

Mathematical Learning Problems

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Difficulties with Mathematics

- **About 6 – 8 percent of school-age children have serious difficulty processing mathematics** (Fuchs & Fuchs, 2002)

This is about the same percentage of children who have reading difficulties.



Dyscalculia

$$5 \div 2 \quad 3/4$$
$$14^8 \quad \sqrt{9}$$
$$3.14 \quad 300,000$$

The condition that causes problems with processing numerical calculations is called dyscalculia

Symptoms include difficulty in conceptualizing numbers, numerical relationships, outcomes of numerical operations and estimation

Students with Dyscalculia Display Difficulties with:



Mastering
arithmetic facts



Learning
abstract
concepts of
time and
direction



Spatial
Orientation and
space
organization,
left/right
orientation



Following
sequential
directions and
sequencing



Environmental Factors

Environment



Basic vocabulary

- A student's attitude about math can contribute to problems
- Fear of math : some students can develop mathematical anxiety.
- Students with environmental problems need help replacing the memory of failure with the possibility of success.
- Students with mathematical disorders have a neurological deficit that results in difficulty processing numbers.

What Causes Dyscalculia?

Neurological and other Causes



- Damage to the Parietal lobe can result in difficulties
- Individuals with visual processing difficulties often display difficulties with math.
- Genetic factors can play a role. It can run in f

General Symptoms



Inconsistent results with addition, subtraction, multiplication and division

Inability to remember mathematical formulas, rules or concepts

Difficult with abstract concepts of time and direction

Consistent errors when recalling numbers including transpositions, omissions, and reversals

Difficult remembering how to keep score during games

Types of Mathematical Disorders

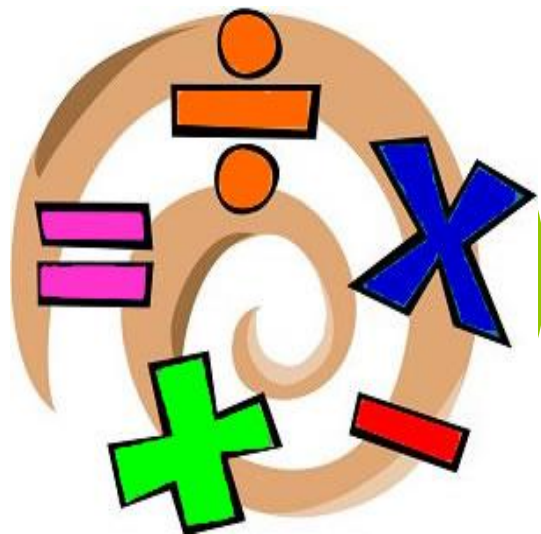
Number
Concept
Difficulties

- Usually appears when dealing with larger numbers and place value

Counting skills
deficits

- Difficulty with counting knowledge and counting accuracy – working memory problems may be present

Difficulties with Arithmetic Skills



$$3 \times 3 = 6$$

Procedural Disorders:
students displaying
this disorder:

- Use arithmetic procedures that are developmentally immature
- Have problems sequencing the steps of multistep procedures
- Have difficulty understanding the concepts associated with procedures
- Make frequent mistakes when using procedures

Difficulties with Arithmetic Skills



Memory Disorders

- Have difficult retrieving arithmetic facts
- Have a high error rate when they do retrieve arithmetic facts
- Retrieve incorrect facts that are associated with the correct

$$9 + 7 = 15$$

Difficulties with Arithmetic Skills



$$\begin{array}{r} 457 \\ +27 \\ \hline \end{array}$$

Visual Spatial Deficits

- Have difficulty with the visual spatial arrangement of their work, such as aligning the columns in multicolumn addition
- Often misread numerical signs, rotate and transpose numbers, or both.
- Misinterpret spatial placement of numerals, resulting in place value errors.
- Have difficulty with problems involving spatial reasoning in areas, as required in algebra and geometry.

What teachers need to consider.

