

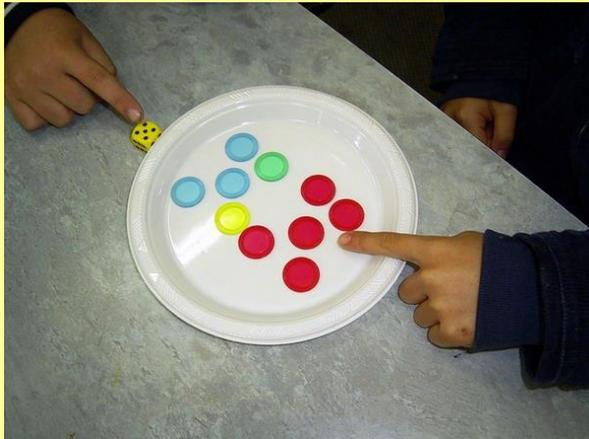


Mathematical Learning Difficulties and Dyscalculia

‘Enabling every Teacher and Teaching Assistant, to explain mathematics effectively to all learners’

Contents

- Exploration of Maths Learning Difficulties and Dyscalculia
- Subitising/Numerosity
- Multi-sensory teaching



**There are THREE kinds of people in
the
world**

Those who can do maths

and

Those who can't

How many children are dyscalculic?

4-6% of the population are dyscalculic.

At least one in every class- affects boys and girls the same!!

Around 6% of children in the UK have severe difficulties with numeracy

(Gross 2007)

Equates to 180,000 primary school children

(DfE 2010)

Definition of Dyscalculia

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.

DFES (2001)

What do we mean by dyscalculia?

It can be used as an umbrella term for mathematical difficulties

It can refer to different levels of difficulty and can become apparent at different developmental stages

A good sign of dyscalculia is absence of number sense or low number sense



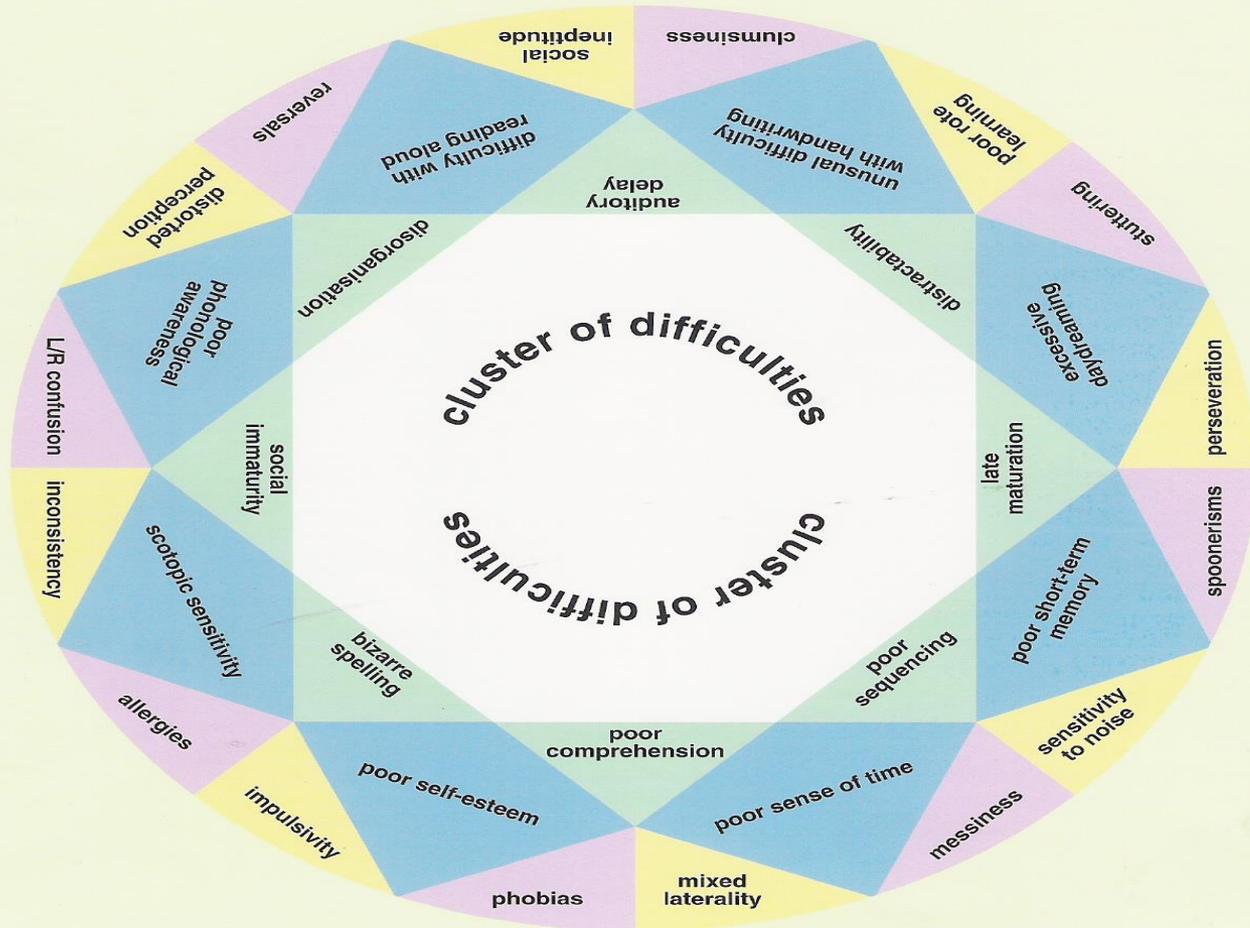
What do we mean by number sense?

