeatedly in an effort to help her get stronger. By preparing and presenting the activity in specific ways, the OT can emphasize specific therapeutic goals such as building strength in specific muscles, improving endurance, or developing better attention to task. This is quite similar to the way in which the Montessori teacher prepares the environment and presents lessons in order to facilitate specific learning in her students.

To an OT, the occupation of young children is play, or what Montessorians call work. Because children learn best through play/work, the pediatric OT uses play/work as a therapeutic modality. For older children, occupation includes academic work as well.

The OT will look closely at the demands of a task to determine what skills are required for successful completion of that task and will take into consideration the child's challenges. The goal is to find

ways to facilitate the child's success with the task. This might mean helping the child build specific skills that are lacking, modifying the environment to remove barriers to success, or simplifying the task to match the child's abilities.

There are many commonalities between the Montessori approach and that of the pediatric OT. These include:

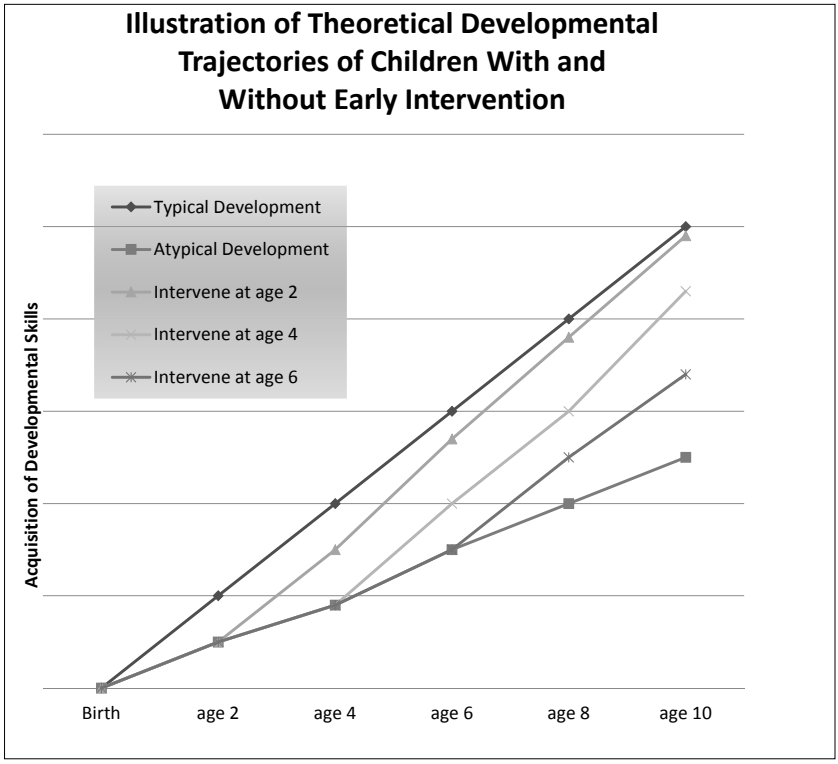
- Use of the prepared environment,
- Task analysis as an integral aspect of education and treatment planning,
- Utilizing a child-directed approach, or "Follow the Child,"
- Recognition of the important role of movement in learning,
- Use of multisensory learning,
- Emphasis on multistep sequences in learning to support executive skills development,
- Incorporation of the belief that every child is unique,
- Acceptance of the concept that development unfolds naturally in predictable sequences, at specific periods of time ("sensitive periods"),
- Understanding that there is great variability among neurotypical children in terms of developmental timelines.

Montessorians understand that the neurotypical child, attending a well-run Montessori classroom, will find her own developmental pathway and will move along that developmental road without external prompting. One key concept that is essential for Montessori teachers to understand is that children with atypical developmental profiles will not simply find their own path and move along it. In fact, in many instances, children with special needs move so slowly

along that path that their developmental trajectory strays far from the typical path. Such children benefit greatly from external prompting such as that provided by the OT and other therapists. Engaging in these therapies provides the child with stepping stones that bridge the gap and gives them a small "push" toward a more typical developmental path. If one thinks about a rocket ship headed for the moon that has strayed from its intended trajectory, a change of only a few degrees early in the flight will make a huge difference later on. The sooner the course can be corrected, the less the rocket will have strayed from the correct flight path. The longer we wait to assist these children, the bigger the problem will be as the child gets older. The child will have had more time to fall behind peers, to receive negative feedback for behavior and performance, and to be experiencing the social, developmental, and cognitive ramifications of disordered attention (or any developmental difficulty, for that matter). Leaving the child to continue unsupported allows for the entrenchment of deviated patterns. An example would be pencil grip. Montessori believed that if a child had not established an appropriate grip by age six or seven, the hand became fixed and it would be very difficult to modify the way the child would hold a pencil. Making changes early in the developmental trajectory will make a big difference in the long run. This is the essence of the argument in favor of early intervention.

On the following page is a graphic representation of this idea. Certainly each child is on his or her own unique path and development is never as simple and straightforward as a line on a graph. However, early intervention is likely to bring the child back toward a typical developmental path, and waiting to intervene only allows the child to move farther from that path.

The remainder of this lecture will focus more specifically on OT strategies and perspectives for assisting children with attention challenges to be more successful in the classroom. Earlier, in the discussion regarding differential diagnosis and comorbidity, the concepts of sensory integration and sensory processing disorder were introduced briefly. The following section addresses the sensory processing framework in greater detail, with specific descriptions of sensory-based strategies for enhancing the prepared environment to provide more opportunities for engaging the senses and the body.



In addition, use of specific sensory and sensory motor activities to address the needs of individual children is described, and implementation of a team approach for managing the behaviors associated with ADHD and related challenges is discussed in more depth.

Sensory Processing Disorder

Our nervous systems are continuously integrating and processing incoming sensory information in order to understand our physical situation and to respond appropriately to environmental demands. There is tremendous variability and a large continuum of what is considered typical in terms of sensory integration. For example, some people prefer sedentary activities such as sitting on the couch to watch a movie, while others like to jump out of airplanes with parachutes on their backs. These behaviors represent the extremes of vestibular preferences and behavior sets. These, along with everything in between, are considered within the realm of typical

behavior. Some individuals experience over- or under-responsiveness to such a severe degree, that their behaviors are considered atypical. For example, an individual with sensitivity to movement that is so severe that it causes car sickness, would be considered to be atypical. Sensory challenges become SPD when daily function is impaired. SPD affects a child's readiness for learning, impairs successful social interactions, disrupts family dynamics, hinders self-regulation, and interferes with attention. Diagnosis of SPD is a challenge and research is ongoing into the causes and appropriate treatment methods for children who struggle with SPD.

