

Mathematics

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Liberating Standards for Mathematics from NCTM

Perhaps the most remarkable thing about the recent spate of ultimate solutions to education problems is the dearth of recommendations from the people most qualified to make them—the professional subject matter specialists and their organizations. A notable exception to this unfortunate rule has been the National Council of Teachers of Mathematics (NCTM). In the early 1970s the NCTM proposed stringent new standards for the education of teachers of mathematics and in 1980 published *An Agenda for Action*, which proposed major improvements in mathematics education.

The NCTM's most recent foray into improving the quality of education is a working draft of *Curriculum and Evaluation Standards for School Mathematics*, which has been circulated to NCTM members and others who are likely to make constructive suggestions. Although the final version of the *Standards* may be somewhat different from the working copy, this draft is an exceptional document that is well worth reading and thinking about as it stands. If you don't have time to read it in its entirety, at least have a look at the short preface and conclusion and at the 17-page introduction—these provide the essence of a vision for the future of mathematics education.

Ideas That Liberate. The *Standards* is, to me, a liberating document. It says that all children can (and should) study algebra, geometry, statistics, probability, and other exciting topics even if they have not yet become proficient in the usual pencil-and-paper algorithms for doing arithmetic. It says calculators and computers should be universally available and that children should use them to avoid the pedestrian drudgery associated with mathematics that so often alienates potentially good mathematics students.

In addition, the *Standards* discourages the belief that some children are naturally good in mathematics but that most others are not and therefore shouldn't be exposed to any more of the stuff than necessary. This belief is commonly held in the United States but not in Oriental and European countries, where all the children are expected to learn mathematics—and do.

The *Standards* also suggests that children should be actively involved in their mathematical education—building on what they know and from their experiences, rather than being passive recipients of knowledge transmitted by teacher or textbook.

Perhaps most important, the *Standards* proposes radically different means of evaluation that would concentrate on more important achievements and would evaluate more than just students. Ultimately, the way we choose our goals and evaluate achievement of those goals will determine whether we improve, stagnate, or deteriorate. Although the document is quite specific about goals and even methods of achieving those goals, it argues that there are multiple paths to the achievement of those goals.

Less Proscription, More Prescription. A document of this size and scope must either be bland and useless or include something to irritate

every reader. This one has taken the latter course. My principal objection to the working draft is the authors' occasional tendency to proscribe rather than prescribe—to tell us what cannot or ought not to be done. Perhaps the most astonishing example of this is a pair of tables on pages 38 and 39, which suggest that it is unreasonable to expect children to have learned with understanding and proficiency all of the addition and subtraction facts before grade 3 or the multiplication and division facts before grade 4. The paper-and-pencil algorithms for these operations are to be delayed even further.

While such delays may not cause any serious permanent damage, there is considerable evidence that large numbers of average children, in this country and elsewhere, have been taught these important skills, with understanding, earlier than the proposed ages and that knowledge of them is helpful in learning other mathematics. Even if that were not the case, to argue that it shouldn't be done or can't be done because certain educators have failed to do it is neither good logic nor good pedagogy. I hope the offending proscriptions will be removed in the final version of the *Standards*.

A Remarkable Document. Reviewers are expected to find something with which to quibble. Having now fulfilled that expectation, I can say with a clear conscience that the draft NCTM *Standards* is a remarkably good attempt on the part of a professional subject matter organization to provide guidance for the improvement of one aspect of education. I hope other professional groups will follow suit and that their efforts will be equally good. □

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All children can study exciting topics.

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