

Learning to count and to understand number

Many children with Down syndrome find number difficult – more difficult than reading – but new approaches give cause for optimism

The next three articles are on the theme of number and mathematics. Many children and teenagers with Down syndrome seem to find number more difficult than literacy. As with all skills there is a wide range of individual variation in progress with some children enjoying number and progressing well to a level where they can carry out calculations with numbers to 100 or a 1000 and understand 'tens' and 'units'. This level of achievement will help them to understand decimal money systems, weighing and measuring. However many children find number difficult and there is little research as yet into the reasons for this.

One factor could be the typical auditory processing and auditory working memory difficulties as, in order to count, a child has to learn the number sequence at least to ten (as numbers after ten or twenty can be worked out in most counting systems). Calculating typically involves manipulating numbers 'in mind' in silent speech which may also be difficult for the individual with Down syndrome. Materials which make numbers and the relationships between them concrete and visual may be expected to help children with Down syndrome as they have strengths as visual learners. For this reason, we have been excited by the potential of the recently designed *Numicon* system to support the learning and understanding of number for our children. The Numicon system is particularly well thought out as the materials illustrate the nature of the number system accurately. The Numicon number shapes show that each next number is one more equal unit - and this helps children to understand the real nature of the number system and the orderly relationships between numbers.

The Numicon system is not just a set of materials, it is a whole approach to the teaching of number for all children which aims to encourage the use of visual and tactile imagery for the numbers to aid calculation. The materials come with a full range of activities which start by encouraging children to see the patterns and symmetry of the system and to be able to recognise the plates by shape and colour, including games to identify them by touch when hidden in a bag. It is important not to skip over these early activities as the full benefit of the system will be lost if the children do not establish concept images for numbers.

Experiences of Numicon are described in the following two articles. In the first article, two psychologists in the county of Wiltshire, UK, describe the results of a pilot project in which they evaluated the use of Numicon with children in junior and middle schools. In the second article, **Vikki Horner**, the parent of a daughter with Down syndrome now 11 years old, describes her experience of using the Numicon approach with Charlotte.

The third article is from **Elizabetta Monari** in Italy and it describes her work teaching mathematics to pupils with Down syndrome in Italy. She illustrates the ability of teenagers in high school to learn algebra, and the ability of a man in his fifties to learn to count and so challenges the low expectations that we may have for the mathematical abilities of children and adults with Down syndrome. Elizabetta puts forward the view that it is counting and calculating that children with

Down syndrome find difficult - not all branches of the mathematics curriculum. With her 'Mathematics tree' model, she also challenges the view that calculating is a necessary prerequisite for other aspects of mathematics and argues that difficulty in calculating should be addressed by teaching the use of a calculator, for example, and should not prevent children enjoying and understanding other aspects of mathematics. Elizabetta's examples certainly challenge the assumption that mathematics is difficult for pupils with Down syndrome and hopefully will encourage teachers and parents to experiment further with maths with their children. It is especially important to encourage teenagers to continue to develop their maths skills. They are often more interested at this age as they can see the practical benefits in their daily lives as they handle money and weigh and measure materials for cooking, or for design and technology or on a work placement.

Editor



Numicon shapes 1 to 10, as ordered shapes and showing different ways of adding to 10

