



"Follow the Child"



# camt Talk



Canadian Association of Montessori Teachers

Canadian Association of Montessori Teachers

Fall 2010

## UPCOMING EVENTS

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Friday November 5  
2010

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## Message from the President



Another school year is soon upon us. I hope everyone is having a relaxing and refreshing summer vacation. The beginning of the school year is an exciting yet somewhat apprehensive time. What will this year

bring? What will the new students be like? How will the class function this year? It is a time to reflect on the previous year and plan for the new year.

Registration is open for the 2010 Annual Conference, which is scheduled for Friday November 5th—mark your calendar and spread the word! The conference theme, *Montessori Going Global*, features inspiring presenters and content rich workshops. More information about this event is available on the CAMT website as well as in the registration form enclosed in the envelope with this newsletter. Register early to avoid disappointment and to receive your first choice of workshops as we did sell out last year. Confirmation e-mails will be sent one week before the conference—we ask that you be patient

and watch your inbox for the confirmation of your registration. We hope you are able to attend and enjoy a day of being re-energized and inspired together with your colleagues and old friends.

Remember to renew your membership and benefit from reduced attendance fees for conferences and workshops as well receiving our newsletters.

We encourage you to visit our website frequently for innovative features and a new image for CAMT! We always welcome volunteers to contribute their efforts to our Board and our workshops as well as to write down their experiences in the Montessori setting and share it through the platform of our newsletter whose readership audience is ever increasing!

Have a great start to the 2010-11 school year!

*Kristin Collver*  
President

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## ABOUT CAMT

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## Following Montessori to Iran by Wendy Agnew



*Who will come with the  
Bones of a month left  
to chew on?  
Who will drop the  
even light of now  
To see a glimpse of  
then?  
Who will step from  
Maple trees to saffron?  
Veils wafting passion  
of predicaments too  
complex for thought,  
Elemental enough for  
dance.*

*w.a. June 2010*

*Excerpts - by Wendy Agnew*

I was sitting in a class at the University of Toronto, listening to one of my favorite lecturers. One of the things I liked best about this wonderful literacy prof. was that he embraced all thoughts with kid gloves of humour and wit. I threw many Montessori comments into the mix and was surprised when, during the break of the second last class, a lovely woman introduced herself and asked if her mother could visit the school where I taught. She was from Iran.

Several weeks later Mrs. M arrived at our school carrying a gift of lilies. She explored the classes and when she was about to depart I offered any help I could give. A few weeks later I was invited to go to Iran to mentor twelve women in Montessori Primary education.

That was the beginning -

### **Tehran, 2004**

Dear Mom and Dad,  
Have arrived in Iran. My hosts are wonderful and the food a sensorial cornucopia. There are rose petals in the yogurt and saffron in the air. My twelve enthusiastic women speak Farsi, but six are bilingual so we are pairing up. The materials have arrived from Holland and are all unpacked and set up in a classroom in the upper part of the school. I have asked my students to prepare original practical life activities and am astounded that over e-mail they got it! The exercises are beautiful!

One of the students created a little tray with a small umbrella and a spray bottle with a colour-coded sponge. One child sprays "rain" on the umbrella. Then, they wipe it down and dry it and put it away. Rain is like gold here...

We have been working steadily on Montessori theory. In pairs, the student teachers have translated each chapter of the Absorbent Mind. They presented their collaborations today. Montessori came alive with dramatic presentations on language, child development, and the importance of movement. One of the students brought her daughter to play the violin as a metaphor for synthesis. The women are deeply touched by Montessori's insights. They seem philosophically attuned to the nuances of her words...

We are in the midst of a whirlwind. Again a metaphor! There are 100 children starting in September ... ahhhhhh. We need to knock out walls and have tables and shelves made. We meet with a team who are excited to be creating, not a school, but a Children's House! They are suggesting carpets and colour and are making curtains that look like clouds. In the days I do presentation and we practice. In the evenings we work setting up the school. We've gone on a trip to Kerman, and at the bazaar (which is naturally air conditioned through ancient technology), we find beautiful copper and silver trays for our practical life and cultural areas...

### The Moveable Alphabet in Farsi **March, 2005**

The school is finding its legs. It's lovely to see the children embrace the environment and vice versa. We spend our time in questions and answers and arithmetic workshops. We create a peace corner and move some shelves to create more flow.

