

## Schema-based Instruction for Mathematics Word Problem-solving

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### Statement of the Problem

Students with learning disabilities often experience difficulties in solving mathematical word problems due to difficulties distinguishing between relevant and irrelevant information and deciding on the most relevant mathematical operation to use.

### Proposed Solution/Intervention

Schema-based Instruction (SBI) teaches the students to categorize a word-problem into one of several different types (change, vary, compare and multiplicative) using key features of the problem. First students are taught to use the problem schemata when given both story situations and diagrams. They learn to read a complete story situation and then map it onto the appropriate schemata diagram. Next they are taught how to map critical elements of a problem on to a diagram and flag the missing element with a question mark. This enables them to choose the appropriate operation. This type of problem solving strategy enhances a student's conceptual understanding. By developing a visual schema the load on cognitive processing may be reduced for those children with learning disabilities. Scripted lessons may be used to increase implementation fidelity.

### The theoretical rationale – how does it work?

SBI seeks to address student difficulty by explicitly teaching strategies to translate

text into a semantic representation of a problem (change, vary, compare and multiplicative compare). It does this by teaching the student to recognize the semantic structure of the problem and then how to construct a schematic diagram, which represents the relevant story information. The strategies taught in SBI help students discriminate the crucial information of a problem from the irrelevant.

### What does the research say? What is the evidence for its efficacy?

A large body of peer-reviewed studies has been published on the use of SBI in teaching students with, and without learning disabilities over the past 20 years. Many studies show promising results in terms of acquisition, maintenance and generalisation of the strategy for teaching word problem-solving skills. The research shows a high level of efficacy for this strategy over traditional methods of instruction for students with learning disabilities.

### Conclusions

The evidence provided by the aforementioned peer-reviewed studies would suggest that SBI is a useful strategy for teaching word problem solving skills to children with Learning Disabilities.

### The MUSEC verdict

Recommended

Key references may be found at:  
[http://www.musec.mq.edu.au/community\\_outreach/musec\\_briefings/](http://www.musec.mq.edu.au/community_outreach/musec_briefings/)

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