According to Lucy Jane Miller, PhD, director of the Sensory Processing Treatment and Research (STAR) Center at the Children's Hospital in Denver, 1 in 20 children in the United States have SPD. In addition, parents reported that, of children who showed symptoms of either ADD/ADHD or SPD, 40% displayed symptoms of both. More than 90% of children with autism are reported to have atypical sensory behaviors (Chang, et al.).

SPD can present in many ways and symptoms may overlap not only with ADHD, but also with other diagnoses such as obsessive-compulsive disorder, oppositional defiant disorder, and autism spectrum disorder, among others. There are three subtypes that can occur separately or together.

- *Sensory modulation disorder* describes the child who has difficulty regulating responses and can be over or under responsive to sensory experiences or engages in seeking behaviors in attempt to get specific types of input.

- *Sensory discrimination disorder* involves difficulty with understanding and differentiating the subtle properties of inputs. For example, if one lacks the capacity to discriminate between walking on pavement and walking on a grassy surface, it is likely that he will be unable to make the appropriate adjustments so as not to fall when transitioning from one surface density to another underfoot.

- *Sensory based motor disorders* include postural disorders and dyspraxia. These are disorders of tone and ability to sequence and plan movements effectively.

Top-Down Versus Bottom-Up Approach

In the context of sensory regulation, this phrase is referring to the direction of information as it flows up the spinal column into the brain, getting processed through lower centers before reaching the cognitive (cortical) parts of the brain. Telling a child to "calm down" or "sit still" would be an example of a top down approach, because it involves giving the child verbal input that must be processed through higher centers of the brain first, in an attempt to get the child to control his arousal level by sheer force of will. It will be virtually impossible for the child who is in the throes of being overwhelmed by sensory input, to simply decide to not be overwhelmed anymore. A more useful approach would be to provide inputs that are "bottom up." Examples of such activities would be having the child do wall pushups, jump, sit in a beanbag chair in a darkened room, color with scented markers, etc. These are all activities that provide primary sensory experiences that are registered distally (far from the central nervous system/brain) through sensory receptors in the skin, joints, or muscles. That information travels up the spinal cord to be processed through lower centers of the brain, including areas that are responsible for regulation of behavior and emotions, before reaching the cortical level. In this way, we can help children who are not functioning at their best, to become more calm, alert, and attentive by engaging them in activities that actually assist them in calming down at the level of the central nervous system.

Self-Regulation

Difficulty regulating arousal levels is common in children with SPD. Being well-regulated means being able to successfully manage the many internal and external events that call our attention, create sensations, and cause us to experience emotional responses. Being able to manage one's responses and remain calm and alert is goal for all of us.

This "calm-alert state" is a state in which the child is ready to engage in learning activities and is free from both external and in-

ternal events that draw his attention from his work. These distractions come in many forms. For some children, it might be wandering thoughts or an impulse to get up and move, for others it might be a desire to seek or avoid sensory stimulation. Some children have difficulty efficiently processing some types of sensory input, such as tactile or oral, which could cause the child to engage in seeking behaviors such as touching everything or everyone in sight, or putting things in the mouth. Some children may be over-responsive to certain types of sensory input (overly sensitive to it). For example, a child with tactile over-responsivity will feel uncomfortable with clothing touching her body and will have difficulty paying attention because the sensations are so uncomfortable. Some children will have an active avoidance response to inputs that overwhelm them. This can compromise the child's attention because she is so focused on being vigilant about who might touch or bump her and planning how she might avoid that eventuality. Children with auditory sensitivity might be distracted by the sound of an airplane passing over the building or the fan turning on as the heating or air conditioning system is activated. The child who is experiencing any of these internal or external distractions will be agitated to some degree and will be less attentive than he could be.

Some children's perceptions of sensory inputs are disordered to the point that non-noxious inputs are interpreted by the nervous system as noxious. These children can experience such a high level of discomfort, and in many cases, pain, that their nervous system responds with what is called the "fight or flight" response. This is a neurophysiological state characterized by an overwhelming sensation of a need to fight or flee for one's life. This is a primal state designed to assist the individual in surviving life threatening situations. Individuals in this state will exhibit changes to autonomic nervous system activities such as heart rate and blood pressure, and they are likely to engage in impulsive and extreme behaviors without the benefit of the conscious filters they might usually use to temper their behaviors. A child whose ability to tolerate sensory inputs is so impaired that it causes a fight or flight response should be referred for OT evaluation.

Strategies for Students in the Classroom: How to Support Students with Specific Needs

There are many ways to help children with attention challenges to stay calm and focused in the classroom. The Montessori approach incorporates many elements that we know can help all children to attend and remain on task. These include the use of child-sized furniture, with tables and chairs of various sizes and types, the appreciation for the use of natural materials, access to nature, the out of doors, and the provision of natural light. Other ways to expand these concepts would be to make sure that each child is properly positioned for optimal function for each work. For example, be sure your children take work off of trays so that their wrists are not being forced into flexion as they access the materials on the tray. Placing materials directly onto the table surface will ensure free movement of the hands and wrists as the child engages with work. Offering the option to work standing at a table is an easy and simple way to allow children to move while they work.

Providing a slanted work surface may be another way to support a child's optimal function. The slant board raises the paper to about a 30 degree angle, making the work closer to be perpendicular to the line of sight, which is optimal for visual function. It also helps get the wrist into extension, which is the preferred position for writing.

Exercise and Movement

Montessori recognized that mental development is connected with and dependent on movements. She understood that children learn

by moving and that concepts must first be experienced concretely in the body. She incorporated manipulation of materials into her work for this reason. Current neuroscience research supports the movement-learning link. The mechanism for this within the brain is complex, but current research focuses on the cerebellum as the locus of this connection.

The cerebellum is a small structure, located at the back and beneath the cortex: It is packed with neurons. Once thought to be responsible only for regulating the control and timing of movement, balance and posture, it is now recognized to be part of a circuit controlling both movement and cognition. Neural pathways project in both directions, to and from the cerebellum and the cortex (frontal lobe).

The cerebellum is active in motor learning, especially the learning of new tasks, and is involved in information processing, mental tasks and imagery, and sensory perception and function. This circuit also plays a role in nonmotor functions such as motivation and emotions. In addition, it is important for memory storage of memories that are learned and learning of skills that need to become automatic, such as writing. It also provides a level of baseline arousal, prior to learning, preparing the brain to process all information. The cerebellum processes a continuous flow of input from the joints and muscles (proprioceptive input). In fact, without proprioceptive input stimulating the cerebellum, we would simply not be alert enough to learn (Berkey).