Most of our teachers have finished their albums. They are creating them from their notes in the old tradition. I am grateful for the presence of Audrey Sillick on my shoulder. She whispers to me in the soft voice of past. And because we are beginning it's possible ...

*Continued on Page 3*

## Following Montessori to Iran (Continued from Page 2)

### August 2008

We are focusing on local culture and nature in our original cultural activities. F is presenting yogurt making as her grandmother did! There are parachutes, and story telling, and recycling exercises designed on Montessori principles. We explore deep ecology and the voices of the earth and an explosion of poetry ensues. We do a silent meditation to nature in the garden up the street and are joined spontaneously by strangers. The teachers have recreated the sandpaper letters in velvet. Our experience deepens...

\*\*\*

Six years and three trips later we have a thriving Montessori school. The participants of the first course have each completed five original albums including thematic introductions, theory albums, observation journals, language portfolios and they have evolved a dynamic system of record keeping.

In late May of this year, I receive an e-mail. "Will you come and train 300 women? The Ministry of Education is interested in converting some of the districts in Tehran to Montessori." And so begins another adventure to be continued in the next issue of The CAMT Newsletter.

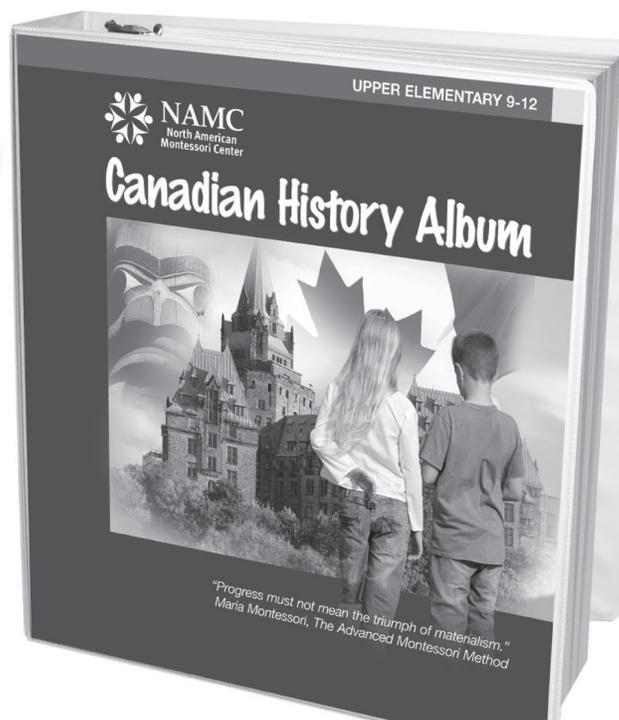


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**...the 'upper limbs become instruments of his intelligence rather than means of locomotion...**



**The precision, multitasking and strong skills of medical judgement dominate how surgery has evolved through the refinement of the hand.**

## The Hand: The Mind At Work by Shaza Tehseen

The subject of this article; the hand, has been a long time admirable utility to me, and I was delighted to discover during my research that there are numerous others who, along with Dr. Montessori, believe in its ingenious functionality and near to celestial purposes.

*Under the guidance of his intellect (his hands) transform this environment and thus enable him to fulfill his mission in the world.<sup>1</sup>*

The study of the hand involves three different perspectives<sup>2</sup>;

- evolutionary
- physiological and
- neurobehavioral

Therefore following Dr. Montessori's importance given to movement and noesis, I will elaborate the interaction of the hand and the brain (neurobehavioral) and the process of the development of thought, action and creativity.

*The hand gives the upper limb its importance and originality.<sup>3</sup>*

Dr. Maria Montessori states that the 'upper limbs become instruments of his intelligence rather than means of locomotion<sup>4</sup> which means that sensorial experiences have a dominant effect on a child's development and the hand and its extension from the arm shapes the thought, language, action and creative areas of the brain.

