President's Message

Teaching to the Test

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Our tests are driving our teaching. This is the message from coast to coast as pressure mounts to produce results and meet the Adequate Yearly Progress requirements of the No Child Left Behind (NCLB) Act. Is this good or bad, and can a good mathematics program survive in this kind of environment?

Accountability is important in mathematics teaching. As professional mathematics educators, we must be able to demonstrate that our students are learning mathematics. Furthermore, the reporting of group data required by NCLB sheds light on gaps and problems within the mathematics program, including whether any group of students is achieving or not. Nevertheless, the kinds of tests that many states require, and the ways that many schools prepare their students for these tests, have serious limitations.

On the positive side, if a test assesses important mathematics in ways that require students to demonstrate mathematical thinking and proficiency, the test might effectively support a comprehensive mathematics program. For example, the state tests used in Connecticut and Washington call for students to complete a variety of mathematical exercises, including open-ended problems designed to require more complex thinking than what is called for in many state assessments. Students in a well-balanced mathematics program anchored in understanding, proficiency, problem solving, and mathematical thinking are likely to do well on these tests with or without special preparation strategies.

However, many state tests fall short of this ideal. Some are based solely on content that can be tested economically in a multiple-choice format, which often encourages students to try out all possible answers to a problem rather than actually solving it. Furthermore, although some state curriculum standards may include complex and high-level mathematical ideas, testing students' understanding of these ideas is not easy. This important content may get overlooked as teachers prepare students for items that are most likely to be included on the test. We must be cautious about the decisions that we make about students on the basis of such measures. No decision about a student's future should be based on any single measure, particularly a large-scale measure with inherent issues of context, bias, and intended purpose.

In too many schools, teachers are expected to "set aside" their mathematics program and instead prepare students for the state test. This may mean weeks or even months of missed instructional time. If preparing for the test means practicing a few items to get used to the format, it might serve students well. Too often, however, test preparation also includes learning tricks and tips that may or may not prove helpful on the test. For example, some schools use materials built on "clue words" for solving story problems or teach other tricks about what to do if presented with particular types of problems. Students memorize such phrases and words as *all together*, *more than*, and *total*, associating each with a particular operation. This type of practice falls apart on two levels. First, it misleads students. For any clue word or trick, most of us could create a test item for which the trick does not work. Second, the time that students spend memorizing tricks or words without understanding the related mathematics is precious time they lose from instruction that could support their mathematics learning. Students are better served by learning the concepts behind the numbers and operations so well that they carry mental pictures of what addition, subtraction, multiplication, or division mean. Recognizing a mathematical operation in the context of a problem and knowing how to perform the operation are far better preparation strategies than memorizing tricks or a list of words.

One other method of teaching to the test is periodic benchmark testing. Some school systems expect students to take tests throughout the year that are similar in format and content to the state accountability test. This can be an appropriate application of data-driven decision making. However, to be effective, any such strategy should be weighed according to cost and benefit. How much information is gained in a usable and timely manner for guiding and improving students' learning on a day-to-day basis? And what are the costs in instructional time and teacher time for planning, administering, interpreting and reporting results, and incorporating those results into the teaching process? These questions are essential to consider in any decision about testing and preparing for tests.

The best preparation for any test is teaching a good mathematics program well to every student. Even if the accountability test is a less-than-ideal measure, a strong mathematical foundation can prepare students to perform well. The reverse is not true, however. If we focus on test preparation at the expense of long-term learning, we may see short-term gains, but students are unlikely to be able to build on their learning from year to year. And some schools that devote excessive time to test preparation at the elementary grades may actually find, a few years later, that their middle school test scores have fallen. The bottom line is that professional mathematics educators need to be skeptical consumers of test-preparation programs and materials and knowledgeable judges of quality assessment practices that support students' learning. Most of all, professional mathematics educators need to be outspoken advocates for students, raising our voices when testing practices may not serve the best interests of students.

How can we balance teaching good mathematics and preparing for the state or provincial test? Are there effective test-preparation strategies that support student learning? Join me for an online chat about these and related questions on February 2 at 4:00 p.m. EST or submit your comments beforehand by visiting www.nctm.org/news/chat.htm.