The excessive movements of many children with ADHD are actually facilitating their learning. Recent research found that individuals with ADHD need to move to maintain alertness. The more they move, the better they perform. Conversely, study participants who were not diagnosed with ADHD who had higher levels of movement during cognitive testing than their non-ADHD peers, actually performed worse (Sarver, et al.).

Moving muscles against resistance, which provides proprioceptive input, is a good way to help children attain and maintain a calm-alert state. This is also sometimes referred to as "heavy work." Proprioceptive receptors are located in joints and muscles and they are acti-

vated when muscles work against resistance. When the muscles are challenged against resistance, they are contracting with force across the joints of the body and, in turn, creates joint compression. Alternatively, activities such as hanging from the hands on a horizontal bar causes traction at the joints. The compression and traction of the joints, including muscle work against resistance are all activities that stimulate the receptors of the proprioceptive system.

As discussed, movement (vestibular input) is another important strategy for improving attention for all children. Most activities provide input to both proprioceptive and vestibular receptors in various proportions. While it is impossible to separate the two and have a child engage in an activity that offers only one or the other, it can be helpful to think about the types of input offered by various activities.

For example, jumping on a mat or a mini-trampoline offers linear movement (vestibular stimulation) with simultaneous compression to the joints of the ankles, knees, hips, and spinal column (proprioceptive input). The two types of input are both fairly substantial in this activity. On the other hand, an activity such as doing wall push-ups offers much more resistive muscle work than it does movement. For some children, the higher ratio of vestibular input they would get from the mini-trampoline could actually rev them up and they might end up having a harder time focusing after jumping on the trampoline. For this child, doing wall push-ups with less movement and more heavy work would be a better choice. Each child will need different amounts of these inputs for optimal function. Having a basic understanding of this concept can assist the teacher in making useful observations to share with the OT.

The Montessori work cycle provides children with many opportunities to get proprioceptive and vestibular inputs. For example, as the child prepares the work area by getting a rug, rolling it out, and getting materials from the shelf, she is moving and working her muscles against resistance. Knowledge of this key concept can help a teacher understand why directing an inattentive child toward the pink tower or broad stair would be a good choice because of the weight of these materials and the multiple opportunities for movement (walking back and forth from the shelf to the mat) and muscle

work (bending or squatting to place each piece onto the mat) that are intrinsic to these works.

Think about placement of materials for activities that provide proprioception to increase the distance between shelf and table or mat area or between sink and water area to increase the amount of movement and proprioception the child will get as she goes back and forth to the shelf to get each piece. You can also give children opportunities for proprioceptive input by designing works that specifically incorporate proprioceptive input (moving the muscles against resistance).

For example:

- Weighted ball activities
    - Walk the line holding the ball
    - Roll the ball on the line
    - Pass the weighted ball around a circle of children before starting a lesson
- Have children roll a rolling pin on The Line
- Walk The Line carrying a tray
- Water activities
- Window washing
- Works with modeling clay
- Gardening tasks such as digging, planting, or watering

There are some activities that provide opportunities for children to push weights which can be implemented by the teacher for all children in the class. For example, having the children help with classroom management tasks such as moving chairs, arranging tables, carrying books, or buckets, or taking equipment out to the playground.

Oral input is another means of providing proprioceptive input by having crunchy and chewy foods available for children. Teachers can provide opportunities for this type of input by carefully considering the sensory opportunities available with their snack table offerings. Fresh crisp apple slices, fresh carrot sticks, and celery are great ways to give children input to the jaw as they eat snack. Another type of input would come from something that requires a bite and pull, such as biting into a fresh bagel and pulling off a bite. Dried fruits such as prunes, apricots, and raisins offer resistance and input to the jaw as well. Foods such as crisp crackers, pretzel rods, and popcorn are crunchy and offer a different type of proprioceptive input.

Individual Therapeutic Programs

While the classroom teacher can try to incorporate opportunities for all kinds of sensory activities into the classroom environment for the use of all students to choose as they like, providing specific programming for the child with a confirmed attention deficit diagnosis should be a team effort. It is the job of the OT to recommend specific activities that should be part of the child's program, and it will be the job of the teacher to implement those recommendations and to document the child's responses. The entire team will be observing and documenting the child's responses at school and at home and sharing those observations with the team. Thus, the teacher's understanding of the roles of proprioceptive and vestibular inputs in regulation (assisting the child to achieve the calm-alert state) is essential for the success of this collaborative process. It is especially important that the teacher understand that vestibular input is extremely powerful. In particular, rotational input, such as spinning, should only be provided with direct oversight by the OT. When using a recommended activity as a strategy for increasing attention, always observe the child's responses during and after she engages in the activity. Discontinue the activity and consult with the OT if it has the opposite effect to that which was desired.

If the OT has determined that your student needs proprioceptive input, she will recommend engaging the child in work activities that involve compression and traction. An activity like pulling on a rope will provide traction to the joints of the wrists, elbows, and shoulders,

while jumping or pushing will provide compression. Some children will respond more positively to traction than to compression. In general, children who are pushing others, shoving their friends, or engaging in wrestling types of activities may benefit from activities that offer them more proprioception and heavy work.

A child's OT might recommend weighted products as part of your child's program. This is not an area for experimentation without input from the professional. The nervous system can acclimate to added weight and that will negate the positive effect of the intervention. When implementing a program with weighted items, be sure to follow the instructions provided by the OT and communicate your observations to her. Your OT should provide information about how long the child should wear the weights, as well as the maximum weight amounts that are safe for each child for weighted items that will be strapped to the body. Weighted vest, waist weight, or cuff weights for the wrists or ankles can all be helpful in increasing focus. Some children benefit from use of a weighted lap pad or weighted blanket for nap time.

Another tool that your OT might recommend is a fidget. Fidgets are small objects, often with special textured or compressive qualities, that can be held in the hands and manipulated as a means of keeping hands busy and providing sensory inputs simultaneously. When using fidgets, it is essential to observe and remove them immediately if they are becoming the distraction rather than improving attention. They can also be thrown by the child and thus must be introduced with care and with a lesson on their proper use.

Pictured here is a bracelet fidget which has been threaded through the child's belt loop. This particular child was not comfortable with the tactile input of the bracelet touching his wrist, so he asked if we could put it through his belt loop. He also added a keychain fob hanging from the bracelet clasp. This fidget has nuts that can be turned and moved as the child wishes. Having the fidget attached to the belt loop makes it available to him whenever he wants it and also prevents it from getting lost.