*Scientists call this "kinesthetic memory" or "neuro-muscular facilitation" and they speak of "sensory-motor" learning, since you are combining sensing input, i.e. what you see with your eyes, with motor output, i.e. what you do with your body.<sup>5</sup>*

Charles Bell, an anatomist of the 1800's, asserts in the *Bridgewater Treatise*:

*the motions of the eye are made perfect, like those of the hand..... the impression on the nerve of sense is accompanied with an effort of the will, to accommodate the muscular action to it.*

He called this the 'muscle sense'<sup>6</sup> which is akin to the 'muscular memory' and the stereognostic sense in the Montessori Method. This sense will help the child to

'recall the impressions' so that his 'ego builds up its intelligence'.<sup>7</sup>

Dr. Montessori has devoted a lot of her work to the importance of movement as an 'essential factor in intellectual growth'. She believes that we should study the 'intelligent movements'<sup>8</sup> which is also being proved through current scientific research:

*Scientists have discovered that there are a large number of internal brain structures which work together with the input and output brain structures to form fleeting images in the mind. Using these images, we learn to interpret input signals, process them, and formulate output responses in a deliberate, conscious, way....*

Dr. Montessori's speaks volumes for the 'development of consciousness' which is through the external manifestation of 'speech and human gestures'.

An appropriate example can be of how the hand transmits information through the revolutionary written communication system for the blind, which is the Braille system.

Then we have the sign language, which according to Ursulla Bellugi, a psycho linguist in San Diego is 'not a code on English'<sup>9</sup> but an 'entirely different way of doing language'. She was explaining this to Harlan Lane, a protégé of B.F Skinner, who was working on speech perception and production. He concluded his observations by realizing that 'language was not about speaking and hearing'<sup>10</sup> and that the 'brain had the capacity for language'. The most relevant statement to this article from Lane is:

*If you can't put it out through the mouth, you put it out through the hands.<sup>11</sup>*

Early observers of language development like Piaget, stern and J.B Watson, describe this eruption of 'mobility, gesture, and verbalism' as the 'genesis of human consciousness'. Thus the hand-thought-language nexus is a pivot for the birth of intelligence.

## The Hand: The Mind At Work (Continued from Page 4)

Dr. Montessori says that 'the eyes and the hand act together upon the treasure (language)'<sup>14</sup> therefore the writing language becomes a 'characteristic of civilised man'<sup>15</sup>. As we read we see that the child's intelligence coexists with his/her sensory movement, and that as cognition is refined so are the motor skills. And ahead in this article we will discuss numerous skills performed by the hand, but directed by the thought.

*The importance of the hand is the real link between the workman, the artist and the intellectual.*<sup>16</sup>

Finally we will discuss the creative element arising from the hand and mind osmosis. I denote it with this bio-chemical analogy because in my opinion this is exactly what both these entities are trying to achieve; an equal level of concentration through continuous exchange of sensory information.

The great cave paintings give the current audience convincing evidence of how language has evolved from symbolic to verbal expression; the anthropological wonders of the world display the thoughts of their architects who sculpted them in concrete form. The mission of the human appears to be fulfilled by looking at these structures that are trying to express that spirit.

It is amazing to watch little hands play musical instruments and watch the human hands create harmony from them. For a pianist, the "development of what is called touch"<sup>17</sup> is the most important aspect of his career. On the other hand, for a rock climber, the skill is grip, which is accompanied by 'slow movement' and 'high force of strength'.<sup>18</sup>



One of my favourite studies in art history is the Sistine Chapel in the Vatican City. The magnificence of around 12,000 square

feet of frescos patiently painted over four years is pronounced accurately by the Renaissance artist and sculptor himself that:

*The greatest artist has no conception, which a single block of white marble does not potentially contain within its mass, but only a hand obedient to the mind can penetrate to this image.*

The precision, multitasking and strong skills of medical judgement dominate how surgery has evolved through the refinement of the hand.

It is fascinating to see the hand and eye coordination taking place on a potter's wheel and how a slight turn of the fingers and a measured pressure of the palm, can create a historical artefact.

The world acclaimed precision of diamond cutting which originated in the 13th Century in India, was carried to Europe by men whose hands passed this knowledge forward to their family craftsman and inheritors.

I will conclude my article by contemplating on the need for reduction of virtual experiences being impressed on the child of today through television and cyber space. As early childhood guides we can make an effort to re-energize the turning of pages of the books instead of the click of the mouse, the dance of the hands during art and gardening instead of the filling of spaces on photocopied images and fantasising with fake toys.

Dr. Montessori's has emphasised many a times in her writings, on purposeful manual activities in the classroom, which allow the care and attention of 'an intelligent mind to guide it'.

*No one can tell what any one person will do with his hands.....if early humans had used only speech to communicate their thoughts ... no traces would remain of past generations. It is thanks to the hand, the companion of the mind, that civilization has been preserved.*<sup>19</sup>

All eras have witnessed distinct features in the ever-evolving educational field but we should try our level best to infuse a hint of sensory explosions in our classrooms.

