

Talking point

Stern stuff

An old, but tried and tested, method for mathematics teaching is making a comeback in SEN circles. Vikki Horner urges teachers to get Stern



Who remembers the Stern materials? At a training course I ran recently, one teacher enthusiastically told me that she had a set of Stern's Structural Apparatus in her classroom cupboard! It was too good to throw away but she didn't know enough about it to bring it out and use it – well now she does!

For the uninitiated, in the 1920s Dr Catherine Stern's interest and work with children in kindergarten and primary schools led to her inventing a range of materials for teaching mathematics. Her system used blocks and cubes to represent numbers, and she developed a specific set of patterns representing the numbers one to ten. Her work with Max Wertheimer, the founder of Gestalt Psychology, confirmed her thinking that learning should not be based on rote memory, but on visualisation of the structural characteristics of the concept, thus giving the child insight into the relationships to be grasped. It was Wertheimer who named her approach Structural Arithmetic.

Using the equipment

Learning through experiments and discovery (*Experimenting with numbers*), children achieve mastery of arithmetic without being forced to learn only by memorisation. The apparatus not only simulates activities but also presents concepts so clearly and vividly that children can visualise them later on. The teaching is presented in three levels: the first (with no number names) develops concepts, working with each piece of apparatus. Children are keen to talk about their experiments. Level two focuses on language, and the blocks and the pattern boards are given their number names. As the names of the blocks and patterns are now in place, level three connects everything to the number symbols. Therefore all the elements learnt in the previous levels can now be associated with

the number symbols (1,2,3, and so on).

In the *counting board* children fit number blocks into matching grooves. They handle, measure, compare and order the number blocks and discover that each number block has a place of its own in the series from one to ten and that they have a different relationship to each of the other numbers.

The *pattern boards* reveal quite different concepts. By filling these boards with coloured cubes children see familiar facts in a new light based on the characteristics of odd and even numbers. Given the difficulties with transfer and storing facts in isolation, Stern's logic of teaching addition and subtraction facts in structurally related 'families' of facts, offers more opportunities to make connections. Children discover what addition 'does' to a number, and what subtraction 'undoes':


- adding 0 to a number, adding one to a number
- adding two to an even number gives the next highest even number
- subtracting two from an even number gives the next lowest even number
- adding two to an odd number gives the next highest odd number
- subtracting two to an odd number gives the next lowest odd number.

In the *10-box* children fit together pairs of number blocks that total ten. Each time they put a block into the box, they measure with their eyes to judge the size of the number block that will fit with it. They systematically study the relationships between each separate block. They see that the first block is big so the second one must be smaller and vice-versa. Once they learn the name of each block they can discover for themselves the combinations that make ten. By filling smaller number boxes with blocks, they work out the combinations of sums less than ten.

The teaching manuals begin with *Experimenting*

with *Numbers*. There are a further three teaching levels, each accompanied by its own book of worksheet practice. The teaching manuals cover primary level mathematics.

Structural Arithmetic offers an exciting adventure for children of all abilities. It allows them to make great strides forward in mathematical thinking, and the number concepts they develop are sound from the very beginning. Catherine Stern had a special interest in helping children with learning difficulties succeed. This is evident throughout the teaching delivery, which is still very much applicable to issues in teaching children with SEN today.

Stern's teaching method has continued to flourish in the USA for over 70 years. It was also used for over 20 years in primary schools here in the UK and also in Ireland up to the mid-1970s. As teaching styles and directives started to change, Stern began to disappear. Now with the passage of time we have come full circle. With training, teachers are seeing how this method can solve many challenging difficulties children are experiencing in classrooms today. If you have some equipment in your cupboards get it out now – Stern is making a comeback! 

Stern materials are available from *Maths Extra Limited*. For details contact enquiries@mathsextra.com or see www.mathsextra.com/

For information on *Structural Arithmetic training* contact enquiries@vikkihornerconsultancy1122.com or see www.vikkihornerconsultancy1122.com/

Vikki Horner works to support children with special needs and advises parents, associations, schools and professionals on using the Stern Structural Arithmetic materials.