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Teaching Tutorial:

Mnemonic Instruction

By Tom Scruggs and Margo Mastropieri

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About the Authors

Tom Scruggs

Tom Scruggs is Professor of Special Education in the Graduate School of Education at George Mason University, Fairfax, Virginia. He worked previously at Utah State and Purdue Universities. Prior to working in higher education, Scruggs taught students with disabilities on the preschool, elementary, and secondary levels in Massachusetts and Arizona.

Professor Scruggs' research interests have focused on learning and memory of students with disabilities. He has also been interested in strategies for promoting inclusion, science education, test-taking skills, peer mediation, and quantitative research synthesis. His publications include over 160 journal articles, 24 book chapters, and 15 co-authored or co-edited books, including The Inclusive Classroom (Prentice Hall), and Effective Instruction for Special Education (PRO-ED).

He has served as co-editor of the DLD journal Learning Disabilities Research & Practice, and currently serves on editorial Boards of several related professional journals. He serves with Mastropieri as co-editor of the research annual, Advances in Learning and Behavioral Disabilities (Elsevier Science).

Margo Mastropieri

Margo Mastropieri is Professor of Special Education in the Graduate School of Education at George Mason University, Fairfax, Virginia. She taught previously at Utah State and Purdue Universities. Prior to working in higher education, Mastropieri was a high school teacher in Massachusetts, an elementary teacher in Mesa, Arizona, and a diagnostician at the Mount Holyoke College Learning Disabilities Center.

Professor Mastropieri's research interests have focused on learning and memory of students with disabilities. She has studied strategies for effective inclusive instruction and has suggested instructional strategies to facilitate inclusive efforts. Her focus has been on how students with disabilities learn in school, and cognitive strategies designed to promote learning and retention of school-related information. Her publications include over 140 journal articles, 24 book chapters, and 14 co-authored or co-edited books.

She has served as co-editor of the DLD journal Learning Disabilities Research & Practice, and currently serves on editorial Boards of several related professional journals.
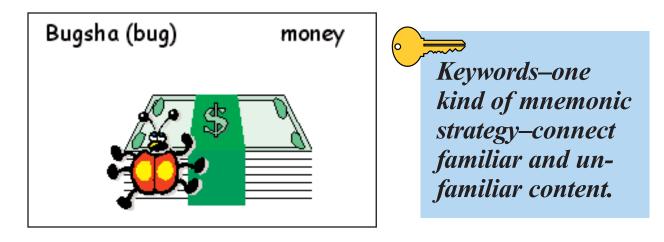
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1. What is mnemonic instruction?

Mnemonic instruction refers to instructional or learning strategies designed specifically to improve memory. In many cases, it refers to modifying or changing to-be-learned information to link it directly to information the learner already knows. This enhanced link between new information and prior knowledge, often employing both visual and acoustic cues, usually results in greatly improved test scores.

One of the most powerful mnemonic strategies is the **keyword method.** The keyword method works best when the information to be learned is unfamiliar to the students. For a simple example, consider teaching the slang word **bugsha**, meaning "money."
1. Create a "keyword" for the new word, that is familiar to learners, sounds like bugsha, and is easily pictured (bug).
2. Create a picture that links the keyword with the definition (a bug climbing on a stack of money).

Mnemonic instruction refers to instructional or learning strategies designed specifically to improve memory.

Bugsha (bug)   money

Keywords–one kind of mnemonic strategy–connect familiar and unfamiliar content.

Tell students, when they are asked the meaning of "bugsha,"
1. Think back to the keyword (bug),
2. Think of the picture (with the bug in it),
3. Remember **what else was happening** in the picture (bug climbing on a stack of money), and
4. Produce the definition (money).

