President’s Message

Fostering a Good Mathematical Disposition

Glenda Lappan

I suppose it is because nearly all children go to school nowadays, and have things arranged for them, that they seem so forlornly unable to produce their own ideas.

—Agatha Christie

Every September, we return to school with a feeling of renewal, hope, and anticipation. And with each of these Septembers, we begin with a professional plan for the year. Our plans include identifying the mathematics content we are going to try to teach better, the ideas we are going to use to streamline our curriculum, and how we are going to build on our students’ mathematics knowledge. To that I would add, as the Agatha Christie quote implies, that we need to plan to help students develop healthy dispositions toward mathematics.

Recently, I asked a mathematician friend of mine what he would most like for students coming into college to know in mathematics. I expected to get the usual list of specific mathematical procedures, techniques, rules for solving equations, and so forth. Instead, he thought for a minute and said, “Just send them to us knowing how to study mathematics and how to be organized and with a willingness to try things in mathematics that require some effort.” This was an eye-opener for me. And I think he is right.

Students need dispositions that will enable them to persevere in more-challenging problems, to take some responsibility for their own learning, and to develop good work habits in mathematics. Unfortunately, we tend to reduce learning mathematics to something that teachers work extremely hard to help students do while students wait for teachers to make it simple enough to survive the test on Friday.

Those Friday tests are important for assessment, but they alone are not enough, especially if they are not always challenging. Fortunately, many teachers are beginning to incorporate assessment suggestions from the NCTM Standards by giving students a variety of opportunities to show us what they know and are able to do in mathematics. Still, it’s clear we need to make more efforts to emphasize assessing mathematical dispositions and work habits—so that when students go on to college or careers, they have the essential desire to solve difficult problems.

Part of the challenge for teachers is the difficulty of assessing such aspects of students’ progress. But much of the source of the challenge is that we have not traditionally taken much responsibility for fostering students’ attitudes toward mathematics and their perceptions of their own role in learning the subject.

So what can we do about this state of affairs? We can begin by realizing that we play a role in changing students’ minds about what is involved in learning mathematics. Already some teachers have been working on ways to encourage better mathematical dispositions and work habits—and to evaluate on the basis of these work habits. One effective tool, once teachers have told students of their expectations, is student self-evaluations used as a regular conclusion to a teaching unit. As a supplement to tests and projects, student self-assessments can shed light for both the student and the teacher on questions such as the following:

Mathematical Dispositions: How do students respond to mathematical challenges? How do they see themselves as learners of mathematics? Are they willing to persevere in attempting to make sense of a problem, a procedure, a concept, or some other important aspect of mathematics? Are they accumulating a set of good mathematical examples that they can use to help remember or reconstruct important ideas?

Work Habits: Are the students able to organize and summarize their work? Do they see the big ideas in what they are learning? Are they seeking connections among ideas that they are studying? Can they use precise mathematics language and appropriate representations to help communicate their ideas? Are they progressing in becoming independent learners? Are they able to learn from, and contribute to, the learning of others?

These goals for the mathematics class might seem to already overburdened teachers like the straw that broke the camel’s back. But teachers who’ve tried this tell me that after a few months of struggling to focus students on their role in learning mathematics through these self-reflections, they see real changes in students’ engagement in their classrooms. Their students not only learn mathematics better but also gain a self-awareness that gives them the confidence to continue to learn. So as the school year begins and new challenges emerge, try to give your students a gift that will carry them forth to future mathematics and life successes—help them learn to produce their own ideas.