Strategies for Children with SPD

Children with SPD can be overly sensitive to input, underresponsive (meaning they may seem not to notice inputs), or they may seek specific types of input. In the classroom, avoid environmental stimuli that may be interpreted as noxious, such as smells, high noise level, lights that buzz, or transition cues that are too loud or irritating. Try using soothing and mellow sounds like wooden wind chimes or a meditation bowl. Pay attention to the room set up so that the children can move easily among the tables and access materials on the shelves without impediments. Even the lighting is important. Having as much natural light at possible is essential and avoiding fluorescent fixtures that buzz and hum can really make a difference for some children. If possible, have a dimmer switch so you have the capability to lower the lights for short periods of time to help everyone calm down and relax.

Some children may need special equipment such as an adapted chair, a ball or peanut chair, sound-canceling headphones, weighted lap pad, or seat cushion. There are many types of seat cushions available, many are air filled, are placed on the chair, and the child will sit directly on them. The amount of air in the cushion is crucial and you will need to consult with the OT to establish the best level of inflation for these cushions. There are also seat cushions that have various fill materials, such as the Core Disc series available through the Abilitations catalogue. These have a variety of filling materials in addition to air. Again, the OT can assist you in determining the most appropriate one for each child.

Thus far, the discussion has focused primarily on ways to prepare a sensory rich environment by incorporating activities that provide sensory experiences for the whole group. Enriching your classroom environment in this way creates an ideal setting in which to observe and document behaviors of children who may need referral to an OT for evaluation and treatment. Your observations provide a wealth of objective data that can be shared with parents to support your recommendation for further evaluation by a medical specialist. When you are trying to learn more about a child who is struggling, before you discuss your concerns with parents, you can collect important information by choosing one activity, deciding exactly how, when, and where the activity will be implemented, and then

documenting the child's responses. For some children, providing sensory breaks during work time or suggesting a specific sensory-based activity (such as doing jumping jacks or wall pushups) will be all that is needed to get them back on track. While development and management of a sensory program would be the responsibility of the OT, it is worthwhile to make some simple observations of your own as you prepare to share your concerns with parents. By enhancing your own understanding of the sensory systems and their role in regulation, attention, and behavior, your observations can be more specific and therefore more useful to parents and medical professionals as they begin deciding what types of evaluation and interventions the child may need.

Sensory Diet

Development and implementation of a sensory diet is an important aspect of supporting children with SPD at home and at school. This is a program developed by the OT, for a specific child, based on his or her sensory processing challenges. It is designed to provide calming and organizing input, in the form of sensory-based activities, for that child to engage in at regular intervals throughout the day. The goal is to promote and maintain an optimal level of alertness and arousal for function and learning. By having the child do these activities, we hope to get the child into a calm-alert state, maximize the "adaptive response" and minimize seeking and avoiding behaviors to increase focus and attention and improve the child's ability to succeed in the classroom. This program is developed by the OT and refined through active collaboration between the OT, the parents, and the teachers. The program will be in constant flux because it changes as the child's responses change.

When implementing a sensory diet, the more scientific you can be in your implementation, observations, and data collection, the more useful your information will be to the OT who is directing the program. Make sure you understand exactly what it is that the OT wants you to do. It may be a specific activity or it may involve having the child do a Montessori work in a specific way that may be different from the usual way the work is carried out.

Implement use of the activity consistently, so you can observe and document the child's response. Based on these observations of

the child's responses and input from the OT, the decision may be made to continue doing the activity as you had originally planned, or the decision may be made to modify the activity by making it shorter, longer, or altogether different. Once a modification is made, you must again observe and document what you see in order to determine if the activity is helping the child be more attentive. Observe the child carefully and make note of his behaviors and responses to sensory diet activities. Treat your observations of attention challenges like you would any other behavior you observe. Montessori teachers have already been trained to be keen observers. Use your skills and use your camera! *The Observer's Notebook,* by Paul Epstein, is an excellent resource about how to be a practiced observer.

This type of teamwork requires real commitment and it takes time. However, engaging in this type of mutually supportive collaboration is worth the effort because team members gain a comprehensive understanding of each other's goals and the teacher has the support necessary to truly integrate the suggestions made by medical professionals into classroom work throughout each school day. This increases the amount of practice time the child will have to work on each goal.

Being a Scientific Pedagogue

Engaging in this process of observation, implementation, data collection, and modification, Montessorians are following in Montessori's footsteps being scientific pedagogues. Her vision was of a medical educational partnership to address the needs of the whole child. Addressing the needs of children with attentional and or behavioral challenges really highlights the need for input from medical specialists. What we call the Montessori method, she called, *scientific pedagogy as applied to child education in Children's Houses.*

As an educator scientist, it is essential that you collect baseline data for at least a week, as soon as a concerning behavior is identified. This will help you clarify the timing, duration, and intensity of behaviors, as well as helping you identify possible causal events. When you implement recommendations from medical professionals, always take notes and gather data so you will have documentation about the

efficacy of what you are doing. In addition, consider these important questions that can help you analyze a student's behavior.

- What is the behavior telling you? Considering this question brings to mind an important reason for using a resource team model. Each member of the team, parents, teachers, and medical specialists, will have a unique understanding of the child, and this will bring varied perspectives on the meaning of the communications behind a child's behaviors. Sharing those perspectives among team members will undoubtedly lead to a more nuanced and probably more accurate, assessment of the child's situation. This means a more educated starting place for deciding how to address each issue.

- Does the child seem to be seeking or avoiding specific sensations?

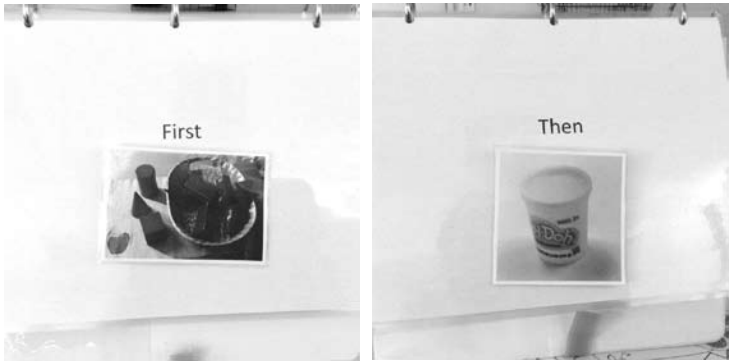
- Given the use of a strategy, is regulation improving? Meaning, is the child better able to follow classroom routines, deal with minor upsets, manage frustration, communicate needs, ask for help?