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## On the Journey of Learning by Britta Mackel



**...childhood constitutes the most important element in an adult's life, for it is in these early years that a personality comes alive.**

A child is born; it is so precious, admired and loved by everyone that it finds itself already on the road of learning. At this early stage, the child is gathering and processing ideas through touching, manipulating, moving and experiencing the environment. Intrinsically, the child already understands

the importance of movement in the learning process. The role of a parent as a guide is one of the ultimate pleasures in life and they will now be able to share new experiences with their child.

It is the first day of school and different challenges are being presented that call for different skills. Now, the child is immersed in learning all about self-help, and he or she thoroughly enjoys its newfound independence. The fact that Dr. Montessori created self-correcting materials means that the children teach themselves, they learn from their mistakes, and even when the task is difficult, they persevere until mastery is achieved and the teacher is not hovering over them.

*'If a child is to be educated at this age, this must be done by the environment and not through oral instruction.'*

*Ch: 25, The Triumphal Chariot, The Discovery of the Child, Dr. Maria Montessori, Clio Press, England, 1988.*

Dr. Montessori realized to give up control in the classroom, since this method was holding the children back. She always felt that it was much easier to stand in front of the classroom and talk instead of giving the children a child-centered education. She said that the convenience of the adults has to be placed exactly where it belongs – last.

We have to understand that the child is inherently good and desires to develop his natural potential to its fullest, but he/she is continually frustrated by the obstacles placed in his/her path by a world made for adults. As Dr. Montessori correctly said that childhood constitutes the most important element in an adult's life, for it is in these early years that a personality comes alive. Whatever affect a child, affects

also humanity, for it is in the delicate and secret recesses of the soul that a person's education is accomplished. Therefore, now we understand that the developmental planes – infancy, childhood, adolescence and maturity are distinct from one another, but connected.

*'This is why the first educational influence upon a child should have as its object the guidance of the child along the way of independence.'*

*Ch: 3, The Teaching Methods Employed in Children's Houses, The Discovery of the Child, Dr. Maria Montessori, Clio Press, England, 1988.*

Dr. Montessori believed that character education was of quality if not a greater consequence than learning to read and write. She wrote numerous books on this subject, since she felt very committed to the development of the whole child which is, nourishing human qualities that are good for the individual person and result in good for the whole society.

Montessori students certainly have a vision of a better world and the commitment to converting this vision into reality. When past students come to meet us teachers and are thankful for the knowledge they were given, we as guides begin to rediscover the joy of teaching. Kudos also to the heads of schools and Montessori guides, who facilitate the Montessori education through their efforts.

As a Montessori teacher I enjoy observing the growth and development of the children, their perseverance, concentration and curiosity and I am still amazed by the beauty of the materials and how they encourage a child to develop his/her own self-esteem. The teacher is hence now on her own personal journey of learning. We wish all the graduates, who were given the recognition of these natural abilities, great success in their future studies. We realize that a student's life will be a journey of learning and that knowledge is an essential part of their life. Our lessons as Montessorians come from the journey, not the destination.

## Every Child Every Opportunity: A Foundation for the Early Learning Program *by Dr. Stuart Shanker*

This mission statement doesn't just live up to the promise contained in its subtitle: it provides the foundation for a profound educational revolution in Ontario. These are strong words, so it is vital that we understand why they are warranted.

Ontario enjoys one of the finest public education systems anywhere in the world. And yet, despite the strenuous efforts made by generation after generation of teachers, parents, and, of course, students, it has proven to be extremely difficult to change a child's educational trajectory from her moment of school-entry. That is, based on children's language, literacy and numeracy competencies from the moment that they enter school we can make fairly strong predictions about their eventual educational attainment, and it turns out to be very difficult to alter these outcomes.

Understandably, there is a large contingent that wonders whether the obduracy of this problem is due to the fact that we are starting formal education too late, and that the key to 'closing the achievement gap' is to expose children to academic subjects at younger and younger ages. But developmental neuroscience is telling us a very different story. Over the past decade, scientists have begun to acquire a much better understanding of why it has been so difficult to change educational trajectories, and it turns out that the explanation for this phenomenon has little to do with IQ; rather, the reason lies primarily in the child's ability to self-regulate: to monitor and modify emotions, focus or shift attention, control impulses, tolerate frustration, delay gratification, co-regulate in social interactions (see Blair & Diamond 2008).

