Introduction

How to use this book

This book is for teachers who are looking for practical ways to help pupils who struggle with maths. It is aimed mainly at primary teachers who do not have a specialist background in either maths or special needs. I hope it will also be of interest to parents, teaching assistants and teachers in SEN departments who support pupils in junior school and in the early years of secondary school.

This book is a collection of teaching activities and games. The activities have been developed over a number of years of teaching dyslexic, dyspraxic and dyscalculic pupils, either on a one-to-one basis or in small groups of pupils who have been withdrawn from lessons for extra support. The activities are equally appropriate for children who have been diagnosed as dyscalculic and for those whose difficulties with number are one of the symptoms of their dyslexia or dyspraxia. Indeed, the suggestions presented here are designed to promote understanding and to help learners make connections, and are therefore suitable for teaching the basic principles of numeracy to any pupil.

The philosophy behind this book is to provide children with the kinds of practical experiences that will help them build sound cognitive models. Because the emphasis is on doing the maths rather than recording it on paper, you will find very few worksheets or ideas for written work in this book. Instead you will find 200 teaching activities and 40 games. I have deliberately included activities that require only what can easily be found in a normal maths classroom or can easily be acquired by parents, such as counters, Cuisenaire rods, Dienes blocks, number cards, dice, paper and pencils. There is no need to buy special equipment, or commercial games and resources that tend to target only a single topic. The activities are simple to set up and most are ready for immediate use with individual pupils or small groups; others just require copies of the games boards or activity sheets that you can find on the CD.

The book is organised into four sections:

1 Early number work – numbers up to 10
2 Basic calculation with numbers above 10
3 Place value
4 Times tables, multiplication and division.

Resources for all four sections can be found on the CD attached to the book. The main body of the text is also on the CD, so that instructions for individual activities can be conveniently printed off.
I have targeted what I know to be specific areas of difficulty and have deliberately broken down the teaching and learning into very small steps. Each section is loosely structured in order of difficulty, starting with concrete activities and progressing gradually through learning activities that are designed to help pupils move through the intermediate diagrammatic stage and right up to the abstract stage of calculation.

Most of the activities are designed to be teacher-led, rather than for children to work through on their own. It is important to ask lots of questions, to direct the discussion carefully, to point out any connections with previous activities and other maths topics, and to encourage pupils to talk a lot about what they are doing, and why, while they are doing it. Naturally, pupils will do best in an atmosphere where mistakes are regarded as a normal, and even an instructive, part of the learning process.

I regard the activities and games in this book as absolutely central to the teaching of pupils who have difficulties with basic maths. Enjoyable as they may be, they should not be seen as just a bit of fun to fill in the spare time at the end of a lesson. They are carefully designed to provide the actual learning experience for a variety of specific maths topics.

Please do not feel that you ought to start at the beginning of the book and work through to the end, or even to keep to the sequence in which the ideas are presented. Instead, you should feel free to pick and choose activities, depending on your pupils and on your knowledge of their particular areas of difficulty. Some activities may need to be repeated often, or revisited at regular intervals; others may be valuable to try only once for particular pupils or not at all. When activities naturally follow on from each other, the text clearly signals the fact. Some activities may need to be preceded by others from another section; for example, some understanding of place value (Section 3) is required before attempting some of the work on larger numbers (Section 2) and before some of the work on multiplication and division (Section 4). Once you begin working closely with pupils, you will find that you are the person best placed to uncover any misconceptions or sticking points that could usefully become the focus of subsequent lessons.

Each section starts with a short overview, putting the topic of that section into context. Following the overview, you will find a summary of the main problems associated with the topic and ideas on how to help. These summaries are presented as bullet points for ease of reference. The remainder of each section is dedicated entirely to the teaching activities and games, set out as clearly and concisely as possible with a minimum of explanatory background or theory. The 200 activities are labelled according to the main teaching point they have been designed to address. A list of teaching points is also included in the instructions for each of the 40 games. Printable and photocopiable resources are provided on the CD, making the activities and games accessible and ready to use, with the minimum of preparation.

The Appendix contains a summary of the more commonly used concrete materials, including an introduction to Cuisenaire rods. Because I use Cuisenaire rods so extensively in my teaching activities, and have found so many people unfamiliar with their use, I have also included on the CD a leaflet of practical ideas, written originally for parents. The leaflet is sized so as to fit inside a box of Cuisenaire rods.
I use the word ‘teacher’ loosely in this book to mean anyone who supports children in their learning, including, of course, teaching assistants and parents. Indeed, parents are ideally placed to use the ideas in this book to promote maths as a practical subject full of patterns and puzzles and therefore full of interest and fun. Whether inside the classroom or at home, the best results will be achieved by frequent, regular, short, but unhurried, sessions, each of which should include a variety of activities and topics and a sensitive balance between revision and new content. Daily sessions will soon improve pupils’ attitude and will steadily boost their self-assurance, their sense of achievement and their maths performance.