Strategies for Children with ADHD in Addition to SPD

For these children, therapists will often recommend multisensory supports such as picture schedules or sensory menus. There are many ways to implement this. Here are a few examples:

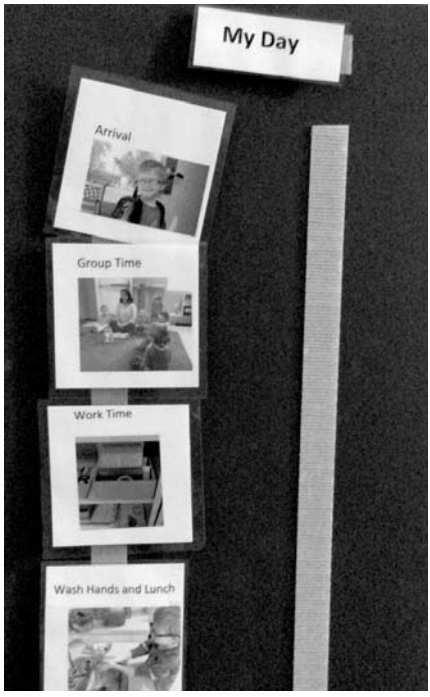
Use of a First/Then board is a great starting place for children. They must understand the concept of planning to do one thing and then another. For some children, having the two planned activities side by side is effective.

Some children will need an even more concrete board that has *First* on one side and *Then* on the other.



Picture schedules can be used to help a child stay on task during a part of the day that is particularly difficult for her, such as arrival or dismissal. Or they may be helpful for the child who needs reminders of the overall routine for the day due to inattention or anxiety.

The board below is set up to cue the child to the daily routine and pictures can be moved to the Velcro strip on the right after that part of the routine has been completed.



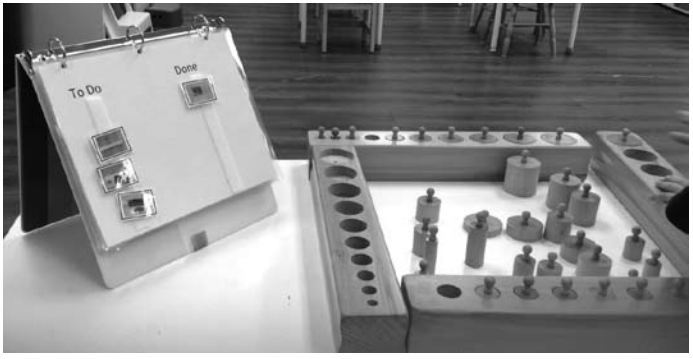
You can put each activity or part of the day in a sleeve of a small photo album and flip the page as it is time for each one.

The menu below offers a variety of options for calming down. It can be used as above for a child who is able to choose among many options.

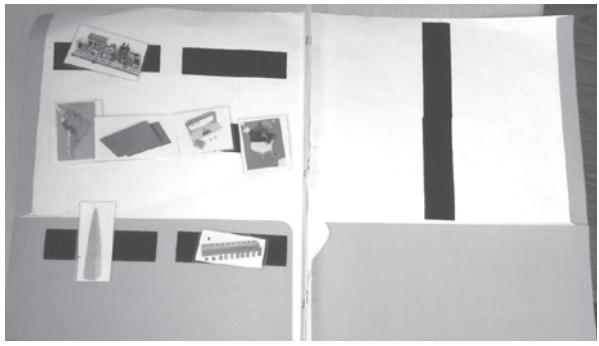
For a child who is upset, agitated or becoming overwhelmed, offer fewer choices as seen below.

For a younger child, pictures can be used, as seen in the example below. The board can be set up to offer one item when the child is upset and not able to make a choice, such as seen below, or it could show two, three, or four choices.

The menu below illustrates another way to organize options for the child. The goal is to assist the child with planning his work time by having him choose pictures of work he will do and place his choices on the Velcro on the left side of the page, ordering first to last and from top to bottom. Thus, when he gets up to get his work from the shelf, he already knows where he is going and what he is getting. As each work is completed, the picture is moved to the right side.



The folder method, pictured below, offers another way to organize a similar menu. The child can pick from among a few choices on the left side of the folder, placing chosen activities on the Velcro on the right. Once an activity is completed, its picture is taken down and moved into the folder at the bottom.



Using picture schedules necessitates creation of a picture library and development of some method of storing and organizing the pictures. Below is one method for addressing this issue.

Use of a study carrel and careful consideration of table placement is also helpful. These children often benefit from the use of fidgets, which are small textured or spongy items that can be held and manipulated as the child works. Be sure to check in frequently to see if the child is on task and actively engaged. These children will often benefit from provision of movement breaks and snack breaks. Try having children "cycle" between two activities, allowing them to leave work to have a break or a snack and then return to it. Use of seat cushion, ball chair, or standing tables are also often helpful. Below are some photos showing these items.

This child is using the squellet-filled core disc seat cushion and is also at the table for pink tower work, which is a work that is often done on the rug. This is a good option for a child whose postural muscles are weak, or for a child with low tone or poor balance who has diffuculty sitting up while on the floor. Often, sitting on a correctly sized chair will provide enough support to get the child's spine into good alignment, which will facilitate optimal function of the arms and hands and thus make it possible for the child to engage successuflly with the work.

Above is one example of a ball chair. Some are designed with arms as well.

Below is an example of a standing table for an older child made from a music stand. Note the footstool nearby provided so the child can prop one foot up to relieve back strain whenever she wishes.

Above is another standing table, sized for a primary student.

Strategies for Children with Learning Differences in Addition to SPD

The frustration experienced by children with LD can greatly interfere with their ability to focus and attend. Manage that frustration with frequent and brief breaks. During these breaks, include activities that provide calming inputs. This might mean an opportunity to go into a quiet reading nook and look at a book, or it may mean a chance to leave the room and be in the quiet of the hallway or office for a few minutes. It might include movement or listening to music. In addition, children with LD often become acutely aware of their deficiencies and it is essential that everyone in the child's life notice their strengths and support the child in being a leader and mentor using those strengths. Two other strategies that are often helpful for the child with LD are 1) breaking down lessons into small chunks and 2) use of multisensory presentation (which is already built into the Montessori method). These strategies can be further adapted. For example, you can use smaller steps and incorporate additional visual supports, such as visual picture schedules, based on the needs of the individual child.

Strategies for Students with Anxiety in Addition to SPD

Finding ways to give these children a sense of being in control whenever possible is very helpful. This is already an essential aspect of Montessori education, but the SPD may cause the child to be so disorganized that she has trouble making choices and following through. These children may need extra reassurance and positive support. One way to offer this may be by teaching calming strategies to the whole class. A strategy such as taking five deep breaths can be taught individually or in small groups and can be practiced as part of yoga breathing exercises. Even though this strategy may be designed as a way of helping one specific child, teaching it to the class makes it available to anyone and ensures that the child does not feel singled out. Providing opportunities for breaks and creating an area in the classroom for calming and regrouping, such as a quiet reading cove, will also be helpful for these children.