Study after study is now telling us that a poor ability to self-regulate impedes a child's ability to attend to her lessons or develop those positive emotional attributes that promote learning, thereby undermining the teacher-student relationship (Blair 2002). Not surprisingly, teachers – and peers! – respond much more positively to children who are able to control their emotions, which has a profound impact on the continuing

development of their self-regulation skills, while those who have difficulty receive much less attention and encouragement.

Thus the obduracy of educational trajectories may be due in no small part to something as basic as the trouble a child has in coping with stress, which can be exacerbated by the very act of coming to school. By grade 1 it is already difficult to help children master self-regulation skills, possibly because the neural systems that support these competencies are already starting to become entrenched (see McCain, Mustard & Shanker 2008). Furthermore, developmental neuroscience is telling us that we have a special window to enhance the development of self-regulation between the ages of 3 and 5 when the part of the brain that supports executive functions is undergoing a critical growth-spurt, (Posner & Rothbart 2006).

Recognizing the importance of these scientific advances, the Pascal Report laid out in careful detail how a universal preschool programme, taught by teachers trained in early childhood development and schooled in the importance of learning-based play, will improve school readiness, precisely because it will enhance the self-regulatory skills that children need in order to flourish in school. To be sure, a child's engagement with her parents lays the foundation for this development; but interactions with teachers and between peers in a preschool setting are vital for its further development.

Thus, growing the public education system down to welcome younger children does not mean subjecting those not yet ready to the rigors of a classroom environment. The Pascal Report made clear that the goal here is not to replicate the sort of teacher-directed program that characterizes grade school; it is to create an environment of child-directed activity that mobilizes the child's interest and imagination.

This is precisely the reason why play is so important (see Hirsh-Pasek et al. 2009). But as Every Child Every Opportunity makes clear, this form of learning-based play is something that the framers of this

*...based on children's language, literacy and numeracy competencies from the moment that they enter school we can make fairly strong predictions about their eventual educational attainment..*

*...the more a child is driven by interest and curiosity the more carefully she attends to her teachers.*

## Every Child Every Opportunity *(Continued from Page 7)*

curriculum have thought about very seriously. That is, what is outlined in these pages is a structured approach to preschool learning that is designed to mobilize and enhance children's interest and curiosity. The thinking here is as old as the cognitive revolution, and indeed, was one of the driving inspirations for that revolution: namely, that the more a child is driven by interest and curiosity the more carefully she attends to her teachers (Bruner 1966). But a child cannot be trained to be interested and curious. Rather, this foundation for learning throughout the lifespan must be carefully nurtured in the early years (Shonkoff & Phillips 2000).

All of the activities and guidelines contained in this curriculum are grounded in this principle. But it isn't just the children and their parents who will benefit from this approach; importantly, so too will their teachers. For recent scientific findings also suggest that, by enhancing children's ability to self-regulate, those engaged in tutoring these young minds will find their work immensely more rewarding and fulfilling (see Mostrangelo 2009). And this may be the ultimate reason why Every Child Every Opportunity is ushering in a profound educational revolution in Ontario.

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*"We know nothing of childhood,  
and with our mistaken notions  
the further we advance  
the further we go astray.  
The wisest writers  
devote themselves to what a man  
ought to know without asking  
what a child is capable of learning.  
They are always looking for the man  
in the child without considering  
what he is before he becomes a man."*

On Education  
by Jean -Jacques Rousseau

*Marty's  
Mentoring*

*call today for a  
better tomorrow*

**Marty Collins, AMI**

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## Creating a Curriculum That Fosters Scientific Thought by Tilan Langley

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The basis for the Montessori Method of education is so scientific that you would assume every such classroom is filled with science experiments and lessons, producing a string of little scientists prepared to fix our ailing environment. However, despite the progress in technology since the time of Maria Montessori, our science curriculum has been pushed aside slowly as our focus has shifted to literacy and mathematics. The Early Childhood classroom has grown complacent with miniature life cycle lessons and attractive puzzles; the time has come to return science to a critical position in the classroom with a comprehensive and well-planned curriculum.

