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Common U.S. Math Standards

THE UNITED STATES HAS NEVER HAD NATIONAL STANDARDS OR CURRICULA FOR MATHEMATICS. Instead, each state decides, for example, what version of high-school algebra should be taught and how to assess whether students have learned it. In March 2010, the National Governors Association and the Council of Chief State School Officers released Common Core State Standards (CCSS) for English language arts and mathematics (www.corestandards.org). The goal is to have all states adopt these as their standards, making more uniform the knowledge and skills expectations for students in preparation for success in college and careers.

The mathematics standards were drafted by teachers, mathematicians, statisticians, mathematics educators, and cognitive scientists, with input from many educational organizations.* Reconciliation of the perspectives of this wide spectrum of participants has relied on research evidence and the curricula of countries that perform better than the United States in mathematics. Research studies such as the Trends in International Mathematics and Science Study (TIMSS) have shown that U.S. mathematics performance is compromised by a lack of focus and coherence in the curriculum. For example, Hong Kong students outscore U.S. students on the grade 4 TIMSS assessment, even though the Hong Kong curriculum covers about half of the tested topics, whereas the U.S. grade 4 curriculum covers over 80% of the tested topics. Higher-performing countries (the U.S. ranks 11th in 4th-grade mathematics, according to TIMSS) teach central topics more coherently and in greater depth. Thus, the proposed new standards differ substantially from today's typical state standards by focusing on key topics and building a coherent progression of learning.

The political push for common standards comes with a push for higher standards. "Higher standards" means covering fewer topics at each grade level but in greater depth, so that students learn them well. It also means covering topics at the appropriate grade level, when students are well prepared for them. In Singapore, division of fractions is not taught until grade 6, whereas in the United States, it is often taught in grade 4 or 5. In top-performing countries, mathematics standards are high for what students actually learn. In contrast, U.S. state standards often tell teachers what to cover, whether students learn it well or not. The CCSS are designed to help teachers know when to devote the necessary time to mathematical ideas that are worth careful study. Cognitive research suggests that conceptual understanding intertwines with procedural skill to develop mathematics achievement. To make solid progress, students need not only skills to tackle mathematics problems but also the mathematical concepts that give coherence and substance to the subject. The CCSS delineate both skills to master and concepts to understand.

Common standards can benefit the education field, just as other fields (such as engineering and medicine) have benefited when common standards have been introduced. And common standards can improve textbooks and other teaching tools. Currently, publishers include every topic that any given state might want to see; as a result, U.S. mathematics textbooks typically have five times as many pages as international texts. By aggregating demand, common standards can make the education market less fragmented, and R&D can focus on creating better and innovative products and services.

Yet by themselves, common standards will accomplish little. They are part of a larger system of tools, organizations, and practices. This raises questions about what else states can share to support effective instruction, such as common training for teachers. Consortia of states are already organizing a common assessment system for student achievement. The promise of an improved education system is thrilling. But people, especially teachers and those who support them, will decide what difference common standards will make.

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*The authors are members of the CCSS for Mathematics working group.



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