

# Response to Intervention (RtI) and the Common Core State Standards (CCSS) for Mathematics: How Do They Fit?

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# What's New with the CCSS?

- Internationally benchmarked standards
- Commonness across 40+ states
- Focus and coherence
- College and career readiness for all
- And all students means ALL students

# 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

- Common Core State Standards
- How does this relate to RtI?
- General principles and findings from the literature

# CCSS Principles

- Focus
  - Identifies key ideas, understandings and skills for each grade or course
  - Stresses deep learning, which means applying concepts and skills within the same grade or course
- Coherence
  - Articulates a progression of topics across grades and connects to other topics
  - Vertical growth that reflects the nature of the discipline

# 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.

# Format of K-8 Standards

Grade  
Level

Domain

Operations and Algebraic Thinking

1.OA

**Represent and solve problems involving addition and subtraction.**

1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.<sup>2</sup>
2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Standard

**Understand and apply properties of operations and the relationship between addition and subtraction.**

3. Apply properties of operations as strategies to add and subtract.<sup>3</sup> *Examples: If  $8 + 3 = 11$  is known, then  $3 + 8 = 11$  is also known. (Commutative property of addition.) To add  $2 + 6 + 4$ , the second two numbers can be added to make a ten, so  $2 + 6 + 4 = 2 + 10 = 12$ . (Associative property of addition.)*
4. Understand subtraction as an unknown-addend problem. *For example, subtract  $10 - 8$  by finding the number that makes 10 when added to 8.*

Cluster

# Grade Level Overview



## Mathematics | Grade 2

In Grade 2, instructional time should focus on four critical areas of mathematics: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

(1) Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

**Critical Area**

(2) Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000

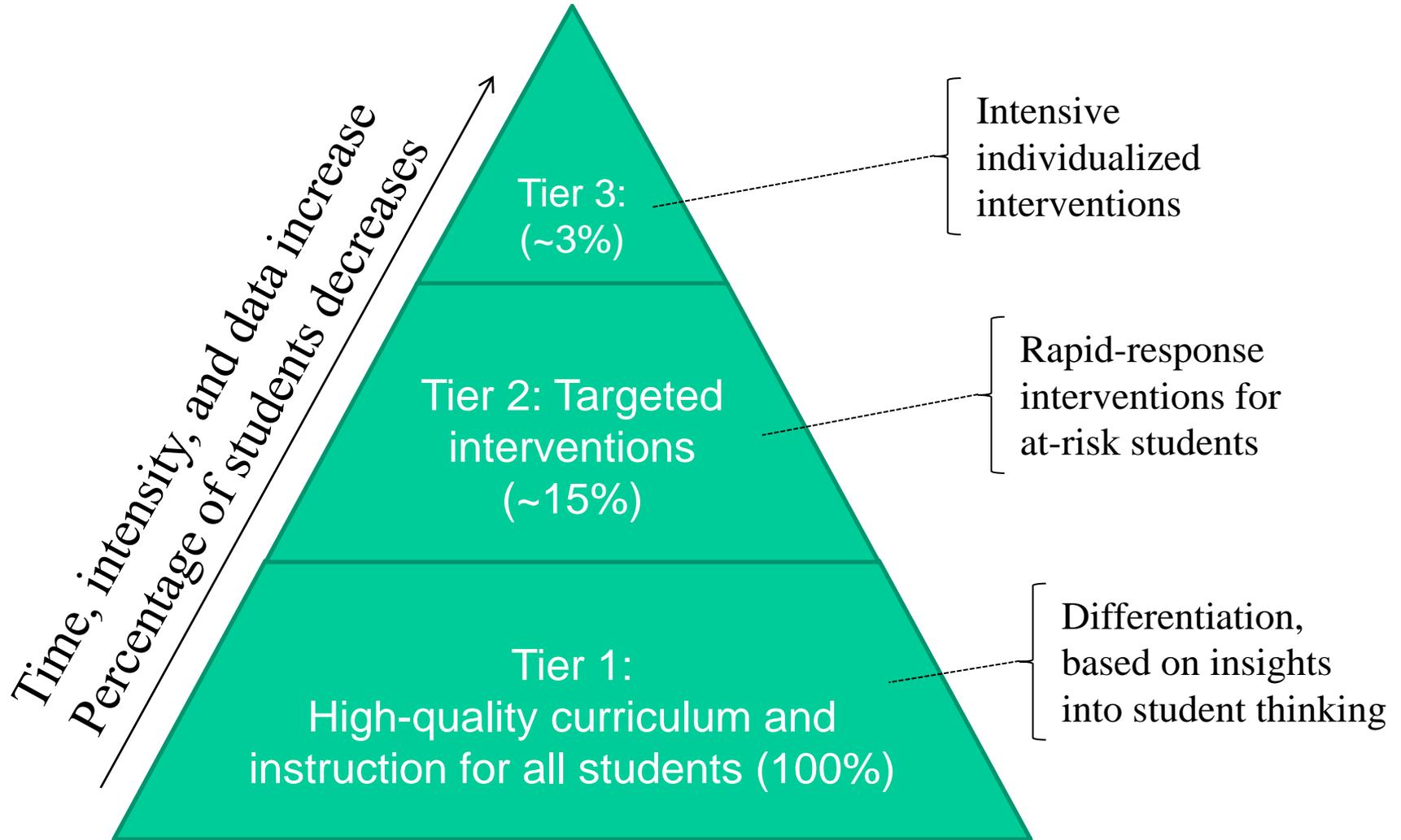
# How do the CCSS and Rtl fit?

