Metacognitive Inquiry

Metacognitive inquiry is a central instructional technique in T² units. It embodies three significant educational ideas:

- Inquiry
- Metacognition
- Modeling

Inquiry has long been considered an important educational methodology. It involves using questions to generate discussion, to assess comprehension, and to direct a dialog. Most teachers would agree, however, that the primary purpose of questioning in the learning environment is to promote thinking. What makes questioning more effective than simply stating or telling for stimulating thought? The answer is both intuitive and relatively simple: Questions demand a response, statements do not. A listener can passively receive a statement without any cognitive engagement at all. In response to a question, however, the listener is compelled to construct a rejoinder, resulting in at least some cognitive engagement (Sigel & Cocking, 1977).

Metacognition is a newer idea in education, and an important one in our understanding of how learning occurs. The term refers to the deliberate conscious control of one’s own cognitive activity and is called “metacognition” because basically it means “cognition about cognition” (Flavell, 1985). Actually, there are three separate sets of skills involved in metacognition. The first metacognitive skill is to understand what strategies, resources, etc. are needed to accomplish a task. For example, to remember the capital cities of the 50 states of the United States, students could use a mnemonic strategy. The second metacognitive skill is to know how to use the strategies. For example, students would need to know how to construct a good keyword mnemonic that links a state with the appropriate capital. The third skill is to know when to use the strategy. Students should know to construct a keyword mnemonic when a particular association is difficult to remember, and when they know they will be asked to recall the association, perhaps for a test. Metacognitive skills are believed to play an important role in many types of cognitive activity including comprehension, communication, attention, memory and problem solving, and a number of researchers believe that ineffective strategy use is a source of learning disabilities (Deshler, Ellis, & Lenz, 1996).

Modeling is demonstrating how something is done, and it is a powerful teaching technique – sometimes more powerful than we would like for it to be. How often we recognize the truth of the maxim, “Actions speak louder than words,” and counter by saying, “Do as I say, not as I do,” usually to no avail! Children are watchers, and they do what they see others do, particularly if the person doing it is “high-status” in the eyes of the child. We generally think of modeling as demonstrating an overt performance (such as dribbling a basketball or drawing a rectangle), but demonstrating a covert performance (such as thinking) with verbalization is a very effective teaching strategy. This kind of modeling, known as cognitive modeling, involves the teacher saying out loud what she is thinking (Meichenbaum, 1977). Using this “think aloud” technique teachers can demonstrate reasoning skills or different kinds of thinking, as well as how and when to use them.
In problem-based learning, teachers combine these three techniques by modeling the metacognitive inquiry used by effective problem-solvers. By posing questions as if thinking out loud, they model the process of thinking:

“What do I know about this situation that would help me solve the problem?”
“What do I need to find out?”
“How could I find out?”
“Is this like any other problem situation I’ve been in before?”
“Is any part of the problem situation the same or similar?”
“What is my goal? What am I trying to accomplish?”
“What steps will I have to take to reach my goal? What are my subgoals?”

If there is a particular problem-solving strategy teachers want students to use they might have the strategy posted in the classroom and model questions pertinent to that strategy. For example, to expand the time-honored Polya (1945) problem-solving operations, the following strategy could be modeled by asking questions like those below.

Understand the problem situation What is going on here?
How might I summarize it? or visualize it?
Who expects what?

Set goals What is my goal?
What am I trying to accomplish?
What subgoals should I set?

Identify helps and hindrances What resources are available to help?
What barriers might be encountered?

Devise a plan What needs to be done?
Who (on my team) can do these things?

Carry out plan How should I sequence these tasks?

Monitor and evaluate Am I making progress toward my goal?
How well am I accomplishing my goals?

There are two points to keep in mind:

• Modeling is most effective when observers (in this case, students) believe the behavior will lead to success.
• For the modeled behaviors to transfer to other situations, they should be used repeatedly and in many different situations. Don’t assume that transfer will happen automatically – it won’t, unless carefully planned.

In the T² units metacognitive inquiry is modeled throughout the problem-solving process, and the technique is made explicit in the Debriefing phase to promote transfer. One of the
reasons for using the problem-based learning unit design is because it encourages strong student engagement and self-direction, but we recognize that guided inquiry is the most effective way to increase productive thinking and promote transfer of problem-solving skills.

Judith B. Howard, Ph.D.
School of Education
Elon University
Feb. 2004

References and Additional Reading


