NWRCC
Northwest Regional Comprehensive Center

education northwest
CREATING STRONG SCHOOLS & COMMUNITIES

IMPLEMENTING THE COMMON CORE STATE STANDARDS FOR MATHEMATICS

February 21, 2012

CENTER ON INSTRUCTION

ALASKA COMPREHENSIVE CENTER

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- Provides consulting services in mathematics education
- Member of the Mathematics Work Team for the Common Core State Standards
- Past President of the Association of State Supervisors of Mathematics
- Served as the Mathematics Initiatives Administrator at the Ohio Department of Education
- Former staff member at the National Research Council
- Extensive experience as a teacher of mathematics at elementary to graduate level

Implementing

the

Common Core State Standards

for

Mathematics

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Underlying Principle

- "*Everyone is good at mathematics because everyone can think. And mathematics is about thinking.*"
  - Yeap Ban Har, National Institute of Education, Singapore
- Corollary 1: Strategies that attempt to remove thinking from learning are bound to fail in the long run.
- Corollary 2: When learning is effective, "getting the right answer" is but a small piece of the work.

Overview

- CCSS implementation in rural schools
- Key messages from Response to Intervention (RtI)
- Key messages from the CCSS for Mathematics
- Implementation resources and suggestions

Major Themes

- All students means ALL students
- The work is about improving instruction, which requires that teachers (all teachers) collaborate to reach more students more of the time
- Common messages among current initiatives
  - Common Core State Standards
  - Improving Adolescent Literacy
  - Response to Intervention
  - School Turnaround
  - …

Recommended Practices for School Turnaround

- Signal the need for dramatic change with strong leadership
- Maintain a consistent focus on improving instruction
- Make visible improvements early in the school turnaround process (quick wins)
- Build a committed staff

From IES Practice Guide and previous webinar

CCSS Implementation in Rural Schools

Rural Schools

- Many of the challenges of rural schools have analogues in urban and suburban schools
  - Student motivation
  - Parental involvement
  - Resources and staffing
  - Uneven instruction
  - Beliefs of teachers
  - …
- Many differences are a matter of scale and scope
- Rural schools are quite diverse as a group
- Rural schools face particular challenges of size and distance

School Size Considerations

- School size is not a determining factor in student achievement
- Schools for grades 6-12 are often considered optimal at about 100 students per grade
  - Comprehensive program and curriculum
  - Individual relationships with students
- CCSS implementation may allow the same benefits in schools as small as one class per grade
  - Common focused curriculum for all students
  - Supports for students who are behind
  - Distance learning for interested students
- Very small schools may require different strategies

Implementation Matters

- Many "optimally-sized" schools fail to achieve their potential because of:
  - Unfocused curriculum and instruction
  - Fragmented programs (e.g., too many courses)
  - Low expectations for "those kids"
- CCSS implementation will require:
  - Commitment to the goal of all graduates being college and career ready
  - Teachers collaborating (perhaps across districts) to reach more students more of the time
  - Mathematical expertise and leadership in each building

Key Messages from Response to Intervention

What Is Not RtI?

- RtI is not a package
- RtI is neither tracking nor homogeneous grouping
  - RtI is *not* about providing different instruction to different groups of students, based on adult judgments about what students cannot do
- When it comes to mathematical thinking, any group of 2 or more students is heterogeneous
- And perhaps you have encountered students who seemed to be heterogeneous all by themselves

Effective Instructional Strategies (Tier 1)

- Problem-based learning
  - Rich problems can motivate concepts and skills
  - To learn problem solving, students must be given opportunities to solve (and struggle with) problems
- Differentiation *within* a task
  - Alternative to differentiation *by* task
  - Given a rich mathematical task, students differentiate themselves
  - Then teachers (and intervention specialists) provide whatever support students need (without giving too much away)

Effective Instructional Strategies (Tier 2)

- **What instructional strategies are effective in helping students with difficulties in mathematics?**
  - The use of structured peer-assisted learning activities
  - Systematic and explicit instruction using visual representations
  - Modifying instruction based on data from formative assessment of students (such as classroom discussions or quizzes)
  - Providing opportunities for students to think aloud while they work

Source: Research Brief from the National Council of Teachers of Mathematics.
Available at: http://www.nctm.org/news/content.aspx?id=8468

Key Messages from the CCSS for Mathematics

What's New with the CCSS?

- Common across 45+ states
- Internationally benchmarked standards
- Focus and coherence
- College and career readiness for all
- And all students means ALL students

College and Career Readiness

- College and career readiness involves mathematics at level of Algebra 2 or its equivalent (A2E)
- All students need proficiency in A2E for
  - Many careers, with or without college
  - Informed citizenship
  - Individual empowerment
- High school mathematics should open doors
  - But adult decisions often close doors for students
  - After students complete A2E, they have choices
- But not your parents' Algebra 2

What Is Needed?