EXAMPLE

Consider the Old English word **carline**, meaning "witch." In this case, "car" is a good keyword for **carline**, because it sounds like the first part of carline, and is easily pictured.
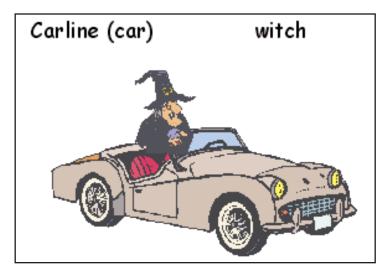
Carline (car)   witch

Tell students, when they are asked the meaning of "carline,"

1. Think back to the keyword (car),
2. Think of the picture (with the car in it),
3. Remember **what else was happening** in the picture (a witch was in the car), and
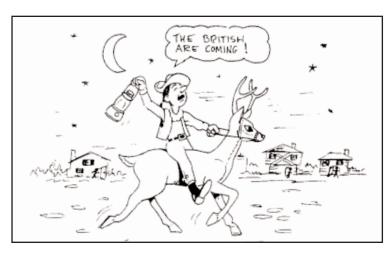4. Produce the definition (witch).

Keywords can also be used to remember important people, places, or events in history.

EXAMPLE

To help students remember that Paul Revere warned the American colonists that the British army was coming, use the keyword "deer" for Revere, and show a picture of Paul Revere riding a deer to alert the population: When asked what Paul Revere is famous for, students should be taught to

1. Think of the keyword (deer),
2. Think of the picture (with the deer in it),
3. Remember what else was happening in the picture (alerting the colonists that the British are coming), and
4. Retrieve the answer.

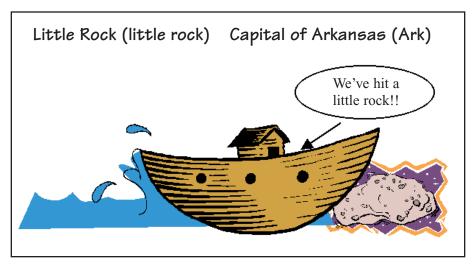> *Keywords can be used to remember important words, people, places, or events in history.*

THE BRITISH ARE COMING!

PAUL REVERE (Deer)

–warned colonists of the British advance on Concord

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Keywords can also be combined with keywords, when both question and answer need to be made more concrete for the learner.

EXAMPLE

To teach that the capital of Arkansas is Little Rock, show a picture of an Ark (keyword for Arkansas) landing on a "little rock" (keyword for Little Rock):

When asked to name the capital of Arkansas, tell students to:
1. Think of the keyword (ark for Arkansas),
2. Think back to what was happening in the picture (ark on a little rock),
3. Think of the word for the keyword (little rock for Little Rock), and
4. Name the capital.

When asked to name the state for which Little Rock is the capital, tell students
1. Think of the keyword (little rock for Little Rock),
2. Think back to what was happening in the picture (ark on a little rock), and
3. Think of the word for the keyword (ark, in this case Arkansas).

Other types of mnemonic systems are also effective. The **pegword** method uses rhyming proxies for numbers (one is **bun**, two is **shoe**, three is **tree**, etc.) to help students remember numbered or ordered information.

Pegwords–another kind of mmemonic aid–help people to remember numerically ordered information
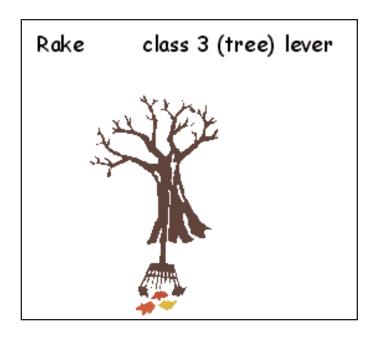
EXAMPLE

To remember that a rake is an example of a third class (or class 3) lever, show a picture of a rake resting against a tree (pegword for 3). Tell students when they are asked to provide an example of a "class-three lever,"
1. Think of the pegword (tree for three),
2. Think of the picture with the tree in it,

3. Remember what else was happening in the picture, and
4. Come up with the "rake" as the example of the third class lever.

Rake   class 3 (tree) lever

Keywords can also be combined with pegwords, to remember numbered or ordered information that is not familiar.

EXAMPLE

To help students remember that the mineral *crocoite* is hardness level 2 (on the Mohs scale), show a picture of a **crocodile** (keyword for crocoite) wearing **shoes** (pegword for 2).