- The ability to determine the number of objects in a small collection, to count, and to perform simple addition and subtraction, without direct instruction.
- Spoken language and number sense are survival skills but abstract maths is not.

The consequences are profound

Around 20% of the UK have difficulties with mathematics which can cause significant practical, educational or functional difficulties (Parsons & Bynner 2005)

Cluster of difficulties



Symptoms of Dyscalculia

- 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
- Immature strategies- for example counting all instead of counting on
- Weakness in visual and spatial orientation



Symptoms (cont'd)

- Directional confusion
- Slow processing speed
- Difficulty sequencing
- Difficulty with language
- Inability to notice patterns
- Poor memory for facts and procedures
- Inability to generalise
- Difficulties in word problems and multi step calculations
- Problems with all aspects of money
- Marked delay in learning to tell the time



Subitising



What do we mean by subitising?

1, 2, 3,...

- Subitising comes from Latin= 'Sudden'
- The ability to give the amount of objects in a set without counting
- Most people can subitise up to five or six objects
- Dyscalculic people do not have this ability
- This is innate, we are born with the ability to assess quantity.
- Babies can count!





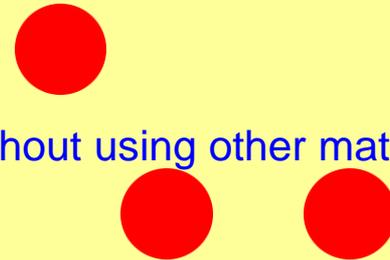
Animals can count in the sense that they can recognise the difference between one animal and a group- this is vital for survival



Two types of subitizing

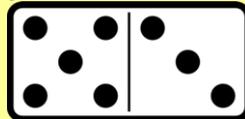
Perceptual

- Perceptual subitizing involves recognising a number without using other mathematical processes- as you did when looking at the dot pictures
- This type of subitising helps children to separate collections of units and associate them with one number word- thus developing the process of counting



Conceptual

- In this type of subitising you are recognising a familiar pattern- such as the dots on a dice or domino
- If children can use conceptual subitising patterns then this will help them to develop abstract strategies.



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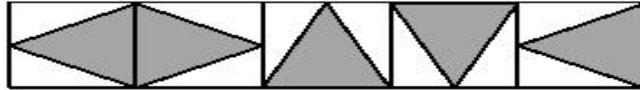


- Manipulations of special materials (Cuisenaire, dots, patterns, dice ,number lines, beads, counters etc)
- Talk plays a key role; pupil has to describe the task , the goal , the action
- Games help to align the pupil-teacher task goals

