The Common Core State Standards for Mathematics

Talking Points

College Readiness: How High Do the Standards Go?

The definition of college readiness in the Common Core State Standards is readiness to succeed in entry-level, credit-bearing college mathematics courses without remediation. This includes courses at four-year colleges as well as courses at two-year colleges that transfer credit to four-year colleges. Research and evidence on college and career readiness was used to set the standards at this level, as can be seen from the bibliography of the standards on pp. 91–93.

International Comparisons: The Common Core State Standards are World-Class

Research by William Schmidt, a leading expert on international mathematics performance and a previous director of the U.S. TIMSS study,[1] has compared the Common Core State Standards to high-performing countries up through grade 8. The agreement was found to be high. Moreover, *no state's previous standards* were as close a match to the high performing countries as the Common Core State Standards.

Evidence from international comparisons strongly informed the development of the standards. The bibliography of the standards on pp. 91–93 lists some of the numerous studies, major reports, and international and state standards that were used during the development process.

Skills, Understanding, and Applications: The Standards are Balanced

According to the Common Core State Standards, students are expected to know basic facts from memory. Fluency with the standard algorithm is an explicit expectation for each operation on whole numbers and decimals. The same cannot be said of *any previous set of state standards*. The grade placements of these expectations are all sensible.

The standards also require students to develop an understanding of the properties of operations, first in arithmetic and later in algebra, to develop a robust fluency that is not dependent on fragile mnemonic devices.

Fluency and understanding work together in applying mathematics. By high school, students are expected to solve complex problems arising from real-world or mathematical situations.

Better Outcomes in Algebra: The Common Core State Standards Allow Acceleration

The strong focus of the standards on arithmetic in grades K–5 is designed to ensure that more students master the fundamentals leading to algebra. That includes procedural skill and fluency as well as the kind of operational thinking that becomes algebraic thinking in middle school. Few if any previous state standards focused strongly enough on arithmetic in elementary school, or included such coherent expectations for fractions and other prerequisites for algebra.

The middle school curriculum in our country has long been repetitive and remedial. With the Common Core State Standards, we now have a college-track vision for the middle grades that builds on strong foundations from elementary grades. Grade 8 in the Common Core State Standards reaches well into the study of algebra, with robust expectations for simultaneous equations.

[1] http://edr.sagepub.com/content/41/8/294.abstract

Students who are truly prepared for an accelerated sequence should also have access to one. Data from international studies suggest that we are far behind the rest of world in bringing even our advantaged students to the highest levels of accomplishment.[2] Acceleration is thus an important issue, and each state should work with local districts to develop plans for increasing the number and diversity of students performing at the highest levels.

The Common Core State Standards provide a vehicle for improving performance at the top end, not an impediment to it. High-performing states like Massachusetts that have adopted the Common Core State Standards are providing flexible guidance for local districts to create accelerated pathways that lead to advanced subjects like calculus during high school.[3]

High School Courses: Integrated Math and Traditional Courses Are Allowed

The Common Core State Standards do not include any preference for either integrated courses or traditional courses. As is the case with acceleration, decisions about high school courses belong to individual states and districts.

High School Geometry: A Streamlined Approach

Dr. Hung-Hsi Wu, a mathematician who contributed to the development of the Common Core State Standards [CCSS] and Professor at the University of California, Berkeley, has written the following in order to clarify the nature of high school geometry in the standards (emphasis in the original):[4]

"Because rotation, reflection, translation, and dilation are now used for a serious mathematical purpose [in CCSS], there is a perception that so-called 'transformational geometry' … rules the CCSS geometry curriculum. Because 'transformational geometry' is perceived to be something quaint and faddish—not to say incomprehensible to school students—many have expressed reservations about the CCSS geometry standards. The truth is different. … [CCSS] helps students to make more sense of school geometry by making the traditionally opaque concepts of congruence and similarity learnable. One cannot overstate the fact that ***the CCSS do not pursue 'transformational geometry' per se****. Transformations are merely a means to an end: they are used in a strictly utilitarian way to streamline the existing school geometry curriculum. One can see from the high school geometry standards of the CCSS that, once reflections, rotations, reflections, and dilations have contributed to the proofs of the standard triangle congruence and similarity criteria (SAS, SSS, etc.), the development of plane geometry can proceed along traditional lines if one so desires."*

Development of the Standards: Led by States, not the Federal Government

The Common Core State Standards were developed through a bipartisan, state-led initiative spearheaded by state superintendents and state governors. The Federal government did not write, review, comment on, approve, or fund the development of the Common Core State Standards.