### Fostering Scientific Awareness in the Classroom

Many great challenges can be overcome through a simple mind-set change. The idea that science is a discrete field limits its appreciation and scope. Observing a child explore and discover the growth of a lima bean as it sprouts and matures is proof enough that science is an unavoidable experience that defines our environment. The commentary of the child as he discusses his discoveries with a friend shows us that children are capable of amazing observations. The questions that follow, some of which occasionally stump the teacher, indicate that children are capable of identifying unknown elements and are willing to search for answers.

These critical signs are indications that children are not only capable of performing most tasks described in the scientific method, but also have the ability to comprehend the result of this process. Their reactions to this new information varies; some will remain quiet and thoughtful, while others rise immediately and find someone with whom to share this knowledge. The end result is a child who now understands one more element in a confusing and complex universe.

A teacher can create learning opportunities using the typical science experiments covering a variety of subjects. Three-part cards in botany, zoology, and planetary science are simple building blocks, and miniature experiments of matter and energy are attractive and easy lessons for

children. The truth is that science does not have to be restricted to these basic exercises; in fact, the lessons on the shelf are extensions of the ordinary environment, removed from their proper context. The most effective lessons are always shown in context, particularly during the initial presentation, with observable results that children can connect with immediately.



*Maria Montessori taught us that children need to understand their complex environment, and in doing so, will gain self-confidence and a calmness based on this understanding.*

Just as a teacher reads a book to a group, presenting background information and employing thought provoking questions as he reads, the teacher should incorporate science in the classroom. Every day there should be at least one opportunity for a child to experience scientific fact or discovery within her environment. As teachers, it is our privilege to provide these opportunities and have answers prepared for the many questions that follow. Understanding these opportunities will satisfy more than just curiosity; it will feed an undeniable need to analyze new concepts and gain knowledge, and will help foster awareness of scientific thought processes in the classroom. Maria Montessori taught us that children need to understand their complex environment, and in doing so, will gain self-confidence and a calmness based on this understanding.

### Scientific Thought

The discussion of how we analyze and test new ideas can get unnecessarily complex. However, the simplest illustration of the scientific method involves five steps, and this widely accepted process provides a basis for all explorations into complex systems and ideas. At first glance, the words used in each step may seem intimidating, but in truth there are similarities to common steps performed by many teachers as they sit down to present a new lesson with a group or an individual. The next section compares a common approach to developing phonemic awareness to the process involved in scientific thinking.

*Continued on Page 10*

## Creating A Curriculum That Fosters Scientific Thought *(Continued from Page 9)*



*A lesson does not have to be completed all at once, as it may begin with the process of observation lasting several days*

### Reading Comprehension Scientific Method

This comparison illustrates a simple concept: the scientific method is an analytical process that can be applied in different settings. Once the steps are understood, this method of analysis should be a daily exercise in a classroom. The real lesson in using this technique is the actual process of deduction, not simply the application of a known outcome using a predetermined set of rules. Since most lessons in the science area of a classroom do not provide for exploration beyond initial purposes, they fail this criteria and fall short of giving the child tools for future experiments.

For example, the beloved "baking soda and vinegar lesson" has only one outcome, having been illustrated already by the teacher during the initial presentation. The child applies drops of vinegar to a small heap of baking soda and watches as bubbles filled with carbon dioxide form. There is no further practical exploration in this lesson as presented, yet it might remain on the shelf for a month. Even if the child uses too much vinegar there will still be a reaction followed by the formation and intended release of gas. To teach the scientific method, this lesson could be expanded to contain vessels for other liquids. The child receives directions to decide what liquids he might use to perform his experiment. The initial presentation should involve a teacher asking the student which liquids he would like to try. The tray should contain a cue card with the five major steps of the scientific method, and a sheet to record answers.

A lesson does not have to be completed all at once, as it may begin with the process of observation lasting several days. If beans can sprout on a moist paper towel by the window, what other seeds can? This is an experiment that may take a week to complete but can provide a wide range of hypotheses, predictions, and results. Experiments should be recorded in some way by the students, through drawings, or in journals for those who are writing.

### Making Science an Everyday Activity

There are numerous books on science activities available for teachers, some more comprehensive than others. In The

Everything Kids' Science Experiments Book by Tom Robinson (Adams Media, 2001), the author presents simple and traditional lessons in science. Another book, Science in Seconds for Kids by Jean Potter (John Wiley & Sons, Inc. 1995), is also comprehensive and concise, with one page experiments that are simple to put together. Despite the apparent simplicity, curriculum teachers create can be restricted by the materials available, and many great lessons are avoided because the materials are not on hand. This problem can be resolved if a teacher realizes that not all activities must look exactly like the picture in the book.