Crocoite (crocodile)   Hardness 2 (shoe)

Students can practice retrieving the information two different ways.
a) Tell students when they are asked to provide the hardness level of crocoite,
1. Think of the keyword (crocodile for crocoite),
2. Think of the picture (with the crocodile in it),

3. Remember what else was happening in the picture (crocodile with shoes).
4. Think of the pegword (shoe for two) and
5. Come up with the number "two" for the hardness level.

b) If, however, students are asked to provide the name of a mineral that is "two on the hardness scale," they should
1. Think of the pegword for two (shoe),
2. Think of the picture (with the shoe in it)
3. Remember what else was happening in that picture (crocodile with shoes).
4. Think of the keyword and what it represented. (In this case the crocodile stands for crocoite, so crocoite is a mineral that is number two on the hardness scale.)

Multiple attributes have also been linked to mnemonics in the same way shown in the example about crocoite.
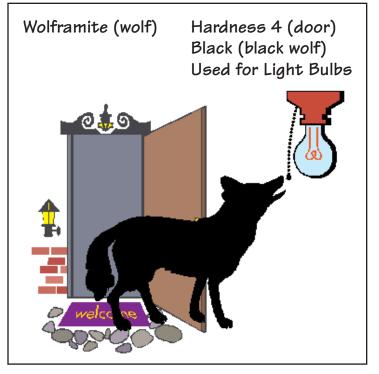
EXAMPLE

Students may be required to learn more than the hardness level of a mineral. In the case of crocoite, for example, they might need to learn that it is often exhibited in display cases and that it is orange in color. Attributes like these have been successfully integrated within the illustration to help students' recall. In the case of learning the color, the keyword can be colored in the exact color you want students to remember, so the crocodile would be colored orange. To help remember the use of "used for display in collections," the entire picture of an orange crocodile wearing shoes would be shown inside a display case. Retrieval information would parallel the previously mentioned procedures, by emphasizing **what else was happening** in the picture.

Multiple attributes can be linked to keywords and pegwords to teach complex relationships among facts.

EXAMPLE

To teach that the mineral **wolframite** is number 4 on the hardness scale, you could picture a wolf (keyword for **wolframite**) at a door (pegword for 4). However, in the same picture, you can teach that **wolframite** is a black mineral, hardness level 4, and used in the manufacture of lightbulbs (i.e., tungsten for filaments). Show a picture of a black wolf, at a door, turning on a lightbulb. The black wolf represents the color, the door the hardness (4), and the lightbulb represents the use, as shown in the following illustration:

Wolframite (wolf)   Hardness 4 (door)
Black (black wolf)
Used for Light Bulbs

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Pegwords can also be used to promote recall of math facts.

EXAMPLE

To remember the fact 3 x 4 = 12; students can use pegwords (3 is **tree**; 4 is **door**; twelve is **elf**), and remember the words "tree door is elf," and think of the picture, as shown.

3 x 4 = 12   Tree x door = elf

Letter strategies are a third type of mnemonic strategies, and include **acronyms** and acrostics. Acronyms are words whose individual letters can represent elements in lists of info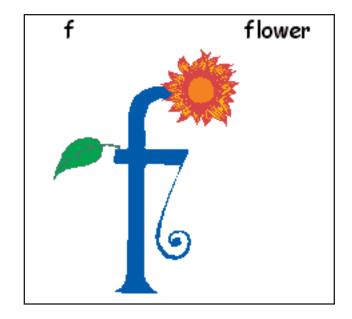rmation, such as the familiar HOMES to represent the Great Lakes (Huron, Ontario, Michigan, etc.). Acrostics are sentences whose first letters represent to-be-remembered information, such as **"My very educated mother just served us nine pizzas,"** to remember the nine planets in order (Mercury, Venus, Earth, Mars, etc.). Acrostics and acronyms often assume that learners will be able to retrieve the information, given the first letter (e.g., "O" = Ontario).

Acronyms and acrostics can also be used to facilitate memory for facts.

Some other types of mnemonics can be useful in specific instances. To help students remember the sounds of individual letters, show a picture with the letter interacting with a word representing the letter sound.

