Affective Issues in Teaching Problem Solving: A Teacher’s Perspective

VERNA M. ADAMS

It is encouraging that mathematics educators are talking about the relationship between mathematics learning and affect. Many teachers feel uncomfortable dealing with some of the psychological aspects of teaching mathematics. Even a teacher who is comfortable discussing a student's feelings of anxiety about mathematics in a one-on-one situation may feel inadequately prepared to deal with anxiety at the classroom level. Perhaps this has been an appropriate reaction to the situation. As many chapters in this book indicate, the relationship between affect and mathematics is complex, having many more components than just anxiety.

What does seem clear is that cognition and affect are interrelated (see the chapters in this book by Mandler [Chapter 1], Marshall [Chapter 4], and McDonald [Chapter 15]). This interrelationship implies that mathematics teachers should consider the effects of affective components of learning mathematics in planning effective instruction. In fact, attention to both affect and cognition may be needed in order to accomplish the goal of developing positive attitudes toward mathematics, a goal viewed by educators as an important outcome of teaching (Hart, this volume, Chapter 3). From interviews with elementary school teachers, Prawat (1985) suggested that “teachers who place equal emphasis on affective and cognitive goals” are more effective in “promoting positive attitudes toward others and toward the class as a whole” (p. 599) than teachers whose goal orientations are primarily cognitive or primarily affective.

As researchers investigate the relationship between affect and problem solving, how to plan effective instruction may become more clear to us. In the meantime, teachers are dealing with affective issues in one way or another. All teachers notice students’ emotional reactions in the classroom, and sometimes classes seem to have an emotional identification. For the classroom teacher, the emotional tone in the classroom is as important as individual emotions. From this perspective, the cooler affective variables, such as beliefs and attitudes, seem as important as the hot affect that may occur during problem solving.

One environment for studying beliefs and attitudes is that of problem solving, because beliefs and attitudes play an important role in the emotion generated during the problem-solving process (Mandler, 1984; this volume, Chapter 1). Some
of these beliefs about the learning of mathematics have been identified by Schoenfeld (1987) and are considered to be “important determinants of students’ mathematical behavior” (p. 198). Student beliefs about mathematics and the learning of mathematics can have serious detrimental effects on problem solving.

In this chapter, I discuss some of my own observations about students’ affective reactions to problem solving as I have moved toward using a problem-solving perspective in my own teaching. My comments on affect are based on discussions with students from Grade 7 to college and on self-reports from students that were part of written assignments that I called problem-solving reports. It seemed natural in these reports to have students reflect on their feelings and thoughts as they completed the assignment. In the first section of this chapter, I discuss these reports and some of the students’ affective reactions to the problems used for the reports. I attempt to illustrate how the self-reports from students were used to modify instruction. The second section of the chapter deals with affective issues that the classroom teacher has to resolve in planning and implementing instruction.

Problem-Solving Reports

Problem-solving reports were used as one type of assignment in a mathematics course for prospective elementary school teachers at San Diego State University. Students were given about 2 weeks to complete each assignment. They were allowed to work together or to get help, but they were required to do their own writing and were requested to report who gave them help. If the help was extensive, the student was supposed to ask the person about his or her thought processes while doing the work; the student was to record that information. After the reports were turned in to me, I read them and then discussed them with the class. The discussion usually included a summary of student affective responses as well as a report on the various methods students used to solve the problem. The purposes in discussing students’ affective responses were to make students aware of the variability of the responses and to reassure them that their responses were not unusual. Examples of students’ work were used to illustrate what I thought was good problem solving or good writing. Students were then given until the end of the semester to rethink and revise parts of the report. At that time, they were to turn in all of the writing completed for the course for a grade.

An example of a problem-solving assignment is given below. A major reason for making this assignment was to have students realize that they could ask questions about mathematics and investigate their own questions.

Problem:
Express the numbers 1 through 10 using 4 fours and any operation.

Assignment:
Section 1. Solve the problem. Show your work.