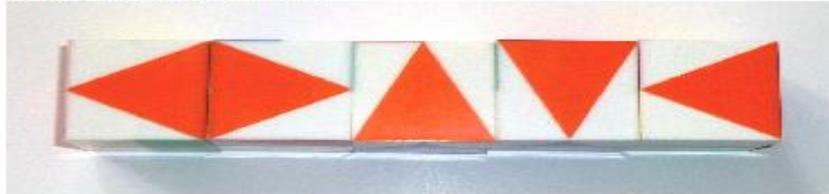
VISUAL PERCEPTION

Drawing triangles from a pattern of cubes

Diagram of pattern to be copied

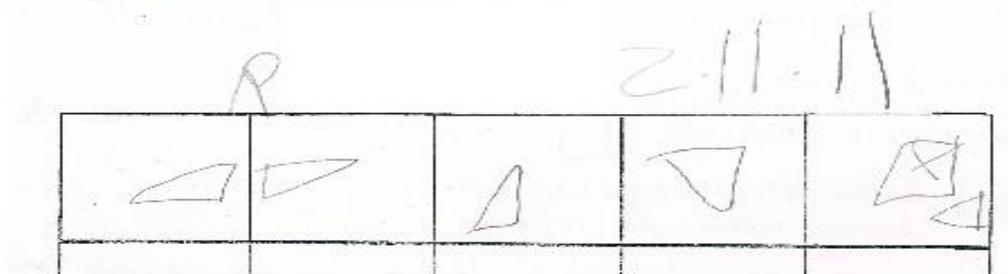


Copy pattern using Mozi blocks



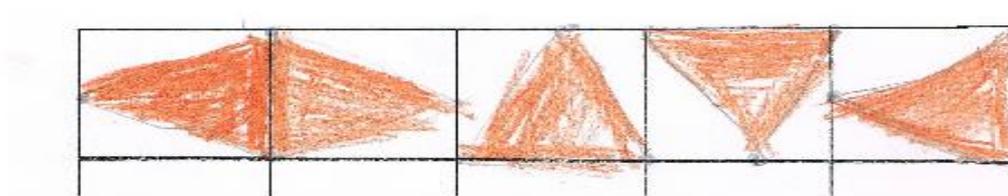
Draw diagram from block pattern

First attempt



Second attempt 30 minutes later

Pupil describes the shapes in each square before drawing, including using directional language to explain where the corners of the triangle are in relation to the square.



Multi-sensory teaching recognises that in order to learn, the sensory systems are required for discrimination of sounds and symbols and for arranging these in a sequential order.

The sensory systems are

Visual



Auditory



Tactile- kinaesthetic



Oral –kinaesthetic



Multi sensory, Concrete Apparatus Manipulatives

- Base ten



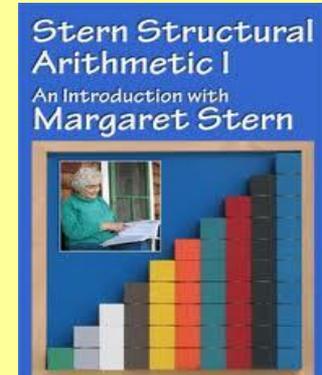
- Cuisinaire



- Number strings

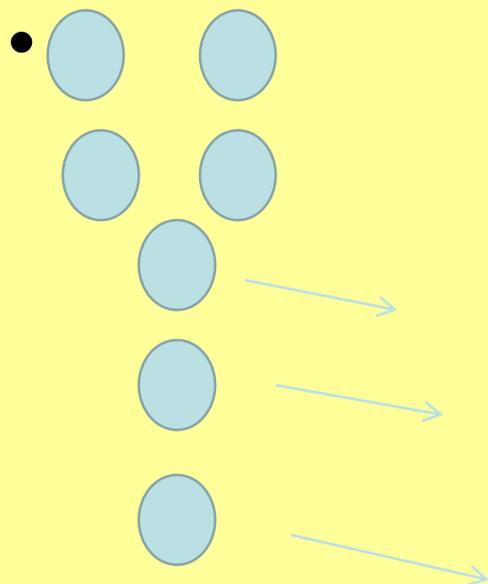


- Numicon

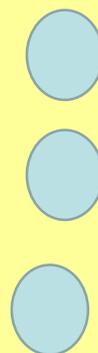


Stern Material

Must link materials and models to language



7-3= Seven take away 3



Over learning

Repetition Repetition Repetition!

- Number facts
- Bonds
- Tables
- Definitions
- Procedures After concept and understanding
- Cards, Mnemonics, visualisations

Number Bond Card (Addition)

Front

$$3 + ? =$$

Back

7

Over Learning/Reasoning

- Support learning of number facts by reasoning
- Children not in position of either knowing or not knowing a fact as can use reasoning strategies
- Two steps for knowing; one just knowing the other deriving

Cumulative /structured

- Skills build on each other
- Ideal world master one skill before moving on
- Task analysis check which underlying skill are needed