Summary of "What's All the Fuss About Metacognition?"

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In "What's All the Fuss About Metacognition" by Alan H. Schoenfeld, Alan gives a short discussion defining metacognition, and then goes on to describe metacognitive shortcomings of students and how they can be taught. The primary focus is on problem-solving skills. He says that there are three aspects to metacognition:

Self-assessment: Your knowledge about your own thought processes.

Self-control: Your ability to keep track of and guide your problem-solving process.

Beliefs and Intuitions: The ideas that you bring into class that shape the way you solve problems.

The first section compares how a group of students solved a difficult problem compared to a professional mathematician (solving a different problem outside of the mathematician's domain). The students read the problem, decided on an approach, and tangled themselves up in the details of the approach until the twenty-minute time limit was up. The professional tried many different approaches, some of which were "just plain wrong," but abandoned approaches when they were proving not to be lucrative. Of particular interest, the professional stopped to check himself along the way, asking "how am I doing?"

The next section focuses on his own techniques that he claims valuable in his problem solving class. He describes four techniques in particular:

Video tapes: He shows video tapes to the students of other students trying to solve a problem. Some students would say "They're wasting all that time, and it won't do them any good!" Others empathize with the taped students. The article points out that it is much easier to analyze someone else's behavior and realize that it applies to you than to analyze yourself.

Teacher as a role model: When Schoenfeld solves problems on the board, occasionally he will emulate the entire problem-solving process, complete with false starts, self checks along the way, and abandoning a solution in progress for a better idea. He says that such a technique should be used sparingly, but does not explain why.

Whole-class discussions: Sometimes Schoenfeld will act as a moderator for a whole-class problem-solving exercise. He will encourage the students to explore the problem and self-moderate, but he will not guide the discussion based on whether it's on "the right track." After the class has come to a solution (probably after several failed attempts), he reviews the process and talks about what techniques they could have used to arrive at the right approach sooner.

Problem solving in small groups: Similar to our own Physics tutorials, he'll arrange the class in small groups and (unlike our own Physics tutorials) give them a difficult problem to work on. He'll traverse the room, asking "What are you doing?", "Why are you doing it?", and "How does it help you?". He makes clear at the beginning of the class that he will ask these questions, and perseveres even though they may make students uncomfortable.

Much of this article resonated with me, as I've recently found myself struggling in a mathematics class. Of some of the beliefs that he mentions, the one that I find most clearly in myself is "any problem can be solved in ten minutes." That is how it's been in the past, unless the teacher has declared that the problems are "hard ones" that should take a long time. Homework has never taken me more than half an hour to finish, but this class's homework seems to occupy three hours per assignment.

Now I wonder what cognitive abilities I might be able to develop to make the homework (and later, the tests!) go more smoothly. I don't find myself tangled up in a particular approach very often, but if I get started and fail,

I don't often start again. That is, I spend a lot of time analyzing, but if I decide on an approach and it doesn't end up going anywhere, I have difficulty coming back to the analysis stage.

It was interesting to see how Schoenfeld communicates these problem-solving strategies to his students. The latter two approaches, whole class discussions and problem solving in small groups, seemed particularly valuable. I like the idea of giving the groups a single hard problem rather than twenty easy ones like we do in Physics tutorial. The group problem-solving strategy can really shine in that case. In fact, all the emphasis on problem solving made me think that the Physics tutorial is too much regurgitation and not enough disequilibration and reconstruction. Perhaps it would work better if the tutorial came *before* the corresponding lecture.

I've certainly used the three questions before in my LA experience, but never conciously. The latter two could be particularly helpful: "Why are you doing it?" and "How does it help you?". Those will be added to my grab-bag of ideas when people get stuck or when people are going down the wrong path.