The Mathematics Area in Montessori

Language of the Universe

by Samantha Pollington, Co-Owner and Teacher at Sunflower Montessori

Math has been called the "Language of the Universe". The abstract mysticism that surrounds that phrase is well suited to the art of Mathematics. **It is an art - a language - a science - patterns, all sprung from a human need for order in the world around them**. Many people, myself included, struggle with Math in school. The interesting thing is math is all around us from birth: "I am four. I go to school at 8'oclock. I can't have snack until 11:30. WHAT DOES THIS MEAN?" These numbers and their symbols are completely abstract. **The Montessori approach to Mathematics battles that abstraction and places the concrete first.** After the child has reached a level of complete clarity in the concrete he will inevitably, at his own pace, reach a level of mind and understanding allowing for abstraction. By starting in the concrete the mind is allowed to take a path of least resistance to abstraction. The child is first introduced to the quantity, he feels the concrete difference in weight, and his eyes see the difference in larger and smaller sums. After being introduced to the quantity the child is then dually introduced to the quantity and the corresponding symbol. After the child grasps the concrete idea of symbol to quantity, the tactile materials are removed and the child works only with the symbols, beginning a new phase of abstract thinking. What a joy it is for a teacher to notice a child disregarding the concrete materials and moving onto a pencil and paper! He reaches this level of mind at his own pace and only proceeds because he understands that it is quicker and more efficient**. He has reached abstraction. The Sensorial and Practical Life areas of the Montessori classroom lay a very important foundation for what Maria Montessori called the "Mathematical Mind**". The Mathematical Mind is obtained through accurate observation and prepared experience. The human mind, mathematical by nature, gracefully utilizes its full potential, collecting environmental and sensory stimuli of its everyday encounters. The mind is able to internalize the stored sensory impressions of this stimulus of order and progression. The carefully designed sensorial materials prepare a child's senses for the order needed to understand Mathematics. A young child's senses are his clue in understanding the world around him. Since his birth the child has been absorbing sense impressions. Sensorial education gives him the opportunity to bring an order to the random sense impressions surrounding him. Dr. Montessori understood the importance of

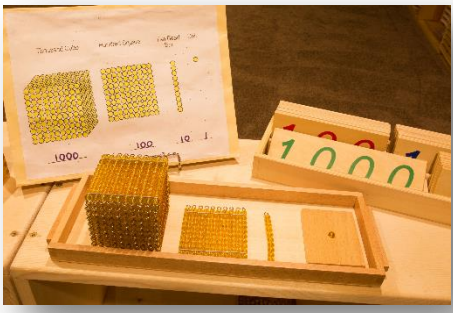
Sandpaper Numerals with Objects

educating the senses and very thoughtfully designed specific materials with that goal in mind. **The child holds within himself an inner need to understand these impressions in order that he may move on to more abstract ideas.** The Sensorial materials are all based on the metric system, and most are presented in sets of ten. These materials are providing sensorial impressions in the brain, laying the foundation for the Mathematical Mind.

The Practical Life area of the Montessori classroom is also an important component in providing experiences toward the Mathematical Mind. Lessons in Practical Life include Motives of Activity. This work is designed to suit the intense desire the child is experiencing based on the sensitive period through which he is passing. Practical Life lessons include a very methodical progression of steps, instilling in the child that sense of order so important to the true understanding of Mathematics.

Perhaps the most impressive aspect of the Montessori approach to Mathematics is the allure of the materials. The math materials are designed in a sequential order, each adding an isolated level of difficulty from the previous. Once the child has a firm understanding of 1-9, the decimal system is introduced. First the quantity is introduced with elaborately stunning materials; The Golden Beads**. The unit is one shining golden bead, the ten bar is a brass bar consisting of ten unit beads, the hundred square is a square formed with ten golden ten bars, and finally the breathtaking thousand cube is constructed of ten golden hundred squares of shimmering golden beads**. The child holds in his hand one-unit bead and in the other hand the weighty thousand cube. His carefully trained senses feel the concrete difference in weight of one and one thousand. After a firm understanding of the quantity is established the numeric signs of the decimal system are introduced together with the quantity. The numerals are color coded in groups of units, tens, hundreds and thousands, providing lasting visual impressions on the mind. At this point the child is introduced to the concept of exchanging. The teacher may say, "I see you have twenty unit beads." She then produces two ten bars to show the child. "Would you like to exchange these two ten bars for your twenty unit beads?" If the child is unclear, the teacher patiently allows the child to count each unit upon his ten bars to make the correlation that the two quantities are indeed the same. She will demonstrate counting the two tens, "One ten, two ten." "It is easier to count two tens than it is to count twenty units." **After the child makes the connection between the quantity and the symbol, the concrete or the quantity is slowly removed as the child has reached a level of abstraction in his mind and they are no longer needed.** This foundation of and overall understanding of the importance of tens, the basis of Mathematics, provides the child with the big picture of Mathematics at a very young age. These impressions will follow him throughout his education and be an invaluable aid in his future endeavors into Mathematics.

Decimal Numeration



The Golden Beads