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EXAMPLE

The letter "f" can be drawn to resemble a flower, the first letter of which makes the /f/ sound:

In another application, students can use verbal elaborations as mnemonics to remember the difficult parts of spelling words.

EXAMPLE

To remember the spelling of the difficult part of "bargain" (-gain), students can remember the sentence, "I hope to **gain** from the bargain," to remember the word "gain" is part of bargain. In another example, to remember that the letter "e" appears three times in the word "cemetery," students can remember the sentence, "She screamed 'E-E-E' in the cemetery," as shown:

Elaborations that emphasize an important feature of a word can help students remember the word's spelling.

2. How do we know that mnemonic instruction is effective?

The effectiveness of mnemonic instruction has been demonstrated in dozens of individual research studies, employing thousands of students with learning disabilities and other special needs, in addition to normally achieving and gifted students. In these studies, students taught mnemonically have greatly outperformed students in a variety of comparison conditions, including free study, teacher directed rehearsal, and organizational strategies (Scruggs & Mastropieri, 2000; Mastropieri & Scruggs, 1989a), often by margins of 2-1 or even 3-1.

Mnemonic instruction has been experimentally validated with students with learning disabilities in:

- English vocabulary
- Foreign language vocabulary
- Earth science
- Physical science
- U. S. history
- World history.

Some mnemonic strategies have also been helpful in:

- Letter recognition
- Math facts
- Spelling

In any area where recall of verbal content is required, mnemonic instruction can be helpful. This is particularly true with students with learning disabilities who have difficulty recalling verbal and content-area information.

Mnemonic strategies provide a direct link from the question to the answer, and thus can make difficult retrieval routes explicit and straightforward.

Research Findings

- Forness, Kavale, Blum, and Lloyd (1997) summarized intervention research in special education and concluded that mnemonic instruction was associated with the most positive results.

- We summarized 24 experimental studies on mnemonic instruction with students with special needs (mostly, learning disabilities), and found that the average student across all comparison conditions scored 43% correct, overall, while the average mnemonically instructed student scored 75% correct (Mastropieri & Scruggs, 1989).

- We summarized the outcomes of 34 empirical investigations which had been conducted since 1983 with students with special needs, including learning disabilities in most cases. These studies included elementary, middle school, and secondary level students across a wide variety of vocabulary and content areas. The average "effect size" across all these

investigations was 1.62 standard deviation units, an effect that suggests that the "average" student receiving mnemonic instruction would score at about the 90th percentile of the comparison group (Scruggs & Mastropieri, 2000).

- Classroom teacher applications of mnemonic techniques have suggested that these strategies are very effective in inclusive classrooms, in some cases raising the performance of students with learning disabilities to that of the normally achieving students (Mastropieri, Sweda, & Scruggs; 2000; Uberti, Scruggs, & Mastropieri, in press).

In addition, students with learning disabilities who have been taught mnemonically are aware of the positive effects of these strategies, report that they enjoy using mnemonics, and report they would like to use them in a variety of different subject areas (e.g., Mastropieri, Scruggs, & Levin, 1985b; Mastropieri, Sweda, & Scruggs, 2000; Scruggs & Mastropieri, 1992; Scruggs et al., 1987).

References of research studies documenting the effectiveness of mnemonic strategies are provided at the end of this tutorial.

3. When should mnemonic strategies be used?

Mnemonic strategies are appropriate to use whenever there is information to be remembered. Mnemonic strategies are ideally suited for helping students remember vocabulary or technical terms, or important content area information from, e.g., science or social studies.

What about comprehension?

Although memory for academic content is extremely important, comprehension is also critical. Mnemonic strategies have not been seen to inhibit comprehension (in our research, students taught mnemonically have done better than controls on comprehension tests — mostly because they remember more information they can apply on comprehension tasks). However, it is possible to remember information (mnemonically or otherwise) without comprehending it. Memory and comprehension should not be looked at as mutually exclusive competitors, but important partners in the learning process. When memory is important, memory strategies are appropriate. When comprehension needs to be enhanced, comprehension strategies (including, e.g., elaboration, multiple examples, multi-media presentations, hands-on applications) are appropriate and can be used side-by-side with mnemonic strategies. Similarly, some problem-solving applications, for example, algebraic solutions for chemistry problems, may not be suitable for mnemonic strategy instruction (although recall of some algebraic formulae may be appropriate).

