Renewing Old Connections:

The Stern - Montessori Link

Early years children are naturally curious. Vikki Horner examines the similarities in Montessori and Stern philosophy to stimulating this thirst for knowledge.

Right: Full Stern Apparatus and book

A Shared History

Dr Catherine Stern began to develop her ideas and apparatus – later to become Structural Arithmetic - through her everyday experiences of running a Montessori school in Germany in the early 1920s. In 1926 the school was recognised by the German Board of Education as a Training Institute. Her work was interrupted by events which led to the Second World War, when she and her family moved to New York. Later, as research assistant to the founder of Gestalt psychology, Dr. Max Wertheimer, Catherine began to understand the psychological background to her experiments. Indeed, it was Wertheimer who named Stern's method Structural Arithmetic. Because of Stern's links with Dr. Montessori, she suggested that her apparatus become part of an advanced Montessori approach. However, Maria Montessori declined her proposal so Dr Stern, undeterred in her mission, decided to take the plunge herself, and a new system of teaching was born. Like Dr Montessori, Catherine Stern's teaching remains as effective and relevant today as it was then.

A Common Philosophy

Dr. Stern believed that children have an inherent desire to seek out experiences and that developing this innate curiosity is vital in early years. Maria Montessori's belief that "A child must (educate) himself, or it will never be done" concurs with Dr Stern's that when a child has freedom to carry out their own experiments and draw their own conclusions, they develop a sense of pride in themselves and in their ability to think for themselves. When children play with jigsaw puzzles for example, they see that when the correct piece is found they know it is right because it clicks into place. Stern's apparatus provides the same self-checking feature and children enjoy the experience of exploration, insight and mastery that this gives.

The wooden apparatus which begs to be handled, invites children to make these discoveries through a framework of experiments to form sound mathematical concepts right from the beginning. Because children seem to reason with mental pictures in arithmetic they need to develop their ability to form images and to visualise numerical concepts presented, not in isolation but in relation to other numbers, and then, by turning the concept around in their minds, to understand how to put it into action. Language also plays a crucial role in the formation of concepts and as Structural Arithmetic is multi-sensory, much like the Montessori approach, the best way to give children the meaning of spoken language is to give them the opportunity to see and touch what the words describe

and, thus, work out for themselves what the words mean. Montessori teachers and parents will see many similarities with both approaches to learning.

Steps to Learning

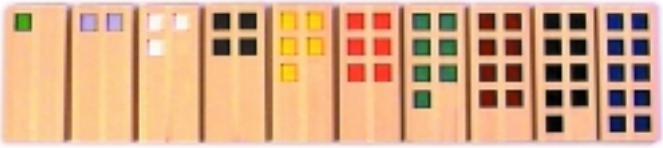
Experimenting with Numbers, the first stage in the Structural Arithmetic programme, is designed mainly for children from 3 to 6 years old. Using the apparatus, children build a strong foundation for addition and subtraction facts of numbers up to 10. They progress from activities and games with concrete materials that help them form basic concepts, to the final steps of recording addition and subtraction facts with simple wooden number markers. This can be achieved without requiring writing skills, and is therefore ideally suited to early years learning. This also offers a solution for the older child who has delayed writing skills.

There are three levels; in Level 1 children begin to play with the number blocks and pattern boards as though they were puzzles; Level II introduces children to the names of the number blocks and pattern boards as they are now eager to talk about their experiments. At Level III children begin to link the number blocks and pattern boards to the symbols or numerals.

The Apparatus

The Counting Board

After much experimenting, the number guide is placed at the top of the counting board and shows where each numeral comes in the sequence from 1 to 10. Each numeral appears above the groove that holds the number of cubes or number block for which it stands. Between the number guide and the grooves there are spaces for the number markers. Children can match the numbers on the markers with those on the number guide. Children enjoy playing the calling back game where the teacher says "Pick a number. Where does it go?" the child selects a number marker such as 3, matches it to the 3 on the number guide, then finds the 3-block and fits it into the 3-groove.



1-10 Pattern boards

Pattern Boards and Word Problems

Acting out word problems with multi-sensory materials will prepare children to analyse complex word problems later on. Also, the ability to apply concepts to different situations is a test of true understanding. It is important for children to learn how to demonstrate word problems of their own creation. Pattern boards and cubes are excellent materials with which to begin. Discovering odd and even numbers are a delight using these pattern boards.

Discovering Combinations with the 10-Box

At first, children fill the 10-box with pairs of number-blocks as though they were puzzles. Each time they put a block into the 10-box they measure with their eyes to judge the size of the block that will fit with it. They systematically study the relationship between each separate number block and the total which is ten units long. When they make a mistake they can see and feel how the block does not fit. When children find pairs that fit, they feel a satisfaction which is unforgettable. This success with filling the 10-box helps them remember the block combinations that total 10 units. Once children have learned the names of the blocks, they will find it easy to name the block partners that make 10.

A Montessori Teacher using the apparatus in her school in Ireland commented after only two months that the material worked well with the vertical age grouping of a Montessori classroom. The children particularly liked activities which involved being 'teacher' with the younger children. The amount of material provided by the kit allowed the majority of pieces to be used at the same time by children of different abilities during the work cycle. Spatial development and social interaction, – sharing, nurturing, waiting for turns – all noticeably improved by using Structural Arithmetic.

10-box filled with blocks

Counting board

The wooden apparatus which begs to be handled, invites children to make discoveries (exploration, insight and mastery) through a framework of experiments to form sound mathematical concepts right from the beginning.

Vikki Horner provides information, advice and training in the use of Stern Teaching Programmes. She also advises and supports children with special educational needs in developing number and arithmetic skills. For information on Stern Training Courses, contact Vikki on enquiries@mathsextra.com or 01747 861503

FREE training courses for Stern's Structural Arithmetic are available to readers of Montessori International. These normally cost £200 per two hour session. Please contact Vikki for further details.