Sometimes, social stories can be of help. These are short stories that you create and that are designed to help a child understand a specific challenge in a new way. The stories are created as books (with pictures or photos) for the child to read. For example, if you have a child who is having bathroom accidents, which you believe are not due to lack of control but instead are stemming from anxiety about some aspect of going to the bathroom, you could write a social story for him. The story might be about that child or a fictional child. In the story, the student is upset about going into the bathroom because the sound of the fan really scares him. When he avoids going into

the bathroom, he has an accident. He is tired and embarrassed about having to clean up after he has an accident. So he and his mom come up with a plan. He will use sound cancelling headphones when he needs to go to the bathroom so the sound of the fan won't bother him. When he tries it out at school the next day it works perfectly!

> Children with LD often become acutely aware of their deficiencies and it is essential that everyone in the child's life notice their strengths and support the child in being a leader and mentor using those strengths.

By creating a simple, short, and straightforward story that the child will be able to relate to, you are helping him realize that he can think it through and figure out how to solve his problem by making a plan to address his situation. Younger children often like the story to be about them; but for elementary aged children, they may be more open to a more indirect approach using a fictional main character. However, some older children may need a more concrete approach that uses them as the main character. The teacher must decide based on their knowledge of the particular child. Generally, social stories are helpful because they describe a problem that the child is dealing with in an objective and nonjudgemental manner and they offer a possible solution. Sometimes, the child will come up with a different solution or strategy to try. Social stories give the child information about how the problem might be solved and the power to decide, on his own, what he wants to do about his problem. Thus, the child is empowered to understand and deal with the situation in a new way and can feel successful.

Ideas for calming students in the classroom:

- Reading cave or cove: create an area with some seclusion from the rest of the class so it seems smaller and more intimate. Provide cushions or a comfy couch for lounging and have books and magazines available for younger children. This will be a place where the child can go to just collect himself and calm down.

- The upper section of the above structure has a quiet nook with a mattress and pillows and is a great get-away spot for children in this classroom.

- Jump spot: this is a designated spot within the room where children can go to jump. It should be a padded nonslip surface, and children should be instructed in its safe use.

- Mat area with yoga cards: set up an area with a gym mat so there will be a place where children can go to get some gross motor activity in the midst of the work period to help themselves regulate.

- A listening station with headphones can be incorporated into the reading cove or can be stationed separately.

- Line activities: walking, rolling pin, carrying heavy ball, rolling heavy ball

- Fish tank corner (with seating options such as bean bag chair and rocking chair)

Evidence-Based Programs

There are numerous programs available that are designed to assist teachers, parents and therapists in helping children develop the skills they need for better attention and focus. Below I will describe several programs that may be helpful for your children. They are all readily available in the form of books, training courses, and website information. I include them as references, describing each in summary, so you can determine if it is something that might be useful to you. Each is well-researched and complex. In order to use any one of them effectively, you would need to be trained by the program designers or their designated trained representatives.

Bal-A-Vis-X

Bal-A-Vis-X, or BAVX, stands for *Balance, Auditory, Vision, Exercises for Brain-Body Integration.* This is a program developed by Wichita, KS school teacher Bill Hubert. The program consists of a series of increasingly complex and modifiable rhythmic movement patterns using sand bags (bean bag sized but filled with sand) and racquet balls. The ability to perform these patterns demands sustained attention for smooth execution of the exercises and the rhythms must be synchronized and maintained by the student and the practitioner together. Hubert developed the program while he was working in a middle school with the lowest quartile performers. These were students whose reading, math, spelling, and writing skills were in the prekindergarten to second-grade level range. He noticed that when he engaged these students in ball bouncing and catching activities, that over time, their academic skills and attention improved significantly. He took a very scientific approach as he implemented his program, giving pre- and post-tests and documenting changes to his program as well as the academic gains made by his students.

A study recently completed in Africa documents significant improvements in the attention of students who were given instruction in the use of BAVX and who practiced regularly for six weeks. Nine of the eleven participant subjects showed increases in sustained attention of more than fifteen minutes. The duration of sustained rhythmic movements measured in minutes during Bal-A-Vis-X appeared to predict global improvement in schoolwork. Subjects showed increased theta brain waves, indicating better focused concentration. While this study has a small sample size and was not double-blind, it shows that BAVX is a promising, nonpharmacological intervention for children with attention challenges.

The Alert Program

This program, also referred to as "How Does Your Engine Run?" focuses on helping children gain insight into their self-regulation challenges and assisting them in discovering what types of inputs are most helpful to them in getting their level of activation or arousal to match the demands of any given situation. The first step in the process is to establish a common vocabulary so everyone understands a shorthand for describing states of regulation. For

example, the vocabulary might be, "My engine is too low," "My engine is too high," or "My engine is just right." This would give students, teachers, and parents a quick way to check in and assess how things are going at any given point in time. Some children prefer to use numbers, such as I am at a 2 out of 10, I am at a 5 out of 10, or I am at a 10 out of 10. The idea is to establish vocabulary that everyone can use to create common understanding of too little, too much, and just right descriptions of the state of arousal of the child at any given moment.

The next step is to increase the child's understanding that everyone gets overwhelmed, feels revved up or has times when their internal state of arousal is not matching the demands of the environment. The first step in this process is for the adults in the child's life to describe their own levels. Next the adults would begin describing how they used strategies to change their level. For example, after arriving home from a trip to the mall, one might explain to the child, "I am exhausted from my trip to the mall. My engine is running really low right now. I'm going to sit down on the couch with a glass of water and take a few minutes by myself before I get up to make dinner." Try to share in real time what you are doing and why, so the child can see and understand. The next step would be to notice and name the child's arousal levels and ask him if he agrees with your assessment. You can then begin asking him to name his own level at various times of the day.

Next would be engaging the child in a series of experiences designed to help him engage in each of the various ways to change levels. The Alert program lists five ways to change one's engine speed. They are:

- Movement: this could be engaging in playground play, obstacle course play, using a mini-trampoline, rolling across the floor, or playing follow the leader, to name a few.

- Look: this would be any activity with a visual basis such as looking at a fish tank, watching a sand timer, turning off the lights and playing with a flashlight, or using a find-it toy.

- Listen: this might be using an MP3 player, playing a drum or a harmonica, or singing a song.

- Touch: this might be using a textured fidget, using a sand/water/rice box, or holding a stuffed animal or pillow.

- Put something in your mouth: this might be chewing gum, having a crunchy snack, using a straw to eat applesauce, or blowing on a whistle or harmonica.