Research is more limited in some specific areas of mnemonic instruction. For example, other than letter-sound correspondence, mnemonic instructional strategies have not been widely tested with students with learning disabilities younger than 3rd grade level. This is not to say that mnemonic strategies are not effective at these age levels, only that fewer studies has been conducted. Therefore, teachers should carefully monitor any implementations at these levels very carefully.

4. What is needed to prepare to use mnemonic strategies?

There are several things to think about when beginning to plan to use mnemonics in your classroom:

1. What do students really need to learn?

The first step in developing mnemonic strategies is to determine specifically what must be learned (from, e.g., textbooks, curriculum guides, teacher presentations). Prioritize your teaching objectives for students to identify the most important content to be mastered. Then, select content from that prioritized list that may be more difficult for your students.

Make a list composed of questions related to the to-be-learned content.

EXAMPLE

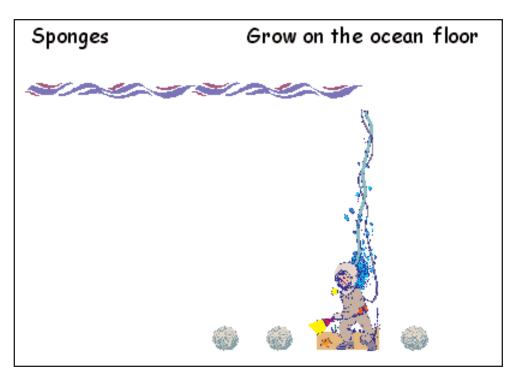| Type of knowledge	Example of question → answer
• Vocabulary word and its definition	vituperation → abusive speech
• Scientific term and its definition	trilobite → ancient sea animal
• Names of famous individuals and their accomplishment	Thomas Paine → wrote "Common Sense"
• Names of countries and their products, resources, locations	Saudi Arabia → oil exporter, Middle East
• Wars and their causes and effects	Civil War → slavery, states' rights
• States and their capitals	capital of Nebraska → Lincoln
• States and their products, natural resources	Iowa → corn

Start out by identifying the most important and most difficult information to remember. Information that is both important, and easily forgotten by students is an excellent starting place for mnemonic strategies.

Use mnemonic strategies for the most important and most difficult content.

2. How familiar and concrete is the information to be learned?

Familiar and concrete: Examine the list to determine the familiarity level of the content. If something is already familiar and concrete, just develop a picture of that thing interacting with the to-be-remembered information.

EXAMPLE

To help remember that sponges grow on the ocean floor, where "sponge" and "ocean" are familiar terms, just picture sponges growing on the ocean floor:

The retrieval steps are the same as if the keyword method were being used. That is, when students are asked about sponges,

1. Think back to the picture of sponges,
2. Think of what else was in the picture, and
3. Respond with the answer ("grow on the ocean floor").

Familiar but not concrete (abstract): If the information is familiar but abstract, develop a strategy using a symbol for the abstract concept.

EXAMPLE

"Uncle Sam" can be used to represent U.S. policy. To remember that the initial U.S. policy during the outbreak of World War I was neutrality, students can be shown a picture of Uncle Sam looking over to Europe at war and saying, "It's not my fight." Again, the retrieval steps would be the same as for the keyword method. That is, when asked about U.S. Policy, students should

1. Think of the picture with Uncle Sam (symbolizing U.S. policy) in it,
2. Think of what else is happening in the picture, and
3. Respond with the answer.

Abstract concepts can be symbolized in other ways.

EXAMPLE

The colors green and red can represent herbivores and carnivores, respectively. To show that **Brachiosaurus** was an herbivore, you could show a picture of a *green* (for herbivore) broccoli (keyword for **Brachiosaurus**). Similarly, warm-blooded and cold-blooded animals can be made more concrete by showing them in warm or cold-weather scenes, respectively. Thus, to show that birds are warm-blooded, show a picture of birds enjoying a warm, sunny day.