Lack of materials can become an exercise in ingenuity and scientific thought by using some creativity and a little help from the children. Allowing the children to be part of the lesson-making process can result in much richer experiences. For example, during exploration into the solar system, the lack of a model of the planets can be an opportunity for the children to create one. As the children discuss how to make "planets/" they address concepts of relative size and the properties of materials until they can figure out a way to create the representative spheres. Showing a child how craters are made using a ball dropped into flour can be easily extended by removing the flour the next day and asking the children to come up with alternatives for the flour. Children have great ideas and allowing them to be part of the solution will teach them the art of problem solving, a much more valuable lesson than the art of gluing and taping the perfectly cut rings a teacher has prepared. Instead of assembling a shuttle, they are inventing one.

Perhaps even more important than involving children in creating lessons, teachers need to make the effort to find a curriculum exciting and interesting to children. Every teacher has some interest in science, whether it involves gardening (botany), jewelry (gemstones, metals), pets (zoology), or some other hobby. The process is the same regardless of the subject, and all that matters is the extent to which a teacher is prepared to discuss and

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## Creating A Curriculum That Fosters Scientific Thought *(Continued from Page 10)*

guide the children through each discovery. Since science is everywhere, we should be able to make a lesson out of anything.

### Uncommon Lessons

Montessori teaching manuals in science are filled with wonderful lessons for the classroom. These lessons are great for the shelf, where small, curious hands can handle them frequently. The lessons are complete and representative of real-life experience, with quantifiable results at the child's fingertips. Many manuals, however, lack some very basic, critical lessons in science, including physics and astronomy. Concepts such as force, motion, momentum, and rotation are missing.

There are numerous fundamental rules of our universe that are easy to explore. These rules are constant and readily observable. During the exploration of fundamental concepts of motion, the children observe various objects of different size and shape as they are sent down makeshift inclines. Predictions are made and hypotheses are tested in a matter of minutes. The most popular shapes are objects used every day: a pencil, a cube, a marble, etc. A measuring tape stuck to the ground, beginning at the base of the incline, allows the child to see how far the object will roll. In this simple lesson, a child will observe the effects of momentum, acceleration, friction, and gravity on various objects.

Though some Montessori manuals include various lessons using wheels and a description of kinetic and potential energy, most do not thoroughly cover concepts of linear motion, equilibrium, and force. In my experience, the latter concepts are far easier to grasp than the former. Simple white banner paper, used frequently for body tracing and mapping, serves as a perfect tool to illustrate the motion of various objects. Round objects dipped in paint can roll down an incline and will chart their own motion across the length of the paper. Pendulums, the physics of simple collisions, and circular motion are other fun topics that can also become simple explorations in a classroom setting.

### Conclusion

A comprehensive science curriculum must include lessons that allow children to explore the entire scientific process. Well-prepared, discrete lessons without varying

outcomes can be a great introduction to the field. However, greater value can be achieved through presentation of mature, exploration-based experiments that encourage a wide range of results. Encouraging children to be part of the lesson-making process promotes creativity and problemsolving skills.

As Montessori teachers, we prepare a rich setting in which children can learn. Classrooms filled with beautiful materials and precise presentations form a system for learning that achieves amazing results. Developing a classroom environment that fosters analytical thinking requires that we broaden our approach to teaching. In a world that is threatened by complex environmental issues, we can no longer afford to neglect the science curriculum. Instead, we must bring core science lessons back to life with an emphasis on learning the scientific method, a process that can help us foster creativity and innovative approaches to problems. To achieve this, a teacher must embrace subjects she is familiar with, focus less on the outcome of the lesson, and focus more on the process of exploration.

### Suggested Reading

Potter, J. (1995). *Science in Seconds for Kids*. Hoboken, NJ: John Wiley & Sons.

Robinson, T. (2001). *The everything kids' science experiments book*. Cincinnati, OH: Adams Media.

*We must bring core science lessons back to life with an emphasis on learning the scientific method, a process that can help us foster creativity and innovative approaches to problems.*

*“The first thing to realize about these exercises of practical life is that their aim is not a practical one. Emphasis should be laid not on the word 'practical' but the word 'life'.....their aim is to assist development.”*

Maria Montessori:  
Her life and work;  
E.M. Standing,Page 214,  
Plume Books,1984



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