

Standards and Assessment in New Jersey

(presentation to the "Math Summit" sponsored by the Association of American Publishers, Washington, D.C. on October 3, 2001)

by Joseph G. Rosenstein

Let me begin with a few words about my background. I am a professor of mathematics at Rutgers University. For my first fifteen years at Rutgers, I did mathematical research, but for the last fifteen years I have focused my efforts on improving K-12 mathematics education. I direct a number of professional development projects for teachers, including one on precalculus for high school teachers and one on discrete mathematics for K-8 teachers, I am currently involved in writing a textbook for prospective K-8 teachers, and I have been very active in developing and promoting New Jersey's mathematics standards, including a parent outreach program. Many of these efforts have been supported with funding by the National Science Foundation.

I need to tell you that, unlike my colleagues on the panel, I am not associated with my state's Department of Education. I have sometimes worked with the department, I have frequently cajoled the department, and I have been known to oppose the department, sometimes vehemently. Nothing that I say today represents the views of the New Jersey Department of Education.

I also need to remind you that New Jersey is not an "adoption state"; we are on the other end of the spectrum, with over 600 districts each of which makes its own decisions on curriculum and textbooks. I hope that this confession will not empower you to sleep through my remarks.

In 1991 I organized the New Jersey Mathematics Coalition - bringing together leaders from business, education, government, and the public to work together to improve mathematics education in the state. Similar coalitions exist in many states, and are affiliated with the National Alliance of State Science and Mathematics Coalitions, known as NASSMC. One of the Coalition's focuses was on standards, and we supported and provided leadership in developing New Jersey's mathematics standards six years ago. With the support of a grant from the United States Department of Education, we developed a 688-page curriculum framework based on the standards. This project was in collaboration with the New Jersey Department of Education, which subsequently used that document, and the process by which it was developed, as a model for frameworks in the other content areas. Now, six years later, Coalition members are playing key roles in revising the standards. I'm here to share with you some of the lessons that I have learned.

First, however, I want to give you my perspective on the debates about mathematics education. There are two major challenges for mathematics education in this country. One challenge is to provide a good background in mathematics to all students, so that they will be able to find jobs in our increasingly global, technological, and information-based economy, and so that our nation will have enough skilled human resources to meet employment needs. Let's refer to this

challenge, that of creating a population that understands, uses, applies, and values mathematics, as the 100% problem. Since that challenge may be unrealistic, both in terms of our nation's needs and in terms of our expectations, let's refer to it as the 80% problem. The second challenge is to train the highly qualified personnel that will replace today's mathematicians, computer scientists, scientists, and engineers. Let's refer to this as the 15% problem. Both challenges are very important.

(A few words of caution. These numbers were made up for use as terminology. I am not suggesting that 15% is an accurate estimate of the percentage of highly qualified personnel needed, or that another 65% should be mathematically literate, or that the remaining 20% will not. Nor am I suggesting that any individual student be consigned to any group; all students should be challenged, not channeled. However, in the end, there are three groups, and I am describing these three groups using percentages.)

The standards movement primarily addresses the 80% problem. It seeks to improve the mathematical knowledge and competency of the student population as a whole. Its focus is not on dealing with the 15% problem. Many of those opposed to the standards movement are primarily concerned with the 15% problem -- in part because of their concerns about future scientists and mathematicians, in part because of concerns about their own children's future, and in part because of excesses of the standards movement (where, as with all movements, dogma tries to drive out common sense). Unfortunately, the solutions offered by those opposed to the standards movement may be solutions to the 15% problem but do not address the 80% problem.

We must reject the two radical perspectives that fuel the "math wars" -- the one which says, in effect, that we should forget about the 15% problem and focus entirely on the 80% problem, and the one which says, in effect, that we should forget about the 80% problem and focus entirely on the 15% problem. Each challenge needs its own set of solutions, and it is counter-productive to try to impose a 15% solution, like returning to the curricula of yesteryear, on the 80% problem.

The common sense perspective is to combine a "standards" approach to dealing with the 80% problem with a "beyond the standards" approach to dealing with the 15% problem. That's what our focus should be. Both challenges can be addressed, and must be addressed, by our society, and we should all be working together to support efforts which work toward addressing each of these challenges. A new website that seeks to "promote the rational reform of mathematics education" is mathematicallysane.org.

Here's a question for publishers. Is it possible for middle and high school textbooks to come in two versions, an 80% version that focuses on achieving the standards, and a 15% version that goes beyond the standards? That would make it easier for more students to learn more mathematics, and would facilitate multiple entry points to the more advanced curricula.

As noted earlier, the goal of standards is to ensure that a substantial percentage of students have the mathematical skills and understandings that they need - to do the variety of jobs that they will have, and, more generally, to function as informed and productive members of society. The way to tell whether students have developed the necessary skills and understandings, the way to ensure that schools teach what the students need, is through assessments that reflect the standards. These assessments must be standardized, since otherwise we cannot tell whether a school or district is properly addressing the standards. They have to be at the state level, since each state has its own standards. Would it be better to have national standards and national assessments? Possibly, but that's not going to happen in the foreseeable future.

There are of course many criticisms of state-wide standards-based tests, and the same criticisms apply to all standardized tests. If, however, the standards reflect what we value, and the assessments are aligned with the standards, then the criticisms are not very telling. This is particularly true if the standards focus on understanding and problem-solving.