- Smells: I have added this category as I have found use of smell bottles and scented Play-doh to be very helpful for some children as they try to calm themselves and become more focused.

Finally, the task would be to help the child become aware of which activities are most helpful for him at any given time of challenge. It may take a different type of input to help the child regulate herself for school each morning than it would take to help calm down after she has a fight with her sister. This is done through ongoing use of the established vocabulary, continued descriptions of your own speeds and levels, as well as asking the child about hers. In addition, you would begin asking her to rate her level before and then again after engaging in various activities to try to help her notice which activities are most useful for changing her level. It can be helpful to make a visual aid, such as a gauge, chart, or meter that the child can use to choose or show her level.

This is a great program that can be extremely helpful in building insight and helping children develop concrete strategies for better self-regulation. Many OTs have been trained in use of this method and the training course is offered fairly often in various parts of the country.

REI-Rhythmic Entrainment Intervention

This program marries "ancient wisdom and modern science." From 1982 to 1994, REI developer Jeff Strong explored traditional therapeutic drumming techniques in Africa, North America, South America, and Europe. He then used scientific research methods to examine the effects of these traditional approaches on brainwave

patterns and behavior. From this research, he discovered ways to use specific rhythms to address many of the symptoms associated with neurodevelopmental disabilities such as autism, ADHD, and learning disabilities by changing brain wave patterns. The Strong Institute website has great information and materials for sale. They will also give you a free download for signing up for the mailing list.

The program uses musical tracks designed to be played as ambient sound so there is no requirement to purchase expensive headphones or special equipment. The program offers audio cds and downloads designed to address general issues such as increasing focus or improving sleep. They also have a series specifically for sensory processing issues as well as a totally customized program. Cds are played at almost sub-audible volume, making them ideal for a classroom setting.

Yoga, Martial Arts, Dance, Music

Adele Diamond is a developmental cognitive neuroscience researcher from the University of British Columbia. She has completed numerous scientific studies of various approaches to promoting the development of executive function in children. She defines her field as "an interdisciplinary field devoted to understanding how children's minds change as they grow up, interrelations between that and how the brain is changing, and environmental and biological influences on that."

In a 2014 Ted Talk, Diamond discussed her ideas and described some of the programs and approaches that she feels are most promising. Among them were yoga, martial arts, dance, and music.

Diamond states that children need to develop strength, flexibility, balance, motor skills, executive function, and more in order to be the best learners that they can be. Her research bears out the fact that the study of yoga, martial arts, storytelling, dance, art, and music, as well as having adequate time for play, are all ways to support the development of these skills.

In a 2011 article in the journal *Science,* Diamond and coauthor Kathleen Lee directly address the merits of Montessori education for development of EFs:

> Montessori (36) curriculum does not mention EFs, but what Montessorians mean by "normalization" includes having good EFs. Normalization is a shift from disorder, impulsivity, and inattention to self-discipline, independence, orderliness, and peacefulness (37). Montessori classrooms have only one of any material, so children learn to wait until another child is finished. Several Montessori activities are essentially walking meditation (Fig. 3).
>
> … the teacher carefully observes each child (when a child is ready for a new challenge, the teacher presents one), and wholegroup activities are infrequent; learning is hands on, often with ≥ 2 children working together… Cross-age tutoring occurs in Montessori mixed 3-year age groups. Such child-to-child teaching has been found repeatedly to produce better (often dramatically better) outcomes than teacher-led instruction. (Diamond & Lee 38–40)

Planning Strategies by Sensory System: Incorporating Sensory Inputs into a Montessori Classroom

Exploring ways to incorporate sensory-rich activities into your classroom will support your ability to collaborate effectively with an OT. This might involve integrating something into curriculum materials that already exist, or you may need to add new materials. Incorporating sensory activities will provide a setting in which you can observe any children you are thinking of referring for further evaluation. Watching these children as they engage in sensory-based activity will help you determine whether or not a particular child should be referred on for evaluation by a medical specialist. I have included below a list of ideas and suggestions for activities that are grouped according to the type of sensory input they provide. These are activities that you can make available to your whole class as a means of supporting calm, organized behavior overall. These are by no means exhaustive lists, and I encourage you to use your own ideas and try activities that fit with the culture of your own classroom.

Muscle Work: Proprioceptive

- Positioning: consider allowing students to use alternative positions for work. Here is an extreme example that offers this child lots of muscle work through the upper extremities and trunk.

- Wall push-ups/chair push-ups: This is a great way to show children where they can do some wall push-ups, either on the side of a bookshelf or on a wall.

Photo used by permission of The Kavanaugh Report

Photo: Mountain Laurel Montessori in Front Royal, VA

- Moving chairs or furniture
- Carrying heavy things/water activities
- Weighted ball and line
- Weighted lap pad or animal
- Fanny pack or backpack
- Play-doh or modeling clay

Movement: Vestibular

- Line activities: Slow walk, rolling ball on line, rolling pin on line

Photo: Meadows Montessori School

Photo: Frederick Country Day Montessori and Arts School

- Extend or minimize distances between work storage and where work is completed to incorporate more or less movement during an activity. For example, for the youngest members of a primary classroom, provide floor work space adjacent to shelves where work is stored to minimize the distance between their work rug and the shelf where they go to retrieve the work. For an older child who is very active, encourage placement of the work rug far from the shelf to encourage multiple trips at a longer distance to provide large motor movement incorporated into the work cycle.

- Movement breaks as a group: after giving lessons on movement concepts such as practicing various locomotor patterns, having children experiment with moving fast and slow or staying completely still ("freezing"), etc., encourage children to practice these movement patterns at times when the class is becoming unfocused

- Movement activities: movement cards and yoga cards as a shelf activity

- Jump spot: create a small area in the room with a padded spot on which the children can jump

Touch: Tactile

- Rice box, sand table, water table

- Soft and or rough fabric glued to underside of tabletop

- Touch and feel works, with and without vision occluded

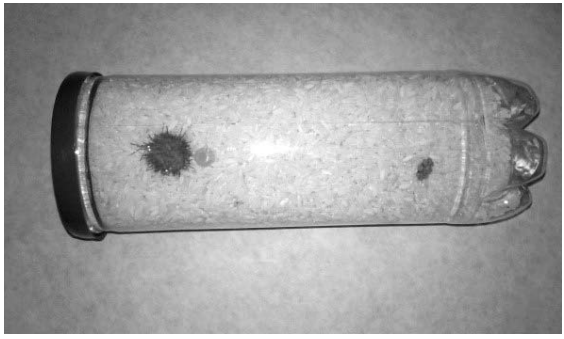
- Play-doh or modeling clay, can mix in sand

