

*The Common Core State
Standards: Opportunities
and Challenges for the
Mathematical Education of
Teachers*



Common Core Standards

- An unprecedented and unified effort to promise U.S. children a high quality, focused mathematical and scientific education that involves both
 - Focal and core ideas and
 - High quality, aligned assessments
- Making good on the promise of these standards will require a revolution in our P-20 educational system:
 - In what and how we teach
 - In how we organize instruction
 - In how we collaborate
 - In how we learn from the efforts.



The Place of the Education of Teachers: Problem and Solution

- Problem:
 - Many teachers do not know the mathematics that they will now be required to teach
 - Many teachers do not have an opportunity to learn that mathematics in preservice preparation or professional development in any methodical, sustained, planful way
 - Many teacher preparation, induction, and professional development programs, whether university-based or other, “alternative” or “traditional” do not have as part of their core infrastructure, strong, substantial relationships with and involvement of both practicing teachers and practicing mathematicians



The Place of the Education of Teachers: Problem and Solution

Solution:

- Teacher preparation programs can be designed to offer sustained study of the mathematics that is needed to teach to the core standards
- Induction and professional development programs could be developed to intentionally and proactively build upon teachers' preliminary knowledge of mathematics and extend it over time

Butwe need the materials and schools to support them as they learn to do that. The standards will not become a reality unless we all conceptualize and approach the problem and solution as systemic.

Some Sample Problems/Challenges of the Current System

Many K-12 students do not learn challenging mathematics

Those students enter college unprepared for college mathematics; the ones who do understand mathematics often do not to enter teaching

Teachers are left to their own devices in terms of continuing their mathematical education

Those same prospective teachers are apprenticed in classrooms of teachers who themselves know little mathematics

Future elementary teachers take very few mathematics courses; those taken by secondary teachers do not prepare them to develop mathematical knowledge for teaching

But A revolution won't occur if we target just one aspect of the problem . . .



- How do we increase the number of students who arrive to college with sound understanding of mathematics?
 - School staffing patterns
 - Professional development for practicing teachers
- How do we “fast track” the learning of all college entrants so that they “catch up”?
 - Content and pedagogy of college mathematics classes
 - Staffing of college mathematics classes
- How do we make sure the both elementary and secondary prospective teachers have opportunities to learn – in enough depth and breadth – the mathematical knowledge for teaching implied in the core standards?
 - Content of disciplinary classes
 - Number of disciplinary classes
 - State and university policies about disciplinary majors, college credits, teacher certification, etc.

But A revolution won't occur if we target just one aspect of the problem . . .



- How do we recruit more talented mathematics students into teaching?
- How do we place beginning teachers in assignments from which they can learn to teach mathematics well?
 - Identification of placement/cooperating teachers
 - Structures of early teaching experiences
 - School and state policies and practices about placing new teachers
- How do we help practicing teachers acquire more mathematical knowledge for teaching?
 - Induction and professional development opportunities
 - State and school district policies and practices about on-going support for teachers
- How do we organize schooling and its resources to support teacher learning and sound instruction?
- How do we mount the public education agenda that would help parents and administrators, as well as the general public, understand enough mathematics to support teachers and students as they rise to the challenges implicit in the Common Core Standards?




The Role of Higher Education

- Aligning higher education curriculum with K-12 curriculum (which includes both adapting admissions standards and revising curricula of first year courses that act as bridges between K-12 and college majors);
- Preparing and educating teachers, both prospective and practicing (which includes revising curriculum in disciplinary departments to prepare teachers to teach the Common Core, revising professional preparation coursework and experiences, and working in partnerships with professional development programs)
- Conducting research on issues of teaching and learning the Common Core State Standards, teacher quality, and the implementation of the Common Core State Standards



Aligning higher education curriculum with K-12 curriculum

- Admissions standards
- Adapting curriculum of first year courses:
 - Revise introductory discipline courses and general education courses
- Future ripple effect in terms of raising expectations for more advanced courses as well.