- Renewed curriculum and instruction
  - Especially across middle and high school, toward a rigorous, relevant, and accessible A2E
- Support for students who are behind
  - To help them catch up
- CCSS and Model Pathways are foundational responses to these needs

CCSS Mathematical Practices

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

K-8 CCSS Changing Content Emphases

- Primary focus on number in grades K–5
- Fractions as numbers on the number line, beginning with unit fractions
- Fluency with standard algorithms, supported by strategies based in place value
- Much statistics in grade 6–8
- Much algebra and geometry in grades 7–8

HS CCSS Changing Content Emphases

- Number and quantity
  - Number systems, attention to units
- Modeling
  - Threaded throughout the standards
- Geometry
  - Proof for all, based on transformations
- Algebra and functions
  - Organized by mathematical practices
- Statistics and probability
  - Inference for all, based on simulation

CCSSM and Acceleration

- CCSSM represent significant curricular acceleration in grades K–8
  - Much Algebra 1, Geometry, and Statistics are in the middle grades
  - Many "accelerated" programs will no longer be ahead
  - CCSS for Grade 8 is a reasonable, internationally benchmarked response to "Algebra for all" in grade 8
- Accelerating large percentages of students much beyond the CCSS for K–8 is probably unwise
- CCSSM for high school include much advanced content and much new content for all students
  - Most students will need three years in high school to complete CCSS
- *So we need to rethink mathematics, grades 6–12*

Implementation Resources and Suggestions

Implementation Resources

- The draft Mathematics Content Specifications from the Smarter Balanced Assessment Consortium (SBAC)
- The Mathematics Assessment Project (MAP)
- The Illustrative Mathematics Project (IMP)
- Bill McCallum's Common Core Tools blog
  - Progressions documents
- Common Core videos from the Hunt Institute
- Phil Daro's SERP Institute videos
- Inside Mathematics website

An Example from MAP

Boomerangs

Phil and Cath make and sell boomerangs for a school event.
The money they raise will go to charity.

They plan to make them in two sizes: small and large.

Phil will carve them from wood.
The small boomerang takes 2 hours to carve and the large one takes 3 hours to carve.
Phil has a total of 24 hours available for carving.

Cath will decorate them.
She only has time to decorate 10 boomerangs of either size.

The small boomerang will make $8 for charity.
The large boomerang will make $10 for charity.
They want to make as much money for charity as they can.

How many small and large boomerangs should they make?

How much money will they then make?

Critique the Reasoning of Others

Phil can only make 12 small or 8 large boomerangs in 24 hours

12 small makes $96

8 large makes $80

Cath only has time to make 10, so $96 is impossible.

She could make 10 small boomerangs which will make $80.

So she either makes 8 large or 10 small boomerangs

and makes $80

For large and medium schools

Math Programs for All Students

- Main pathway completing the CCSS in grade 11
  - Rather than Prealgebra in grade 9, provide support for *all* students to reach these standards
  - Provide alternatives to Precalculus for seniors
- Alternative pathway completing the CCSS in grade 10, allowing for AP Calculus in grade 12
  - Determine where "compacting" should happen
- Flexibility for the small numbers of students who are eager for still more mathematics
  - Align with gifted education policies
  - Expect PSEO during senior year

For small schools

Math Programs for All Students

- Main pathway completing the CCSS in grade 11
  - Rather than Prealgebra in grade 9, provide support for *all* students to reach these standards
  - Employ distance learning for seniors
- Flexibility for students who are eager for still more mathematics
  - Employ acceleration on a case-by-case basis, driven by interest, emphasizing depth of learning
  - Employ distance learning as appropriate
  - Attend to gifted education policies

Research-Based Principles

- Implementation matters
  - Variation within a model is greater than the variation between models
  - Adoption of standards, programs, or textbooks merely opens the door
- High-quality professional development
  - Focuses on the content the teachers are teaching
  - Draws on curricular materials teachers are using
  - Involves analyzing student work
  - Takes time

Maintain Focus and Coherence

- Implementation plans may miss the point
  - Readers might not see focus and coherence
  - Strategies may be counterproductive
- The goal is coherence in curriculum, instruction, and learning
  - Standards are taken as atoms, but the power is in the bonds (Jason Zimba)
  - Think in chapters, not lessons (Phil Daro)

What Can Districts Do Now?

- Get to know the CCSS through Professional Learning Communities
  - Use the "critical areas of focus"
  - Take a "progressions view"
- Begin developing the Mathematical Practices
- Develop support structures for struggling students
- Identify transitional changes for 2012–13
- Be skeptical of easy alignment and quick fixes
- Watch for new opportunities and resources

Implementation Questions for You

- Can we empower teachers to make necessary changes?
  - Curriculum, instruction, support, programs…
- Can we get the incentives right?
  - So that teachers will regularly work together to reach more students more of the time
  - So that we all learn from and with our best teachers
- Can we bring mathematics leadership to the decision-making table?
  - So that school-improvement efforts focus on long-term improvements not short-term fixes

Questions and Answer Session

Webinar Series
Recording and PowerPoint

- December 2011
  - Rural School Turnarounds
- January 2012
  - Improving Adolescent Literacy in Rural Schools
- February 2012
  - Implementing the Common Core State Standards for Mathematics

http://nwrcc.educationnorthwest.org/events

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  http://www.alaskacc.org

Thank you

Webinar recording and PowerPoint may be found at:

http://nwrcc.educationnorthwest.org/events