

OHIO MATHEMATICS AND SCIENCE COALITION

Comments on

Ohio Mathematics Content Standards

Initial comments:

In general, we find that these standards are a step in the right direction. However, we believe that there is a critical piece missing from them. We have very conclusive data from the TIMSS reports and our own research conducted by NCREL that indicate that our curriculum tries to cover too much at each grade level. This curriculum doesn't provide the leadership for our teachers to focus on certain topics at each grade level to provide the needed depth in these areas. If you just provide 4 sets of benchmarks for 12 years of curriculum, teachers may continue to try to cover all of these objectives at each grade level. Thus, we believe this perpetuates "the mile wide and inch deep" curriculum. Further, there are a few places in the curriculum where we believe that the expectations are unrealistic based on what we know from mathematics education research.

Our review of these standards is framed around the following 4 questions:

1. Overall how does this document help move the current Ohio Model toward the new PSSM?

All of the reviewers were consistent in seeing these standards as generally a higher level set of expectations than the Ohio Model. As we reviewed the standards by level (3rd, 5th, 8th, and 12th), we found that many of the goals were verbatim from the National Council of Teachers of Mathematics (NCTM) Principles and Standards for School Mathematics (PSSM) document. Some of the reviewers believed that the remaining goals either were at a higher level (than PSSM) or were confusing and vague. For example we believe that the Ohio Grade 8 expectations for geometry are close to the requirements currently for HS geometry (make and test conjectures regarding congruence, similarity, symmetry, and the Pythagorean relationship). Other reviewers indicated that some current research indicates that students are unable to reason about ratios and proportions until after the age of 13. Thus asking 5th graders to "use models and pictures to relate concepts of ratio and proportion and percent" might be beyond the capabilities of these students.

The next comment consistent among all the reviews is that many of these standards may be interpreted incorrectly by teachers who don't have a deep understanding of the mathematics involved or the research (mentioned above) behind the development of these important mathematics topics. For example, what does it mean to use models and pictures to relate concepts of ratio, proportion, and percent and why is this important for these 5th grade students? All the reviewers indicated that teachers might, on the surface, see the need for the proposed changes; however, if there isn't support and discussion about these proposed goals, they may be either ignored or interpreted incorrectly. Typically this means that teachers stress procedures and facts over concepts and understanding. We believe that this would be a stronger document if it provided teachers with more grade level specific benchmarks which drives the focused curriculum called for by research in mathematics education.

2. What is your opinion regarding these expectations for all of Ohio's students? Too high, not high enough...or just right? Why?

Although these expectations are appreciably higher than we are currently reaching (particularly in the high school), overall we believe that these are necessary goals for our students. The reasons we give parallel those given previously by reviewers of TIMSS, NAPE, and reports about the need to have a competitive US workforce in a global economy. We noted that the 3rd & 5th grade expectations were

more consistent with the current expectations of the more challenging 4th and 6th grade proficiency tests. We do caution that students at this level are not ready for the complexities of ratio, proportion, and percent. We believe that the real stretch for students and teachers will come from the 8th and 12th grade expectations. These are much different from the current graduation exit exam (current 9th grade test). High school teachers will need a coordinated set of benchmarks to help their students make the required progress.

3. Do you think that the creation of this document will help Ohio move toward better mathematics teaching and learning? Why or why not?

We all agree that this document raises the bar for curriculum expectations in the state of Ohio. We think this is a good thing. If, however, teachers see this change to be similar to that of the late 1950's to teach more symbolic/abstract mathematics at an earlier age, then this effort will suffer the same fate. We believe that the Ohio Academic Standards for Mathematics should help teachers focus on particular topics so that each grade level can develop a few new core ideas and help connect them to previously learned ideas. If we have learned anything from TIMSS, it is that we should carefully reduce the topics taught at any grade level while increasing the depth of each idea. This will take much work on the part of individual teachers and thus, significant support will be desperately needed.

4. What is your overall reaction (and how do you think your colleagues will react) to the creation of a new set of standards for Ohio?

We are a bit split on the release of this document. On the one hand, we all agreed that the clarification and elaboration of some goals with associated assessment items was of value in illustrating what students should know by the end of the given grade levels. Additionally, it is a positive step toward aligning our current document to PSSM. We were less sure about how this document might impact teachers teaching, and children learning. There are many obstacles in the way of these standards being implemented in the same spirit of their creation. Some of these are lack of understanding of the mathematics required at the elementary levels to the lack of understanding of the development of some of the more sophisticated topics (variable, function, ...) at the high school levels. In addition, we believe that the issue of reducing the amount of content taught at any grade needs to be addressed to have a significant impact on learning.

Summary of Suggestions:

There are several things that we'd like the people who are working on these standards to consider:

1. The amount of curriculum for each grade level needs to be reduced. This document should take leadership in recommending how this should be done. We hope that these recommendations would be done with the use of available research in mathematics education.
2. Why is Geometry and Spatial Sense listed as Standards # 3 and #4? If one is more Geometry (like #3) and the other more like Spatial Sense (#4), rename or at least give them a different name. But we're not sure why they are in different standards.
3. Ditto for Patterns, Functions, and Algebra (Standards 5 & 6).
4. If you are going to write a set of comprehensive curriculum guides, why not adopt the PSSM as the set of standards? We would then call the Curriculum Guides Ohio's version of implementing the PSSM? This might be where we recommend how to reduce the amount of curriculum for each grade and how to develop both the depth of concepts and mathematical processes (problem solving, reasoning, etc.) in our students.
5. It is a good start, but far from the document we should release.