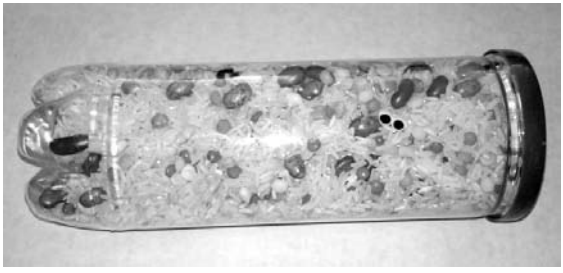
- Art experiences

- Pressure clothing/compression vest

Vision

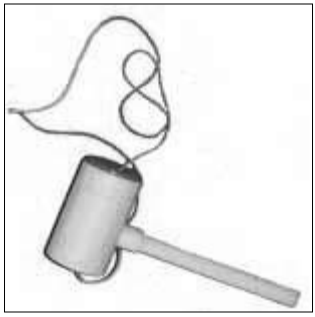
- Find-it Bottle: Below are two find-it bottles made from a tennis ball jar with the lid super-glued on. The top picture shows a homogeneous field which makes it easier to find the contrasting colored objects hidden within. The second bottle has a more complex field with rice and beans, making it a more complex visual-perceptual challenge to find the hidden objects.





- Fish tank
- Books
- Bubble timer

- Tether ball: if possible, find a place to hang a tether ball from above, rather than mounting it on a pole



- Blow toy with string combines oral with visual input as child blows into pipe and string moves and draws visual attention

- Reduced lighting/enhanced lighting

- Quiet cave/reading nook

- Flashlight games: use flashlights to draw a child's attention to visual input

- Play follow-the-leader to find objects of a specific color or with a certain starting letter

- Draw shapes and letters with the beam of the flashlights, move the flashlight fast/slow/medium move the light up high/down/low or to front/back/corner of the room

- Ball play

Sounds: Auditory

- Play music CD or REI CD as ambient sound

- Musical instruments

- Singing

- Headphones for individual use, music at a tempo of sixty beats per minute is most calming

- Sound canceling headphones

- Auditory games from the Montessori curriculum such as Hide a small music box while children close their eyes, start the

music, and have children find it, Montessori bells, Montessori music curriculum

Smell: Olfactory

- Scented Play-doh
- Smell bottles: create a work that requires the children to identify common smells (this is part of the Montessori primary curriculum and can be adapted for elementary classes)
- Cooking activities
- Herb and flower gardens

Taste: Gustatory

- Cooking activities
- Snack
- Special cultural events
- Food tasting activity from the Montessori curriculum

Oral

- Blowing bubbles
- Chewy, crunchy foods, chewing gum older children
- Thick liquids: applesauce or yogurt through a straw
- Cold—popsicles, milkshakes
- Spicy, salty foods
- Whistles, kazoo, harmonica
- Commercially available chewies, these come in many styles, a few are shown at the right

Multisensory

- Picture schedules/visual schedule (shown in earlier section on ADHD and SPD)

- Sing a song telling directions, giving cues, and use movements to reinforce

- Use more than one sensory channel at a time: show, tell, provide physical examples to touch

- Consider use of manipulatives with an older child

Creating a Sensory Rich Prepared Envrionment and a Therapeutic Educational Environment

The Sensory Rich Prepared Environment

Engaging children in activities that provide them with enhanced sensory experiences through carefully chosen activities, as described in this paper, will support children's optimal functioning. This is simply an extension of Montessori's ideas about the necessity of allowing children to move as they learn and to use their hands as essential tools of exploration. She understood the essential role of sensory and motor enrichment in the classroom for all children and she incorporated many sensory and motor exploration opportunities throughout her curriculum for children of all ages.

The Therapeutic Educational Environment

When a member of the classroom community needs individualized help due to extreme attention difficulties, a team approach that stresses collaborating with medical specialists will transform your classroom into a therapeutic educational setting for the child who needs it. You will be able to provide a truly individualized program that addresses therapeutic challenges and provides appropriate supports for the child throughout the day. This approach holds the promise of providing so much more to students with special needs than a traditional approach in which students are pulled out or actually leave the school to get their therapy. With such an approach, there often is little or no communication between the school and the therapists, and it is often difficult to integrate opportunities for

skill practice into daily life at school. In addition, in many traditional settings, teachers are tasked with addressing student goals without being provided with the support they need from therapists to do that effectively. In the Montessori setting, this collaboration and consultation are easier because of the Montessori method and its intrinsic qualities that provide such a great starting place for meeting the needs of all children.

Conclusion

Addressing the needs of children with attention challenges in the Montessori classroom is a multifaceted endeavor. It is extremely helpful for the Montessori teacher to understand the complex array of issues that can cause a child to be inattentive as well as to be familiar with other conditions that can co-occur with attention difficulties. The partnership of Montessori teachers and OTs is well suited to collaborate to meet the diverse needs of these students in the classroom. The teacher can enhance opportunities for sensory and motor experiences to create a sensory-enhanced prepared environment that can provide many opportunities for all children to engage in sensory and motor activities to support improved focus and attention in the classroom. For students whose challenges are more significant, a referral to medical specialists may be indicated. Having a resource team at your school is an ideal way to address the needs of this type of child. The resource team is a multidisciplinary team of medical specialists who ideally have been trained to understand the many ways that the Montessori curriculum supports development of executive function and promotes good attention for children. Cultivating that understanding will help the members of the Resource Team to collaborate effectively with teachers and parents and support the success of the child in the Montessori classroom.

Website Resources

www.abilitations.com–Therapy balls, lap pads, core disc cushion, ball chairs.

www.alertprogram.com/articles.php–Article about the Alert program with clear description and outline of the program.

www.asensorylife.com–A great resource for teachers and parents with information about sensory processing and sensory-based strategies, lots of pictures of sensory caves and quiet corners.

www.bal-a-vis-x.com–Learn more about Bal-A-Vis-X, its history, founder, latest research, and where to buy materials.

www.devcogneuro.com–Adele Diamond's site.

www.funandfunction.com–Therapy supplies and equipment including lap pads, vests, seat cushions, scissors, specialty papers, and pencil grips.

www.orientaltrading.com–Toys and supplies including fidget toys, scooter board, whistles, and oral toys.

www.southpawenterprises.com–Sensory integration equipment, toys, games, books, balls, etc.

www.spdfoundation.net–Information about sensory processing disorder, including the latest research about SPD.

www.stronginstitute.com–Rythmic entrainment intervention information.

www.therapyshoppe.com–Great toys and supplies including fidgets, sensory toys, whistles/oral toys.

www.therapro.com–Wide array of therapy items.

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