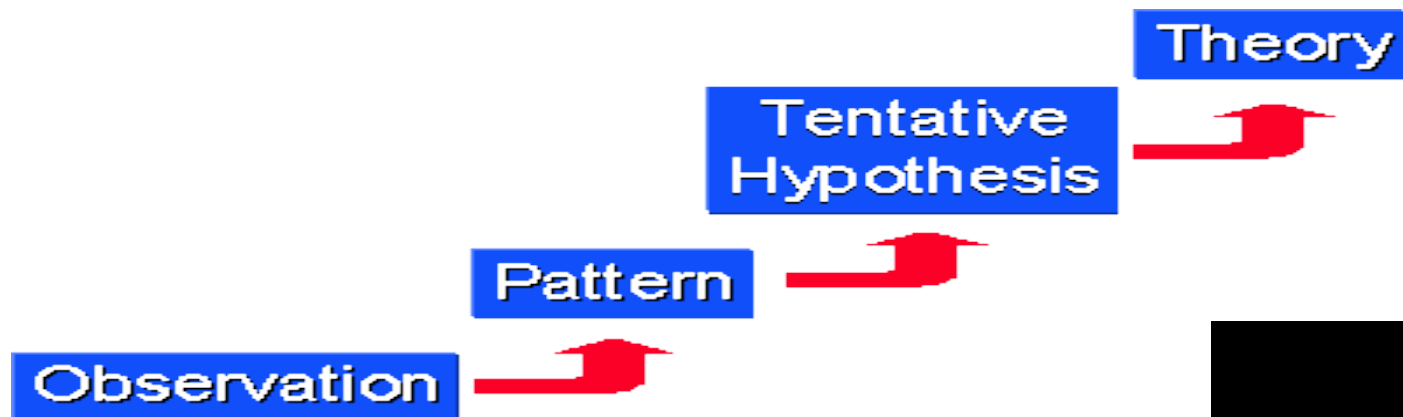
What is the source of the problem?

- What skills are weak?
- Has the student mastered prerequisite skills?
 - Can they:
 - Follow sequential directions
 - Recognize patterns
 - Estimate by forming a reasonable guess as to size, quantity and amount
 - Good spatial organization and orientation



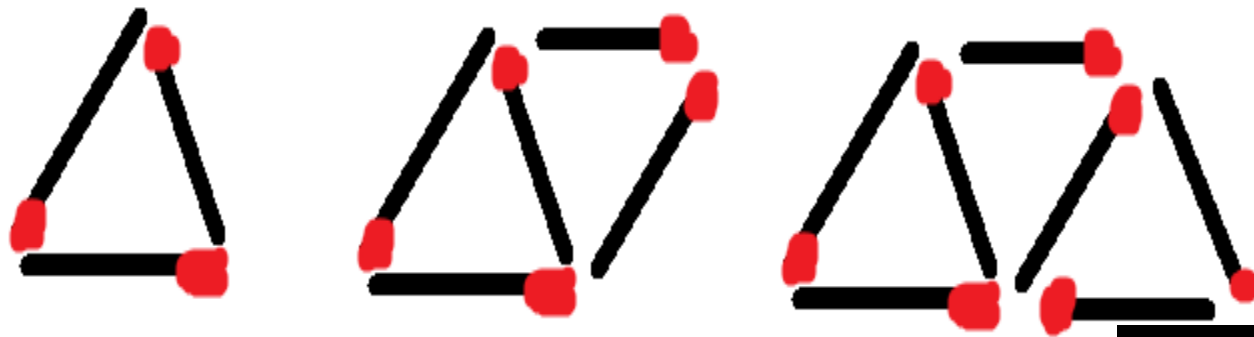
Deductive Reasoning

- Can student do deductive reasoning /reason from a stated premise to a logical conclusion?



Inductive Reasoning

- Can student do inductive reasoning /detect the patterns in different procedures and concepts?



Language of Mathematics

This is an area where a lot of students have difficulty. They may have problems with the following;

- 1. They may be ELL
- 2. They may have issues with remembering vocabulary terms and associating it with the mathematical operation
- 3. They may have a limited vocabulary and not equate the operation of multiplication and product as being the same

What Works?

What helps students retain and understand what they are being taught?

- 1. Teach fewer concepts at a time
- 2. Use manipulatives, visuals and software
- 3. Helps students search for and find patterns.
- 4. Build on student's strengths.
- 5. Spiral and reteach important information frequently.



More of what works!

- Sentence frames/ There are ___ sides to a triangle
- Math games – (a little stress helps the brain remember)
- Early exposure to prenumeracy skills – i.e. ask children to go up 4 steps, down 2.