USING MNEMONIC INSTRUCTION TO TEACH MATH

What Is Mnemonic Instruction?

Mnemonic instruction is a set of strategies designed to help students improve their memory of new information. Mnemonics instruction links new information to prior knowledge through the use of visual and/or acoustic cues. These strategies have been proven effective with students at a wide range of ability levels (gifted, normally achieving, and those with mild and moderate disabilities) and at all grade levels. Mnemonics are particularly helpful in teaching students with disabilities who have difficulty recalling verbal and content-area information, as they are effective with any type of verbal content.

There are three basic types of mnemonic strategies:
- *Keyword* – A keyword is a familiar word that sounds similar to the word or idea being taught. Keywords are generally used with an illustration of some type. The teacher creates a picture or other graphic that links the old and new information in the student's memory. For example, a mnemonic for remembering the definition of the word "carline" (meaning witch) might be a drawing of a witch driving a car.
- *Pegword* – Pegwords refer to a set of rhyming words that are used to represent numbers. For example, the pegword for "one" is "bun." Pegwords are used to help students remember information involving numbers or other information in a particular order.
- *Letter* – Letter strategies include acronyms and acrostics (or sentence mnemonics). For example, the acronym **HOMES** can be used to help students remember the names of the Great Lakes (Huron, Ontario, etc.). Acrostics are sentences in which the first letters of the words correspond to the first letters of the information students are expected to remember. For example, "**E**very **G**ood **B**oy **D**oes **F**ine" is commonly used to help music students remember the notes on the lines of the treble clef.

What Does It Look Like for Math?

All three types of mnemonic strategies can be used effectively in teaching math. Mnemonics are used in teaching math facts, order of operations, measurement, geometry, problem-solving techniques, and other areas of math. The pegword strategy is used almost exclusively in math because it is designed specifically to help students remember numeric information, especially in a particular sequence. Each of the three types of mnemonics is illustrated below as they can be used for differing areas of math instruction.

How Is It Implemented?

In teaching new content, good teachers not only tell their students what is important to remember, they give them ways to remember it. Teachers must:

Ø Create the mnemonics themselves and must be explicit in their instruction, telling students, for example, "[H]ere is a good way to remember this."

Ø Go through the specific steps involved in using the mnemonic to show students how to use it to retrieve information.

Ø Practice all the steps of the strategies with the students, until they can practice them independently and retrieve the information correctly.

See the references at the end of this brief for resources on combining mnemonics, using them with varying levels of student independence and teacher support, and using them with other teaching techniques.

There is no need to be an accomplished illustrator to create the illustrations or other graphics used in some mnemonics. Simple drawings or clip art can be used, as in the example below. Most word-processing software offers a wide selection of clip art, and there are Web sites offering free or inexpensive clip art. And most mnemonics can be used without pictorial illustrations. The references at the end of this brief provide some sources teachers can use in developing mnemonics and accompanying illustrations.

Keyword Strategy

The keyword strategy is based on linking new information to keywords that the students already know. This strategy can be an effective way to teach multiplication facts. For example, to learn the "2 Family" of multiplication facts, which is described in the box, students are taught to associate a visual image with each fact in that family and then are given a strategy that utilizes the visual image for solving it.

Example of Keyword Strategy
Visual Images for the "2 Family"
• 2x2 skateboard with 2 sets of wheels
• 3x2 six pack of soda
• 4x2 spider with two sets of four legs
• 5x2 two hands with all fingers held up
• 6x2 dozen eggs in a carton
• 7x2 calendar with 2 weeks circled
• 8x2 two octopi, each with eight tentacles
• 9x2 an 18 wheel truck
(Wood & Frank, 2000)

Pegword Strategy

The pegword strategy uses a consistent set of rhyming words to represent numbers. The rhyming words, or "pegwords," provide visual images that can be associated with facts, thereby helping students associate the number that rhymes with the pegword. This strategy is useful for teaching many areas of math, especially math facts; however, students must have a firm understanding of the pegwords before the strategy can be introduced. For example, to teach the math fact 6x6, the student would first be taught the pegword "sticks" to associate with six. In other words, students have to first be taught the pegwords and how
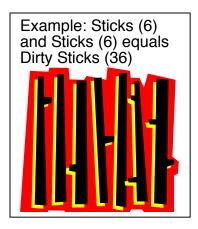
to use them, before a specific pegword mnemonic can be taught and used. Once the student learns all the pegwords, the student can learn the pegword strategy for 6x6 (sticks x sticks) = 36 (dirty sticks). The boxes below further illustrate the steps to teach the 6x6 pegword strategy.

How to Teach the Pegword Strategy?

Use the pegword flashcard, which has corresponding visual symbols. (Example: six = "sticks")

Teach students how to use the Pegword Strategies.

Have students say the pegword strategy for each math fact.

Example: Sticks (6) and Sticks (6) equals Dirty Sticks (36)

Letter Strategy

As shown above, letter strategies involve the use of acronyms or acrostics (sentence mnemonics). One acronym that can be used in math is **STAR**, which is an effective instructional strategy with students who have progressed in math sufficiently to learn word problems and equations. This strategy cues students to complete general problem-solving steps. Teachers must model the strategy to students and then use the mnemonic repeatedly with students until they are able to use it independently. See the box below for a description of the **STAR** acronym.

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Letter Strategy for Problem-Solving

Search the word problem
Translate the words into an equation in picture form
Answer the problem
Review the solution

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References

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Ellis, Edwin (1993). Integrating Strategy Instruction: A Potential Model for Teaching Content Area Subjects to Adolescents with Learning Disabilities. *Journal of Learning Disabilities* 26, 6, 358-383.

Gagnon, Joseph Calvin & Maccini, Paula (2001). Preparing Students with Disabilities for Algebra. *TEACHING Exceptional Children* 34, 1, 8-15.

Scruggs, T.E. & Mastropieri, M. A. *Teaching Tutorial: Mnemonic Instruction.* www.teachingld.org

Wood, Donna K. & Frank, Alan R. (2000). Using Memory-Enhancing Strategies to Learn Multiplication Facts. *TEACHING Exceptional Children* 32, 5, 78-82.

Other Web Resources

Alert 5: Mnemonic Instruction. www.teachingld.org

www.allfree-clipart.com

www.ssaskschools.ca/curr_content/bycrsjmath/geometry/teachers/length/teachfac.html