Unfamiliar information. If the information is unfamiliar (e.g., "carline"), then develop a strategy using the keyword method. Recode the unfamiliar term into something that is acoustically similar, easily pictured, and familiar to the target students (e.g., carline → *car*). Next, place that recoded "keyword" in an interactive picture with the to-be-remembered information. It is important that the keyword and the to-be-remembered information be doing something together, not simply appearing side-by-side (e.g., a witch driving a car).

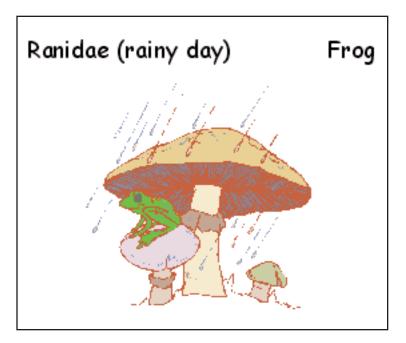### 3. How do I develop mnemonic pictures?

If you are a terrific artist, drawing pictures will be no problem. If you are like us, you need some alternatives! Pictures need only to be recognizable to students. Sure, fancy art work looks nicer, but even line drawings and stick figures help recall! There are several possibilities for developing illustrations, including:

- Pictures can also be cut out from magazines and newspapers and taped onto an interactive illustration.

- Sometimes there is a very able artist among your students or enrolled in one of the school's art classes who would be thrilled to help you out.

- We have also found the abundance of available clip art to be especially helpful in developing mnemonic illustrations. [Many of the pictures we are using in our chemistry research this year were developed using the clip art, some of it completely free from the Web. Go to a search engine and type in "clip art. If you know the exact object you are looking for, type in clip art _____ (word) and you will be amazed at what comes up! There are also many commercially available programs that contain numerous galleries of clip art such as Click ART (Broderbund), Print Master (Broderbund), Art Explosion (NOVA Development), or Picture It (Microsoft). Many of the illustrations we have presented here were taken from Click ART.]

- If you don't have any time or Internet access to find clip art, or any other way to develop pictures, simply provide an interactive sentence that describes what the picture would look like.

EXAMPLE

Say to your students:

The scientific term for the family of common frogs is **ranidae**. Can everyone say that? **Ranidae**, good! A good word clue (keyword) for **ranidae** is "rainy day." So, everyone think of a picture of frogs sitting in a rainy day. Think about your mental picture carefully, and explain it to the class" (students describe a picture such as the following):

The retrieval steps are the same as with any mnemonic picture:

1. Think of the keyword
2. Think of the image of the keyword in your mind, and what was happening in the image
3. Retrieve the answer

4. How long will it take me to develop all these mnemonic pictures?

The amount of time to develop mnemonic pictures can vary, depending on the method of creating pictures, and the time taken to develop the strategies. This is usually the most time-consuming part of mnemonic instruction. Keep in mind, however, that once developed, mnemonic strategies can be used over and over again, from year to year. So if just a few strategies are developed each year, a considerable number can be developed in time. Also, since they improve learning and retention, instructional time can be saved in the long run. Teachers teaching the same subjects can divide the content and share mnemonic materials. Brainstorming for ideas for good mnemonic strategies is also helpful. We have found from experience, that the more mnemonic strategies are developed, the less time it takes to develop more.

Creating mnemonic instruction materials is time-consuming, but over time a teacher can create a large store of reusable materials.

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5. What are all the materials I would need to present mnemonic strategies in my classroom?

First, you need the mnemonic pictures, and a method for presenting them. For very small groups, you may be able to simply show the pictures. For larger groups, mnemonic illustrations can be displayed on an overhead projector or on a computerized display.

It may also be useful to have smaller copies of the pictures to hand out for students to study, tutor each other, or complete practice activities, in which they write the strategies, responses, and describe how the picture helps promote memory. Practice with mnemonic strategies is a great way to ensure that information will be remembered for a long time.

