

Keeping Current

Research-Based Ideas for Teachers from the Editors of *Better Teaching*®

Teaching Thinking and Problem Solving Skills

Research shows that students who have good thinking skills do better in school and in life. They are able to use their knowledge in situations that require complex thinking and in solving real life problems.

A positive classroom climate that is characterized by high expectations, teacher warmth and encouragement and pleasant surroundings can enhance all kinds of learning—and classroom climate is especially important when it comes to teaching thinking skills. That's because moving beyond one's comfortable mental habits and experimenting with new ways of looking at things involves risk. In order for students to be willing to participate in such activities they need to feel free to explore new ideas, consider new opinions and try out different points of view.

Consider classroom layout

The physical layout you choose and the visual elements you include in your classroom can have a big impact on students' willingness to participate, to think and to take risks. For example:

- **Minimize the passive, receptive mode** that many students adopt when they sit in orderly rows facing the teacher. Arrange the desks in a semicircle so everyone is in the middle of things, so students are facing one another and so there are no back corners in which to hide.
- **Surround students with bulletin board displays** that feature quotations, cartoons, puzzles and copies

of their own work that illustrate the importance of good thinking. Use phrases that encourage students to think about how they think—"Is it fact or opinion?" and "What would happen if ... " for example.

Know the hallmarks of teaching to promote critical thinking

- **Ask open-ended questions** that do not assume one right answer. They encourage students to think and respond creatively without fear of giving the "wrong" answer. Ask questions that require students to repeat the information you are teaching. Careful, systematic questioning is one of the best ways to encourage higher order thinking.
- **Allow wait time** before accepting responses to questions. Critical thinking seldom involves snap judgments, and allowing adequate time before soliciting responses helps students understand that they are expected to deliberate and ponder, and that the response that comes to mind immediately is not always the best response.
- **Provide opportunities** for students to see how a newly acquired skill can apply to other situations and to their own personal experience.

Make thinking visible

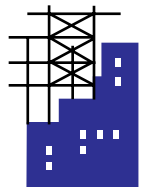
An important step in improving thinking involves helping students look at how they presently think.

Once students have completed a thinking task, ask them to describe exactly what they did. Then, have them listen to how other students explain their processes. Finally, have students analyze the different accounts to determine what steps work best.

Another way to make thinking visible is to model a thinking operation. Demonstrate the key steps and explain why each step is important. Next, have students attempt to replicate the procedure. The key is to make students compare what they currently do to what more skilled thinkers do.

Use scaffolding, cueing

Scaffolding and cueing are good ways to help students learn new thinking skills. A scaffold is a skeletal framework of a thinking procedure—such as a checklist—that lists each step in the process. You can use procedural checklists that list the steps in order, process-structured questions that walk students



through the steps they are to follow or graphic organizers that chart or diagram the thinking process.

Cues, or prompts, are much less explicit than scaffolds. For cues to be effective, students must already understand the procedures and rules they are to follow. In such cases, asking a volunteer to name the first step in the math process to be used, for example, can be an effective cue.

Try taxonomies

To make sure they are helping their students practice higher order thinking, many teachers use classification systems, or taxonomies, that identify the different levels of thought elicited by various questions. One very general type of classification system involves two basic types of questions. Recitation questions require students to retrieve information. Construction questions require students to construct new knowledge.

The most popular system for classifying questions is Bloom's Taxonomy, which identifies six levels of cognitive processing:

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation.

The skyscraper analogy

The skyscraper analogy is one good way to help students understand that moving their thinking from the knowledge level to the evaluation level results in more meaningful or expanded thinking—just as moving from the bottom floor of the skyscraper to the top floor results in a broader view.

Use the following language to explain the levels of Bloom's Taxonomy and the prompts related to each level:

1. **Ground floor (knowledge)**—getting the facts.
—What is ... ?
—Can you recall ... ?
—How would you explain ... ?
2. **Twentieth floor (comprehension)**—understanding the facts.

- What is the main idea of ... ?
—How would you summarize ... ?
—What facts or ideas show ... ?
3. **Thirtieth floor (application)**—making connections.
—What examples can you find to ... ?
—How would you show your understanding of ... ?
 4. **Fortieth floor (analysis)**—taking the pieces apart.
—How would you classify ... ?
—What conclusions can you draw from ... ?
—Why do you think that ... ?
 5. **Fiftieth floor (synthesis)**—creating new understandings.
—What would happen if ... ?
—Suppose you could
—What would you do ... ?
 6. **Roof (evaluation)**—giving opinions.
—What is your opinion of ... ?
—Why was it better than ... ?

Follow up with writing

Follow up reading assignments with a writing assignment. Writing is a highly complex task that requires planning, interpreting, executing and reviewing—and it can engage students in higher level thinking about what they have read.

Here are a few possibilities:

- **Literary letters.** Have students share their thoughts about their independent reading assignments in letters to you. Provide written responses that encourage students to reconsider and extend their thoughts.
- **Reading response questions.** Pose questions that require students to record their immediate reactions to what they have read; analyze their

reactions; and consider what they have read in the light of other readers' reactions, other things they have read and their own personal experiences.

- **Letter to an author.** After reading a book by a living author, have students research the author's life and write letters to the author posing specific questions about the book.
- **Buddy book journal.** Pair students with partners and have them read the same book. Each student must record three reflections about the book in his own journal. He must also respond to his buddy's journal of reflections.
- **Character journal.** Allow students to select a book with a well developed main character. Ask students to assume the role of that character and write first person diary entries reacting to one incident in each chapter.

Integrate thinking skills across the curriculum

Teachers can and should teach thinking skills and subject matter at the same time. Make sure that students have repeated opportunities to apply and practice their thinking skills.

Focus on topics and themes that are relevant to students and to their lives today and in the future. Build learning activities around productive thinking questions and activities.