DYSCALCULIA AND OTHER SPECIFIC LEARNING DIFFICULTIES

Developmental dyscalculia was first recognised by the Department for Education and Skills (2001) and defined (p. 2) as:

*a condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence.*

There is a debate about whether true dyscalculia differs from the maths difficulties experienced by some dyslexic and dyspraxic learners, a debate I am happy to leave to the academics. What matters to me is the fact that the same sorts of intervention seem to help many pupils who are underachieving in maths, whatever label they have been given. I believe that the coming years will see a growing recognition of the particular problems and educational needs of dyscalculic learners, in much the same way as the last two decades have seen an increasing acceptance of the existence of dyslexia and a developing consensus about the best teaching and learning approaches for these pupils.

As a teacher, you might suspect that you have a dyscalculic pupil in your class if an otherwise competent student has a surprising level of difficulty with ordinary numeric operations and relies on finger-counting, often for all four arithmetic operations, well beyond the age at which most of the others in the class have progressed to more efficient strategies. A dyscalculic learner stands out as having no ‘feel for numbers’ at all, no ability to estimate even small quantities, and no idea whether an answer to an arithmetic problem is reasonable or not. Memory weaknesses, both long-term and short-term, are a great handicap and result in a pupil with dyscalculia being unable to remember facts and procedures accurately, or consistently, no matter how many times they try to learn them by heart. Pupils who have dyscalculia simply cannot remember their times tables reliably, and you may find they can recall some facts one day but not the next. They are also likely to lose track of what they are doing when attempting any procedure that requires more than two or three steps. Even basic counting can be a problem for pupils with dyscalculia, especially counting backwards.
Indicators for dyscalculia are:

- an inability to subitise (see without counting) even very small quantities
- an inability to estimate whether a numerical answer is reasonable
- weaknesses in both short-term and long-term memory
- an inability to count backwards reliably
- a weakness in visual and spatial orientation
- directional (left/right) confusion
- slow processing speeds when engaged in maths activities
- trouble with sequencing
- a tendency not to notice patterns
- a problem with all aspects of money
- a marked delay in learning to read a clock to tell the time
- an inability to manage time in their daily lives.

Research into dyscalculia is still at an early stage, but it is estimated that dyscalculia affects roughly 4–6% of the population. This equates to at least one child in any average classroom.

A dyslexic pupil might show many of the same indicators as those mentioned above, because it is thought that at least half of all dyslexics also have difficulties with maths. Outside the maths classroom, you might suspect that pupils are dyslexic if they read and write much less willingly and fluently than you might expect, if they read and reread written material with little comprehension and if their spelling is particularly weak, inconsistent or bizarre. Dyslexic learners show much greater ability and understanding when speaking than you could ever guess from looking at the scrappy and minimal amount of written work they produce. Other indicators are memory weaknesses, problems with processing auditory information, and difficulties with planning and organisation.

A typical dyspraxic pupil does not seem to have the same long-term memory problems as a dyslexic and so might be able to remember times-tables facts with ease. Dyspraxia, also known as developmental coordination disorder, mainly affects motor control, which results in pupils being clumsy and uncoordinated, poor at planning and organisation, and unsuccessful at subjects such as PE and sports that require balance and coordination. Dyspraxic pupils cannot process sensory information properly and are therefore forever tripping and falling, dropping and breaking things, and mislaying their belongings. In the maths classroom, dyspraxic pupils have particular difficulty handling equipment such as a ruler, a protractor or a set of compasses, and their written work is likely to be very messy and difficult to decipher.
A pupil with attention deficit hyperactivity disorder (ADHD), may signal his (and it is usually a boy) presence by being unable to stop fidgeting or to sit still, being too easily distracted by outside stimuli, having a tendency to talk and interrupt excessively, and finding it extremely difficult to stay on task and see any undertaking through to the end. I mention the condition here only because nowadays pupils with ADHD or ADD come under the umbrella term of ‘pupils with specific difficulties’. However, pupils with attention disorders may not have any specific problems with maths once they have found a way to manage their impulsivity and concentration difficulties.