

# Dyscalculia and the Davis Maths Mastery Programme

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Mathematical understanding runs throughout all areas of our lives. It measures change according to a standard and enables us to establish order through the sequential steps, and to assess the result.

It is estimated that between 3 and 6% of the population struggle with dyscalculia, an inability to conceptualise numbers and the number facts. The DfES defines dyscalculia as: 'a condition that affects the ability to acquire arithmetic 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 are five main problem areas commonly experienced by people with dyscalculia:

- 1. Anxiety and stress**
- 2. Reading problems**
- 3. Memory difficulties**
- 4. Reasoning problems**
- 5. Arithmetical issues**

Dyscalculia typically occurs in thinkers who need to learn through meaning but have failed to grasp the meanings behind some or all of the mathematical symbols they have encountered. For these problems to be resolved, a medium has to be found through which these meanings can be mastered. In the Davis programme, a multi-sensory medium in the form of plasticine clay is used.

The Davis approach looks at how confusion can arise in the learning process as a result of symbols, terms, concepts and processes that are not understood; abstract concepts are made a reality and confusions are "clayed out", often with dramatic results. Mathematics begins to make sense as it becomes related to real-life concepts.

The Davis approach acknowledges the dyscalculic person's preferred learning style, namely to learn through meaning and hands-on explanation, rather than by rote or repetition, and uses multi-sensory teaching strategies before moving to the traditional paper and pencil medium. The Maths Mastery Programme is an individualised one-to-one programme, typically done over 30 - 45 hours.

The programme provides a unique and different approach to address the main problem areas:

## **1. Anxiety and stress**

Fluctuations in concentration and ability

Increased stress or fatigue

Anxiety and exasperation

Studies have shown that students with dyscalculia become confused and experience an inability to concentrate as they become overwhelmed by their difficulties. Reducing and managing anxiety is a key component of the Davis programme. The student is shown how to self-manage their stress and energy levels using kinaesthetic tools. They are also given strategies to help monitor and maintain concentration.

## **2. Reading problems**

- Reading and understanding maths books
- Feeling that nothing makes sense
- Relating printed questions to mathematical techniques

The reading correction strategies are used from the Davis Dyslexia Correction Programme. The methods use the three dimensional learning style of the dyslexic student. The Davis methods are based on the idea that there is something different in an individual's thinking style; something of great value, that can be worked with towards a greater understand of language and maths.

Since dyslexic students think in pictures, they have difficulty thinking with the sounds of words. The methods correct the learning disability, using the natural strengths and talents of the individual's personal thinking and learning style. The student is shown how to extract meaning from the written text.

The BDA estimates that about 40-50% of dyslexics show no signs of dyscalculia and that, for some dyslexic pupils, difficulty with maths may stem from problems with the language surrounding mathematical questions, rather than with number concepts – e.g. their dyslexia may cause them to misunderstand the wording of a question.

It is important to clarify whether a student is struggling because of their reading difficulties or whether they truly have a fundamental difficulty with maths concepts. These factors are explored during the assessment and each programme is individually structured to meet the student's needs.

## **3. Memory difficulties**

- Remembering what different signs/symbols mean
- Remembering formulae or theorems
- Recalling dates, times, phone numbers etc.

A good memory for facts often depends on being able to organise them into meaningful patterns. If arithmetical procedures are just sequences of meaningless steps, then they will be hard to remember and frequently misapplied.

Mathematical symbols and processes all rest on a series of foundation concepts or universal laws which have to be fully understood before maths can be mastered. The Davis facilitator, or student's helper, takes the student on an exploratory journey through the seven main concepts which underpin maths.

For example, one such concept is sequence, the principle that one thing such as a number or quantity follows another. Another important concept is 'time' and all programmes include a detailed look at how time relates to the student's own life.

Once the student has mastery of these concepts, the programme then follows a series of exercises to introduce arithmetical concepts and symbols. These small, careful steps ensure that the student has a clear understanding of the meaning behind the symbols and procedures.

Rote learning depends largely on auditory memory and is unlikely to be a natural learning strategy for a dyscalculic child. The exploratory nature of the programme is a more powerful

learning tool. The student is also given 'tools' to rediscover their visual and kinaesthetic learning, which will assist in remembering formulae and telephone numbers.

#### **4. Reasoning problems**

- Moving from concrete to abstract
- Following steps in a mathematical process

The multisensory nature of the programme, the use of plasticine clay, provides a basis for the student to experience the steps within a mathematical process. Once the meaning is established, the student can move intuitively from the concrete to the abstract.

#### **5. Arithmetical issues**

- Understanding place value
- Carrying out sums without a calculator
- Difficulty in learning and remembering arithmetical facts

Dyscalculic pupils often show a kind of rigidity that accompanies rote application of a procedure that is not properly understood. Once the underlying mathematical concepts have been mastered, the student works through a series of exercises and is encouraged to explore how the concepts are applied to mathematics. The exercises are structured to ensure that the student demonstrates, through the plasticine clay, that each step is understood with complete certainty before they progress further.

The maths programme ensures that the student develops 'numerosity' and understands that 'one is one' and this relates to a standard. Once this is understood the student can progress to look at 'amount' and develop an understanding that a numeral represents a number.

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The Davis Maths Mastery Programme is clearly explained in the book *The Gift of Learning* (ISBN 0-399-52809-1) by Ronald D. Davis. Chapter 18 details what must be done, when to do it and the reason why.

Please contact the DDFA [www.unlocking-learning.co.uk](http://www.unlocking-learning.co.uk) if you would like more information on dyscalculia and the Davis methods or to find a Davis Facilitator.