Preparing and educating teachers, both prospective and practicing

Five major changes

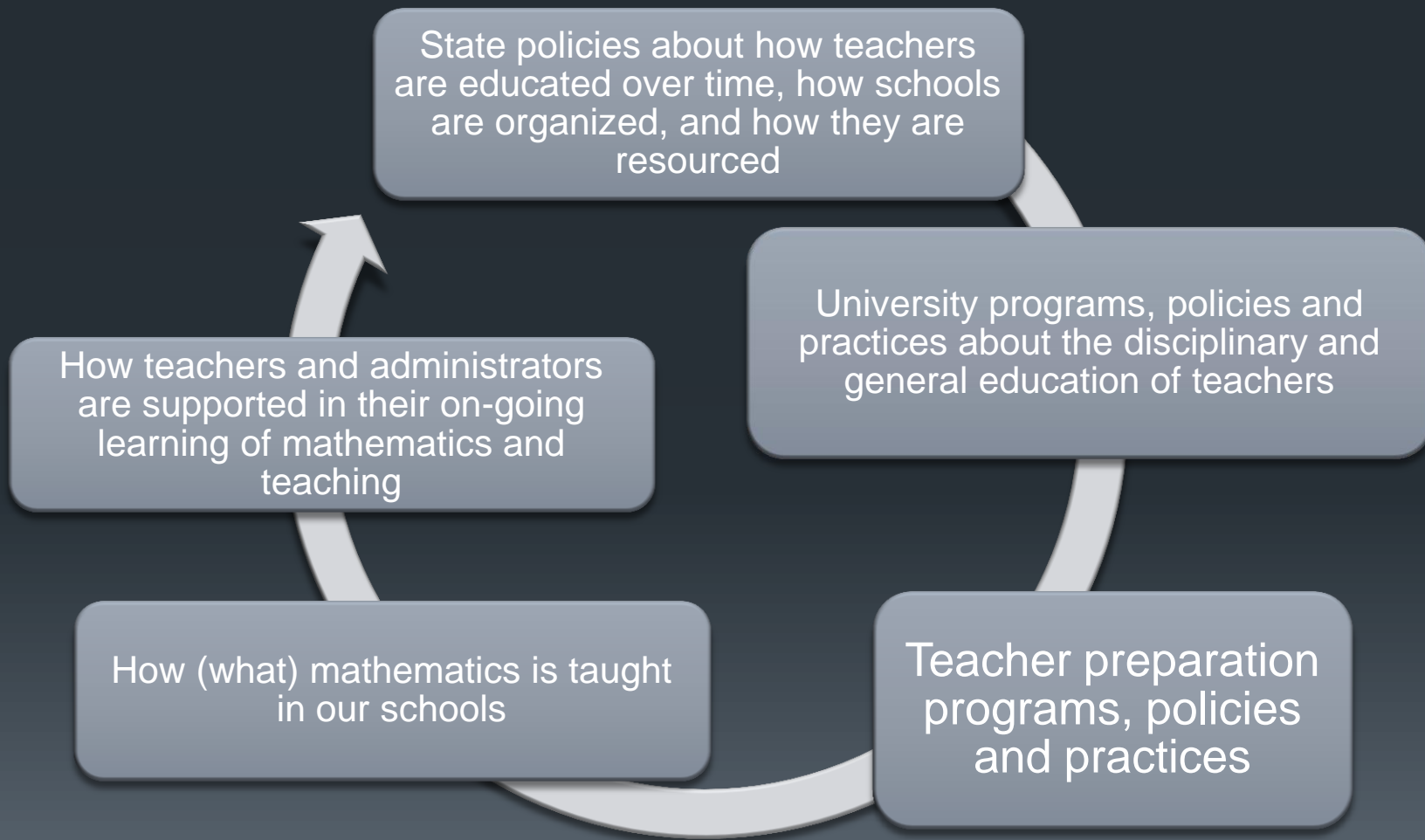
- increasing selectivity and proactive recruitment to increase both the content knowledge of teachers and the diversity of the teaching force;
- altering the content (and in the case of elementary teachers, the number) of disciplinary courses for future and practicing teachers;
- altering the professional preparation courses for future and practicing teachers;
- identifying, nurturing and sustaining high quality field experiences for all future teachers; and
- designing and maintaining a data collection system (including both assessments and infrastructure) committed to continuous improvement.



Conducting research

- To inform the standards
- To assess the standards
- To describe and evaluate the implementation of the standards

The Core Challenges and Opportunities





Partnerships for change

- National organizations
- State departments of education
- P-12 schools
- Higher education
 - Professional preparation programs (schools or colleges of education)
 - Disciplinary departments
- Industry

What can we do right now?

National organizations

- Actively support and encourage the engagement of member IHEs in the implementation of the CCSS within their states
- Encourage and facilitate dialogue and collaboration among member IHEs in their efforts to respond to the challenges of the CCSS
- Convene panels of disciplinary and teacher education faculty from member IHEs to provide guidance to national efforts to implement the CCSS

What can we do right now?

Institutions of higher education

- Raise awareness of the Common Core State Standards with university presidents, provosts, deans, and department chairs
- Build a coalition of actors to engage the multiple units across disciplinary departments and teacher education departments in considering their responsibility for responding to the CCSS
- Build coalitions with IHEs across the state to build support for the CCSS, to ensure a commonality of vision, and to develop shared resources for responding to the CCSS

What can we do right now?

State departments of education

- Form partnerships with IHEs focusing on implementation of the CCSS, perhaps through P-20 councils, with particular attention to developing plans to transition to the CCSS
- Revisit certification requirements to reflect the content knowledge required for effectively teaching the CCSS
- Explore certification of elementary mathematics specialists to build capacity for enacting the CCSS in P-6
- Design and maintain a data collection system

Teacher education programs

- Create task forces of mathematicians, mathematics teacher educators, mathematics K-12 teachers, scientists, science teacher educators, K-12 science teachers, assessment experts, and educational researchers to interrogate the content of the professional preparation of teachers to ensure its effectiveness in preparing teachers to teach the CCSS
- Create partnerships with SDEs to revisit certification requirements and measures for teacher assessment that are aligned with the CCSS
- Create partnerships with disciplinary faculty and with K-12 schools to provide professional development as the schools work to implement the CCSS and to ensure that prospective teachers have experiences that will prepare them to teach the CCSS

Disciplinary departments

- Create task forces of mathematicians to interrogate the content of introductory courses and consider what it would take to align those courses with the standards
- Create task forces of mathematicians and mathematics teacher educators, scientists and science teacher educators to interrogate the content of disciplinary courses that are targeted for prospective elementary and secondary mathematics teachers
- Create partnerships with teacher educators and K-12 educators to develop content courses that will ensure teachers have the content background needed to support students' progress in meeting the CCSS



Teacher education programs

- Create partnerships with disciplinary faculty and with K-12 schools to provide technical assistance with the adoption of curriculum materials, the development of student assessments, and the development of teacher assessments in alignment with CCSS, as well as to monitor their effectiveness
- Recruit strong STEM candidates into teacher preparation programs – by using information gained from new assessments
- Have high quality field experiences with teachers who have mastered teaching the standards

