**Looking Ahead by Looking Back**

1989 & 2000: NCTM
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- Principles and Standards for School Mathematics
  - Key recommendations: Content strands, content standards (grade bands), and mathematical processes

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2009: Focus in High School Mathematics: Reasoning and Sense Making

**Overall Achievement is Up**

*Figure A. Trend in fourth-grade NAEP mathematics average scores*

*Figure B. Trend in eighth-grade NAEP mathematics average scores*

**We Know What Makes a Difference**

[1] These include the quality of teachers and teaching;

[2] access to challenging curriculum, which ultimately determines a greater quotient of students’ achievement than their initial ability levels; and

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Common Core and Cognitive Demand

“... the Common Core standards emphasize the cognitive demand category ‘demonstrate understanding’ more than state standards do ...” and twice the emphasis on “solve nonroutine problems” than state standards do (p. 105).


Quality Teaching
Planning for Instruction Focused on the Mathematical Practices

Some Features of Effective Instruction – T²

Tasks
• Conceptual Engagement & Productive Struggle

Talk
• Mathematical Discourse

We Don’t Emphasize Perseverance (MP 1)

Students often urge the teacher to make mathematical “tasks more explicit by breaking them down into smaller steps, specifying exact procedures to be followed, or actually doing parts of tasks for them. Should the teacher succumb to such requests, the ... sense-making aspects of the task are reduced or eliminated ...” (p. 351).


Conceptually Engaging Tasks are Atypical

“... typical classroom mathematics teaching in the United States tends not to use challenging tasks, nor to promote students’ thinking about and engagement with mathematical ideas, and thus fails to help students develop understanding of the mathematics they are learning” (p. 1).


However, CCSSM Content Standards Alone Likely Will Not Address Achievement Differentials

“The Common Core may reduce variation in achievement between states, but as a source of achievement disparities, that is not where the action is. Within-state variation is four to five times greater” (p. 12).

If your students are going home at the end of the day less tired than you are, the division of labor in your classroom requires some attention.


Supporting Perseverance by Emphasizing Mathematical Practices 2 and 3

Teachers’ questions play a central role to the outcome of a lesson. “Asking questions that scaffold or support students’ continued engagement with a task and that press students to explain and justify their thinking are key to sustaining the cognitive demands of mathematical tasks” (p. 351).


School Organization to Support All Learners (and Teachers)

Too often, schools serving large populations of minority students emphasize “slowing down” or providing less mathematics content, rather than providing more challenging content.


The Power of Formative Assessment Processes

“Based on its review of research, the Panel recommends regular use of formative assessment, particularly for students in elementary grades ... for struggling students, frequent (e.g., weekly or biweekly) use of these assessments appears to be optimal, so that instruction can be adapted based on student progress” (p. 47).


Formative Assessment

“If students have left the classroom before teachers have made adjustments to their teaching on the basis of what they have learned about the students’ achievement, then they are already playing catch-up. If teachers do not make adjustments before students come back the next day, it is probably too late” (p. 191).

Time Must Become the Variable, Not Learning

Time and support must become variables. Some students will require more time to learn, and so the school must develop strategies to provide students with that time during the school day.


Change is Hard

The most likely reason for the stability of teaching practices over time is that teaching is a cultural activity and cultural activities, by their very nature, are highly resistant to change.


We Must Move Beyond Pockets of Excellence

Teachers working alone in their classrooms develop inconsistencies in instructional practices and rigor and create inequity in student learning experiences.


Addressing the Culture and Supporting Teachers as they Engage Students with the Mathematical Practices

Change Takes Perseverance

When teachers try to change more than two or three things about their teaching at the same time, the typical result is that their teaching deteriorates and they go back to doing what they were doing before. My advice is that each teacher chooses one or two techniques and tries them out in the classroom. If they appear to be effective, then the goal should be practice them until they become second nature.


The Importance of Professional Learning Communities (PLCs) as a Vehicle to Improve Consistency in Instructional Quality

Teachers have a professional responsibility to participate in group decision making to improve the art and practice of teaching. One of the most powerful forums for teacher improvement is involvement in a professional learning community.

Perhaps We Don’t Have an “Achievement” Gap

When African American and White students complete the same mathematics courses, the differences in average achievement gains are statistically insignificant. Additionally, there are no statistically significant differences in achievement between high- and low-SES students who complete the same courses.


The Importance of Persisting in the Curriculum

Of all pre-college curricula, the highest level of mathematics in secondary school has the strongest continuing influence on bachelor’s degree completion. Finishing a course beyond Algebra 2 more than doubles the odds that a student who enters post-secondary education will complete a bachelor’s degree.


Will the CCSSM help us close our instructional gaps? Yes, but only if …..

• We focus first and foremost on the Mathematical Practices, i.e. if we make this reform effort about instruction and not just content.
• If we put structures in place to support all students and teachers in achieving the goals of the CCSSM.
• If we address the cultural resistance to change, both within schools and in our culture at large.

The CCSSM May Be Our Last Opportunity to Get it Right

The unprecedented adoption of the same set of mathematics standards by nearly all states ... provides the opportunity for educators nationwide to press the “reset” button on mathematics education. (p. 48).