One criticism of statewide tests, for example, is that teachers will just teach to the test. Of course teachers will teach to the test, whatever test it is. But if the standards embody what we value and the test is aligned to the standards, then it's not so bad that teachers teach to the test, since they will be teaching what we value. Others argue that tests stifle the creativity of the students, or of the teachers. That might be correct if today's standards focused on rote learning, on memorization of facts and procedures. But they don't. They stress understanding and problem-solving.

While most of the discussion about assessment focuses on student scores, it must be remembered that the primary purpose of assessment should be on improving instruction. The responsibility for meeting the standards should be placed not on the students, but on the schools. When we speak of high-stakes tests, we should be speaking of high stakes for systems, not for students. That is, if students do poorly on a test that reflects the standards, then the system should be revised; the system is not teaching those skills and understandings that we value. And the system, at the state level, must provide the appropriate assistance and support. Teachers, for example, should have maximum access to test materials, so that they will learn what levels of understanding and problem solving students are expected to demonstrate. In New Jersey, it took a great deal of noise to get the Department of Education to place a sample test on its website; what should happen, as I believe is the case in some other states, is that, once a test is given, all of its questions should be released - except for a few that could help equate performance of students over several years. And even that is a modest expectation. Imagine what would happen if states were as eager to make their products teacher-friendly as publishers, rolling out print materials, websites, and workshops for teachers on the kinds of instruction that in the long term would improve student achievement.

Economical realities and political realities intervene, however. For example, releasing items costs more money, since more items would have to be developed and tested. And, for example, the response to poor student performance on tests is rarely a call for improved instruction, via

more professional development for teachers. Instead we hear calls to weaken the standards or the assessments, or to lower the passing scores.

One of the problems that we have had with the Elementary School Proficiency Assessment in New Jersey, referred to as ESPA, is that somehow elementary school principals concluded that their positions depended on the success of their fourth graders on the test. So they passed that urgency on to the fourth-grade teachers, who in turn passed that on to their students, who had no one to whom they could pass their stress. And so we have had stories appearing in local newspapers about students being traumatized by the tests, and about the reaction of their parents, quite justifiable, to such stress, and about reports that elementary school teachers no longer want to teach fourth grade.

That's a failure of the system. What should have happened, easy to say in retrospect, is that in order to find out where students were doing well and where they were doing badly, principals should have been asked to administer ESPA for a year or two without providing any test-preparation to the students, other than a review of test instructions. After obtaining the test results, which would not be made public, district and school personnel should have initiated a plan for changing curriculum and instruction so that students would acquire the necessary skills, and should have developed a realistic timetable for improvement of test scores. And the state should have provided assistance in developing and implementing such plans. If this kind of process were in place, it would then be reasonable to hold principals and superintendents accountable for achieving success over time. This makes sense, but unfortunately it can't work like this in our society, where the public demands to know the test scores, and has a right to do so, and where real-estate values go up and down with test scores.

Test preparation is another failure of the system. If the curriculum properly addresses the standards, then it should not be necessary to stop real instruction for a month or two each year and focus on test preparation. The focus of the district should be on improving their curricula and instruction, and not on the test scores - on the long-term solution, not the short-term fix.

One of the Coalition Board members, a retired businessman and engineer, keeps reminding us that if you find out at the end of a manufacturing process that the product is defective, the problem is with the process, not with the product. That is, there is no reason why students should, in large numbers, fail a standards-based assessment at the end of their school careers. At many points along the way, assessment should have revealed the students' shortcomings, and appropriate interventions should have taken place promptly. Test scores should therefore also be made available promptly, something not done in New Jersey. If the system doesn't allow it, the system should be changed.

The purpose of testing at earlier grades is to determine whether students are making progress to the goal of learning the necessary skills by graduation. These are, by definition, low-stakes tests - actually, they should be considered "no stakes" tests, since the consequences for students who do poorly should be only positive. One of my daughters did poorly on an eighth grade test a few years ago, and the extra attention that she received was just what she needed.

Is remediation boring? It certainly is if you just keep doing the same stuff over and over! Is remediation stigmatizing? It certainly is if you call it remediation, or any other similar term. My suggestion is that students who do poorly on the mathematics portions of the state assessments be placed in the gifted and talented program - the material is much more interesting and challenging, and it certainly doesn't carry the same stigma.

This illustrates a general point, which is that we shouldn't let facility with computation be the sole determiner of who gets to do interesting mathematics. Those in the gifted and talented programs are the ones who are really engaged with mathematics, who get to solve mathematical puzzles and logical conundrums, all of which are more interesting and challenging than the computational aspects of arithmetic and algebra, and we shouldn't shut students out of those topics because they are not good in computation or don't see any reason to learn it. Yes, we do want all kids to learn computation, but we also want them to become problem-solvers and to develop an appreciation for mathematics and its applications. We should try to achieve those goals as well, while we work on improving students' computational skills and understanding, rather than punishing them for their computational weaknesses by withholding the fun stuff.

I suggested earlier that textbooks come in an 80% version and a 15% version. I did not mean that the 15% version should be enriched by all the fun stuff. That should be in the 80% version. The 80% version should include all of the interesting mathematical topics, like discrete mathematics, that engage the students' interest. The 15% version should be enriched by all the fancy algorithmic and algebraic stuff that only geeks like me enjoyed!

My remarks will be available tomorrow at my web site - so here is my website and the other two that I mentioned earlier. I appreciate this opportunity to share my thoughts with you.