5. How do I implement mnemonic instruction in my class?

When presenting important concepts and content in class, good teachers often say to their students: "This is important to remember." Excellent teachers, however, say: "This is important to remember, and what is a good way for us to remember this?" Or, "This is important to remember, and here is a strategy to help you remember this information." Strategic teaching consists of informing students of the specific steps they must employ to learn how to retrieve the information.

At first, mnemonic instruction should be very explicit, with teachers stating and practicing all the steps of the strategy with students, using maximum supports. Later, students can begin to practice strategies more independently.

Mnemonic instruction should start out with lots of teacher support and progress to the point that students can use strategies independently

Maximum supports

EXAMPLE

Using an overhead projector, notebook computer hooked up to a large screen, or other means of display, show the picture to the class and describe the strategy, using language such as the following:

> Today, we're going to learn some information, using a new strategy with a word clue to help you remember this information. I'll explain with this example.

> *Ranidae* is the scientific term for the family of common frogs. The word clue for *ranidae* is "rainy day." What is the word clue for *ranidae*? Good, rainy day. [show picture (see illustration on p. 15).] Now, remember this picture of a frog in a rainy day. Remember this picture of what? Good, a frog in a rainy day. So, when I ask the meaning of *ranidae*, first think of the keyword, rainy day, then think of the picture of the rainy day and think of what else was happening in the picture. Remember the frog in the rainy day, and give the answer, what? Good, frogs.

EXAMPLE

You can also practice retrieving the information from the opposite direction, for example, by asking students first the meaning of *ranidae*, and then by asking them the scientific term for the family of common frogs. Remembering in this direction can be a little more difficult because *ranidae* is not a familiar term initially, and some additional practice may be necessary.

> Now, let's try it the other way. If I ask you the scientific term for the family for common frogs, think of the picture with the frog in it, and think what else is happening. What is that? Good, it is a rainy day. Now what does rainy day stand for? Good, it stands for the answer, *ranidae*.
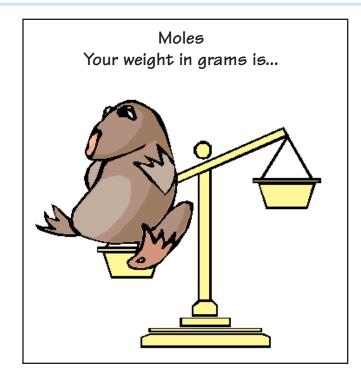
Experience and formative evaluation will help you determine how many mnemonic pictures you can use in a single lesson. Remember that it is possible, however, to combine more than one fact in a single mnemonic picture.

Intermediate support

Once students have learned the steps in mnemonic strategy instruction, they can begin to practice them independently with peers. In our present research (Mastropieri & Scruggs, 2001), peers practice mnemonic strategies in tutoring pairs in chemistry classes with more abstract content. Tutors can serve to promote recall of important terms as well as elaborations on the conceptual foundations of that information. Following are examples of tutoring materials about **moles**, and **molarity**.

The tutoring materials contain questions about the important content, mnemonic illustrations, and questions for peer tutors to ask their partners for follow-up and elaboration of the specific content.

EXAMPLE

Moles
Your weight in grams is...

Ask the question: What is a mole?

Answer: A mole is the atomic weight in grams of an element or compound
- If your partner is correct, go to $\Rightarrow$
- If your partner doesn't know the answer, review the strategy.
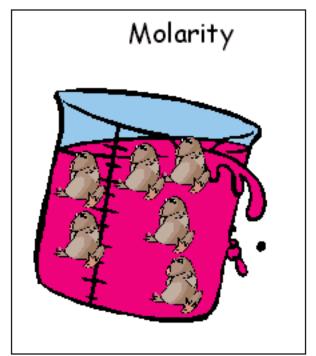
Strategy:
Think of the word "mole." Then, think of the picture of a mole on a scale looking at his weight in grams, to help you remember that a mole is the atomic weight in grams of an element.

Then ask: What is the strategy to remember mole?

Then ask again: *What is a mole?*

⇨ Then ask: What else is important about moles? [Answers include: The mole serves as a bridge between the invisible world of atoms and the macroscopic world of materials and objects]

Then ask: What is an example of a mole? [Answers include: O (oxygen) is atomic weight 16, so 1 mole O = 16 grams O]

Question: What is molarity?

