

Career and College Ready Shifts in Mathematics

6 "Research-Based" Math Shifts

CCRS Research Summary 3 Math Shifts

1: Focus: Teachers use the power of the eraser and significantly **narrow and deepen** the scope of how time and energy is spent in the math classroom. They do so in order to **focus deeply** on only the **concepts that are prioritized in the standards** so that students reach **strong foundational knowledge and deep conceptual understanding** and are able to **transfer mathematical skills and understanding across concepts and grades.** (CCSSM, 2010, p. 3-5; NMAP, 2008, p. 15-20)

1: Focus strongly where the Standards focus

2: Coherence: Principals and teachers **carefully connect the learning within and across grades** so that, for example, fractions or multiplication spiral across grade levels and **students can build new understanding onto foundations** built in previous years. Teachers can begin to count on **deep conceptual understanding of core content** and build on it. Each standard is not a new event, but an **extension of previous learning.** (NMAP, 2008, p. 20-22; Mosher, 2011; CCSSM, 2010, p. 4)

2: Coherence: **Think across grades, and link to major topics within grades**

3: Fluency: Students are **efficient and accurate** in performing foundational computational procedures without always having to refer to tables and other aids. Teachers help students to study algorithms as "general procedures" so they can gain insights to the structure of mathematics (e.g. organization, patterns, predictability). Students are able to **apply a variety of appropriate procedures flexibly** as they solve problems. Helping students master key procedures will help them understand and **manipulate more complex concepts** in later grades. (NRC, 2001, p. 121; CCSSM, 2010, p. 6)

4: Deep Understanding: Teachers teach more than "how to get the answer" and instead support students' ability to **access concepts from a number of perspectives** so that students are able to see math as more than a set of mnemonics or discrete procedures. Students **demonstrate deep conceptual understanding of core math concepts** by **applying them to new situations** as well as **writing and speaking about their understanding.** (NRC, 2001, p. 118; CCSSM, 2010, p. 4, 6-8)

3: Rigor: Requires **fluency, application, and deep understanding**

5: Application: Students are expected to use math and **choose the appropriate concept for application** even when they are not prompted to do so. Teachers provide opportunities at all grade levels for students to **apply math concepts in "real world" situations.** Teachers in content areas outside of math, particularly science, ensure that students are using math – at all grade levels – to **make meaning of and access content.** (NRC, 2001, p. 124, p. 72-73; NMAP, 2008, p. 49-50)

6: Dual Intensity: Students are **practicing and understanding.** There is more than a balance between these two things in the classroom – both are occurring with intensity. Teachers create opportunities for students to participate in authentic practice and make use of those skills through **extended application of math concepts.** The amount of time and energy spent **practicing and understanding** learning environments is driven by the specific **mathematical concept** and therefore, varies throughout the given school year. (NMAP, 2008, p. 45-46; NRC, 2001, p. 115)

Reflection:

How has implementation of the shifts impacted mathematics instruction in your building/district?

Specifically, what instructional practices are most significantly changing? What evidence are you monitoring in order to track changes in practice?

What opportunity(ies) for improved practice, around the shifts, are you noting? What might be next steps?

Works referenced:

Common Core State Standards for Mathematics (CCSSM). (2010, June). Retrieved from Common Core State Standards: http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf

Common Core Instructional Shifts. (2011). Retrieved from Engage:NY: <http://engageny.org/resource/common-core-shifts/>

National Mathematics Advisory Panel (NMAP). (2008). *Foundations for Success: The Final Report of the National Mathematics Advisory Panel*. Washington, DC: U.S. Department of Education. Available online at: <http://www.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf>

National Research Council (NRC). (2001). *Adding it up*. (J. Kilpatrick, J. Swafford, & B. Findell, Eds.) Washington, DC: National Academy Press.

Mosher, F. A. (2011, September). *The role of learning progressions in standards-based education reform*. Retrieved from Consortium for Policy Research in Education: http://www.cpre.org/images/stories/cpre_pdfs/lp%20policy%20brief%20web%20ready.pdf