

Mathematical Curriculum

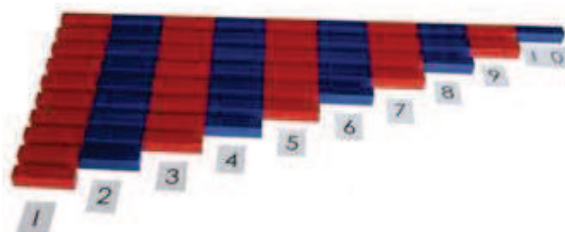
For centuries, the study of mathematics was withheld from all but the most learned, and even when it became generally taught; it was delayed past the child's natural interest. The natural interest is of course connected to the child's sensitive periods for order as well as the development and refinement of sensory perception both of which are phasing down by the age of 4½ years.

Even Dr. Montessori subscribed to the accepted wisdom regarding the teaching of mathematics. At first like everybody else, Montessori regarded the teaching of mathematics as very difficult and that it would be foolish to expect more than linear counting to 100 and recognition of the numerals 1–10). It was not until she noticed that it was the 4 year old that were attracted to the bead cabinet – a piece of material originally developed for the 6–9 classroom, that her thinking began to change, and the wonderful mathematical exercises of the Children's house were born.

When a child does enter the mathematical area, they are at first introduced to the concepts in a concrete way, through the use of materialised abstractions. The first activity is ordering the Number Rods in a purely sensorial way, echoing the work the child has done with the red rods. Soon after, s/he begins to count the sections, but each rod is still a whole, and there is no need for the child to make the cognitive leap into understanding accumulative groups of separate objects. The rod 5 for example is all in one piece representing the number 5. But the five units are distinguishable by the different colours on it. This overcomes a very great difficulty, that of adding one unit after another in a sum total. After the child can successfully order and count the rods, s/he moves onto making larger quantities out of 2 smaller rods.

In the Montessori classroom a great deal of work is done to support the development of the mathematical mind before the child even enters the math area. Much of this work involves the child exploring patterns of relationships. This is done unconsciously before the age of 4 –4 ½ years and more consciously after that. There is a sequential progression using pieces of equipment with different relationships to one another.

THE NUMBER RODS



Many of these materials are found in the sensorial area, such as the pink tower, the number rods and the sound boxes. The creation of categories is also supported by work with these and other sensorial materials. They each move the child along the progression to building abstractions. Abstract thought is governed by the mathematical mind. All of the sensorial materials involve the child bringing order from chaos, such as the red rods, the touch tablets and the geometric cabinet assist the child to internalise his/her sense of order.

There are five areas contained within the mathematics section of the Montessori curriculum.

- 1) Numbers 1–10 (0–10) is the first area a child is introduced to. Until the child can be successful here, the work of the other areas cannot begin. The first purpose of this area is for the child to learn the basic symbols and the quantities they represent. This is done through the work with the sandpaper numerals, number rods and cards and the spindle boxes. Quantities are introduced first as a single entity (number rods) and then as sets (spindle boxes). The concept of zero as an empty set is also included here, and is reinforced with the Zero game, and the number memory game. The work done here also presents and reinforces the sequence of 1–10, introduces the concept of odd and even (cards and counters), and prepares the child for the understanding that the numerals 0–9 are all that is needed to make up any number in our system of mathematics.
- 2) Teens and tens are introduced through number boards and is primarily a language exercise, but also allows for counting practice. It establishes a repeating pattern, 1 – 100 and gives the child opportunities to practice. The long and short bead chains are used for this work. They also indirectly prepare the child for cubing and squaring of numbers, as the child folds the chains up into a series of equal squares, and superimposes them to form cubes.
- 3) The golden beads are used to introduce the child to the four mathematical operations (addition, subtraction, multiplication and division). In the exercises contained within the operations the child is introduced to the decimal system. By working with decimals, the child learns to carry out operations with concrete materials.
- 4) Memorisation involves repetition, but a five year old is moving away from wanting to repeat the same action or operation over and over again, so we continue with other activities which contain the same information.
- 5) The child then begins to move into the area of abstraction.

(D. Berry circa 2002)

THE GOLDEN BEADS

