Schema-Based Instruction (SBI):

What is it?

- A method for teaching students how to solve math word problems
- Schema – a structure that helps students to organize their knowledge and understanding of different types of word problems
- Supports students in determining the best way to solve a word problem

Purpose:

- To support students in their understanding of word problems
- To provide scaffolded instruction
- To use organizational structures to help students categorize different types of word problems

Advantages:

- Has been proven to be supportive for students with Learning Disabilities
- Goes beyond the basic algorithms by teaching students how to understand the word problems
- Could be used to provides support for all students, not just those with Learning Disabilities
- Useful at the high school level to support individualization of students struggling with mathematical word problems

Types of Additive Word Problems: Those for which the solution operation is either addition or subtraction

- **Change**
  - A change occurs to the beginning set, causing a change in the end set
  - Ex. John has 54 candies. He eats 14. How many candies does he have left?
- **Group**
  - This involves part-whole relationships
  - Knowing that the whole is equivalent to the sum of its parts
  - Ex. I have 5 apples and 6 bananas. How many pieces of fruit do I have altogether?
- **Compare:**
  - One set acts as the comparison set
  - Ex. Mary has 6 lollipops. Her brother has 3 times as many lollipops. How many lollipops does Mary’s brother have?

Types of Multiplicative Word Problems: Those for which the solution operation is either multiplication or division

- **Multiplicative Compare**
  - Two different sets are being compared
  - Ex. Matthew is saving money to buy a dirt bike. This month, he saved 12 times as much as he saved in December because he was hired to deliver papers. In December, Matthew saved $16.35. How much money did Matthew save this month?
Vary

- There is a specific relationship between two sets of quantities, which is maintained when either of the two quantities change
- Ex. Statistics Canada has determined that there are 30,000,000 people living in urban centres in Canada. If Canada has 230 urban centres, how many, on average, people live in each urban centre?

Proportion

- There is a direct or inverse relationship between two sets of quantities
- Often “if” “then” questions
- Ex. If two pencils cost $1.35, then how many pencils can you buy with $7.50?

Procedure: Use a four-step strategy checklist calls FOPS to support student learning of this strategy

Student Procedure for FOPS:

- Find the problem type
  - Read the problem
  - Retell the problem to clarify understanding
  - Decide the problem type and draw a diagram of the important information
- Organize the information
  - Underline the key words found in the word problem (more than, on average, etc.)
  - Fill in the diagram with important information
  - Set up the problem
- Plan to solve the problem
  - Change the information in the diagram into a mathematical equation
- Solve the problem
  - Solve using already known strategies such as cross multiplication
  - Check the answer by putting it into the diagram

Teacher Procedure:

- Teach the prerequisite skills (Ex. Recognizing the different types of problems schemata)
- Introduce the schema strategy instruction using whiteboard, SMART board, or overhead
  - Provide clear modeling
  - Demonstrations
  - Explanations through examples
- Teach the generalized rules for determining the operation needed to solve word problems
- Check student understanding of strategies and provide necessary corrective feedback
- Provide guided practice
  - Presenting schemata diagrams as students learn to apply the strategy
  - Reduce scaffolding (help) over time as students create diagrams to solve word problems more independently
- Provide systematic and varied practice to support the transfer and retention of skills
- Monitor student progress through frequent checks
ADHD:

Schema-Based Instruction

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For further information go to:

- Power Point at


- [www.teachingld.org/pdf/teaching_how-tos/journal_articles/Article_5.pdf](http://www.teachingld.org/pdf/teaching_how-tos/journal_articles/Article_5.pdf)


- Software: Go Solve Word Problems by Scholastic Information:
  
  - This is an adaptive math software program meant to teach students to recognize the underlying mathematical construct of a word problem. It makes use of anchored instruction, guided practice, and adaptive practice. It does not identify the type of word problem, but uses graphic organizers to organize information and to help solve the problem.
  