Answer: Molarity is the concentration of a solute in a solution; moles per liter

- If your partner is correct, go to ⇨
- If your partner doesn't know the answer, review the strategy.

Strategy: Think of the word "moles" for mole, and remember the picture of a number of moles in solution, to remember molarity is the concentration of a solute in a solution, in moles per liter.

Then ask: What is the strategy to remember molarity?

Then ask again: What does molarity mean?

⇨ Then ask: **What else is important about molarity?**

[Answers include: molarity is a ratio, moles of solute divided by liters of solution]

Minimal support

Students can learn to use mnemonic strategies independently. This is best done in stages.

1. Students should be very familiar with the use of mnemonic strategies from having used them frequently in class.

2. Teachers can begin to solicit student input in the creation of mnemonic strategies ("what's a good way to remember this?"), using the steps in mnemonic strategy creation: create a key word, and show or imagine the keyword interacting with the to-be-remembered information:

   Class, what would be a good keyword for the Earth's **core**? Apple core? Yes, that would be a good keyword, because it sounds just like core and we can picture an apple core. Now, how could we use apple core to help us to remember that the Earth's core lies at the very center of the earth, and is made of iron and nickel? What would your picture look like? Now, draw your picture and label it.

3. Teachers can also provide group discussion on use of the retrieval steps, using dialogue similar to the following:

   Now remember, when I ask you about the Earth's core, remember the keyword you created, which is what? Good, apple core. And what is in the picture with the apple core? Good, the apple core is at the center of the earth, and made of irons and (5 cent) nickels. And what does that tell you about the Earth's core? Good, that it is in the center of the Earth, and is made of the metals iron and nickel.

Such group-administered mnemonic strategies can be very effective; however, it may take more time to cover the same amount of content than if the teacher simply displays the strategies (Scruggs & Mastropieri, 1992).

4. Students can be taught to generate their own strategies entirely independently, in their own classes. Teach them to remember the steps in creating mnemonic strategies:

   • Identify important information
   • Create a keyword for the unfamiliar word
   • Create (or imagine) a picture in which the keyword is interacting with the answer.
   • Study the strategy and practice until the information is learned (see Fulk, 1994; Fulk, Scruggs, & Mastropieri, 1992).

King-Sears, Mercer, and Sindelar (1992) described the successful use of the IT-FITS strategy to promote independent strategy use with students with learning disabilities in science classes. The strategy included the following steps:

- **I**dentify the term
- **T**ell the definition of the term
- **F**ind a keyword
- **I**magine the definition doing something with the keyword
- **T**hink about the definition doing something with the keyword
- **S**tudy what you have imagined until you know the definition (King-Sears et al., 1992, p. 27).

Students may need considerable supervision at first, as they learn the individual steps in strategy creation. In time, students can use this method to substantially improve their memory for academic content.

6. How do I know that teaching using mnemonics is working?

The best way to determine the effectiveness of mnemonic instruction is by frequently questioning and testing students on their recall of the information.

When reviewing the information, it is helpful to ask students to state the answer, and then how they remembered the information. In this way, you can collect feedback on student knowledge, as well as successful strategy use. You can compare students' scores on the items for which they used the strategy, with students' scores on the items for which they did not use the strategy. If the strategies are working appropriately, scores should be much higher for the items for which they used mnemonic strategies. Over time and frequent questioning, students may go directly to the answer without using the mnemonic retrieval steps. When students answer incorrectly, however, it is good to review again the strategy.

Evaluate whether mnemonic strategy instruction is working by asking students questions frequently and keeping records of their accuracy.

If individual mnemonic strategies do not appear to be working, ask yourself the following questions:

- Is the information suited to mnemonic strategies?
- Is the keyword familiar to the student?
- Does the strategy effectively link the unfamiliar term with the answer in an interactive illustration?
- Has enough practice been provided?

Students themselves can be asked to provide input on the effectiveness of individual strategies, and to share effective strategies with the class.

7. Where can I get additional information about mnemonic instruction?

Books

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