Each of the 48 states that signed on to the initiative received three drafts of the standards, in November 2009 and in January and February of 2010. Many of them convened panels of teachers, mathematicians and educators to review the standards, and provided substantial feedback.

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[2] http://www.hks.harvard.edu/pepg/PDF/Papers/PEPG10-19_HanushekPetersonWoessmann.pdf

[3] http://www.doe.mass.edu/candi/commoncore/MakingDecisions.pdf

[4] http://math.berkeley.edu/~wu/Progressions_Geometry.pdf

National organizations also received drafts for review. AFT organized two meetings of teachers to review the standards, attended by two of the lead writers. NCTM organized a weekend panel attended by one of the lead writers.

The standards were released for public review in March 2010 and received 10,000 public comments. All actionable comments were considered by the lead writers.

The President supports the idea of raising mathematics achievement through college- and career-ready standards. For that reason, the administration has provided incentives to some states for adopting college- and career-ready standards, and is funding the development of improved tests based on the Common Core State Standards. Each state has the option to use these tests, but no state is required to use them or pursue any set of policies based on them.

Sources for the Standards: Research, National Reports, and Successful Standards of Other States and Countries

The Common Core State Standards reflect the collective expertise of hundreds of experts: teachers, education researchers, mathematicians, and other leading experts from across the country. The standards build on the best of previous state standards plus a large body of evidence from international comparisons and domestic reports and recommendations to define a sturdy staircase to college and career readiness. You can read the standards at www.corestandards.org.

The Common Core State Standards will bring needed changes to mathematics education. TIMSS and other international studies have concluded that mathematics education in the United States is a mile wide and an inch deep. By contrast, we know that in higher-performing countries, strong foundations are laid and then further knowledge is built on them. Focus also emerges as an important principle in college and career readiness. Surveys suggest that postsecondary instructors value greater mastery of prerequisites over shallow exposure to a wide array of topics. These findings and a range of additional research informed the Standards.

Development Teams: Who Wrote the Standards?

The Standards were developed by two teams, a 51-person Work Team and a 19-person Feedback Group, composed of teachers, math education researchers, mathematicians, state department personnel, policy makers, and representatives from testing organizations (see http://bit.ly/10JgDUj for the membership). A research mathematician, William McCallum, chaired the Work Team. He and two other lead writers, Phil Daro and Jason Zimba, molded narrative progression documents submitted by the Work Team into successive drafts of the standards, which were reviewed by the Feedback Group (along with participating states and national organizations). The lead writers also commissioned essays on mathematics education research that informed the writing of the standards.

Local Control: Curriculum, Teaching Methods, and Implementation

The Common Core State Standards do not dictate curriculum or teaching Methods, and they do not implement themselves. They describe the skills and understandings we want students to have. A curriculum is a sequence of learning experiences designed to achieve those skills and understandings. Translating standards into curriculum, and implementing curriculum in the classroom, are pieces of work that need to be done. This work is a matter of local control, as it always has been under previous state standards. Within the confederation of states who have freely chosen to adopt the Common Core State Standards, there is room for innovation. To quote the supporting letter from the Council of Great City Schools:

"There is little reason to think, as some critics have claimed, that common standards would undermine the nation's tradition of local control of schools. Not many of those critics are superintendents in the nation's largest cities, where we have more than enough local decisions to make. The freedom to teach to inconsistent standards that don't prepare our students for college and careers is not a freedom we would fight for."

The Power of Sharing: Bringing Focus and Coherence to Mathematics Education

Common standards bring coherence to the publishing business. The need to accommodate multiple standards often forced a lack of focus and incoherence onto publishers: How could they build a coherent progression on operations with fractions when different state standards introduced addition and subtraction of fractions anywhere from Grade 1 to Grade 7?[5]

Common standards allow smaller publishers to enter the market. Selling to 50 states was expensive, and only big publishers had the budget to do it. Now anyone can produce a high quality Common Core aligned unit and they have a national audience.

Common standards also allow the nation's teacher preparation programs to be more focused on the mathematics teachers will be teaching, rather than on generic courses designed for a wide variety of state standards.

A Historic Opportunity for Innovation

We are only at the beginning of Common Core implementation, and the standards have already spurred efforts to innovate in the areas of assessment, professional development, and curriculum. States adopting the Common Core can benefit from the best of innovative tools that develop based on a shared standard.

[5] CSMC, *The Intended Mathematics Curriculum as Represented in State-Level Curriculum Standards: Consensus or Confusion?*, p. 5, http://bit.ly/19Z6tBV.