- Focus and coherence support Rtl
  - Easier to notice when students are behind
  - Easier to provide targeted support
- But let us first ask
  - What is Rtl?
  - What does research suggest about Rtl implementation?

# What Is RtI?

- RtI is about establishing a school-wide system for allocating instructional resources where they are needed
  - Give all students access to the regular curriculum AND provide differentiated instruction and support
  - Some students are 15 minutes behind; others are years behind
  - Labels are less important than providing additional instruction where it is needed
  - RtI integrates regular and special education
    - Students with disabilities are in every tier

# Rtl Framework



# What Is Not Rtl?

- Rtl is not a package
- Rtl is not a new method of identifying students with learning disabilities
- Rtl is neither tracking nor homogeneous grouping
  - Rtl 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

# Rtl Is About Instruction

- Rtl requires high-quality, differentiated Tier 1 instruction
  - Differentiation happens within Rtl, in each Tier
  - Teachers should be differentiating their instruction all the time based on insights into student thinking
  - If large percentages of students seem to need Tier 2 support, examine regular instruction
  - Many learning difficulties are caused by poor instruction
- Rtl is about knowing where students are
  - Keeping track of their progress (and their thinking)

# Rtl Requires Investment

- Invest in the expertise of your staff
  - Classroom teachers, intervention specialists
  - School-based mathematics coaches, district-level mathematics leaders
  - School and district administrators
  - Professional learning communities, building leadership teams
- Be cautious about investments in tools for screening and progress monitoring
  - Be modest in both expectations and dollars
  - Tools cannot do the hard work of improving instruction

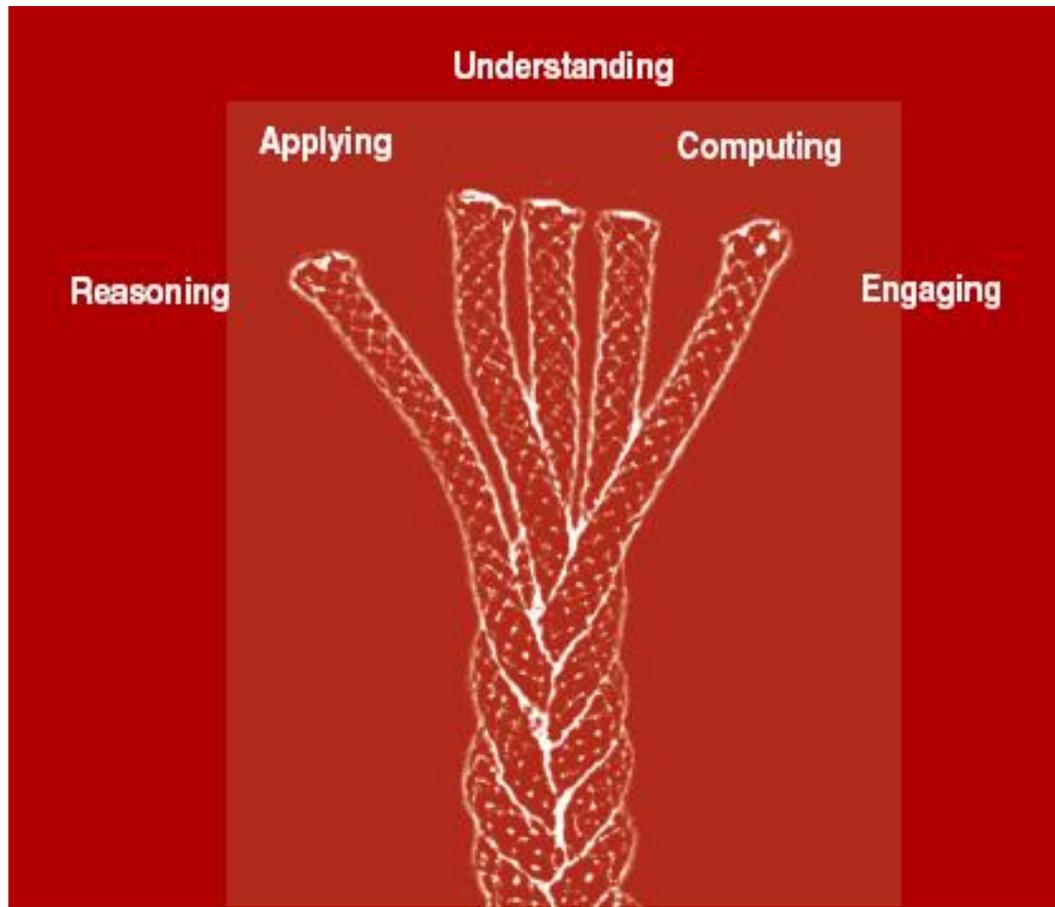
# Evidence at Three Levels

- Student
  - Effective mathematics learning
- Classroom
  - Effective instructional strategies
- \* Interlude \*
  - Evidence-based assessment
- School and district
  - Effective improvement strategies

# Effective Mathematics Learning

- Described as *Mathematical Proficiency*
  - *Adding It Up*, Mathematics Learning Study, National Research Council, 2001
  - *Foundations for Success*, National Mathematics Advisory Panel, 2008
  - *Common Core State Standards for Mathematics*, Council of Chief State School Officers, National Governor's Association, 2010

# Mathematical Proficiency



# Mathematical Proficiency

- Does your program help *all students* develop understanding, reasoning, and problem solving alongside skills?
  - Do all students engage in mathematical thinking?
  - Do they see mathematics as sensible?
  - Do they believe in their own efficacy?
  - Can they solve problems that they have not seen before?

# Effective Instructional Strategies (Tier 1)

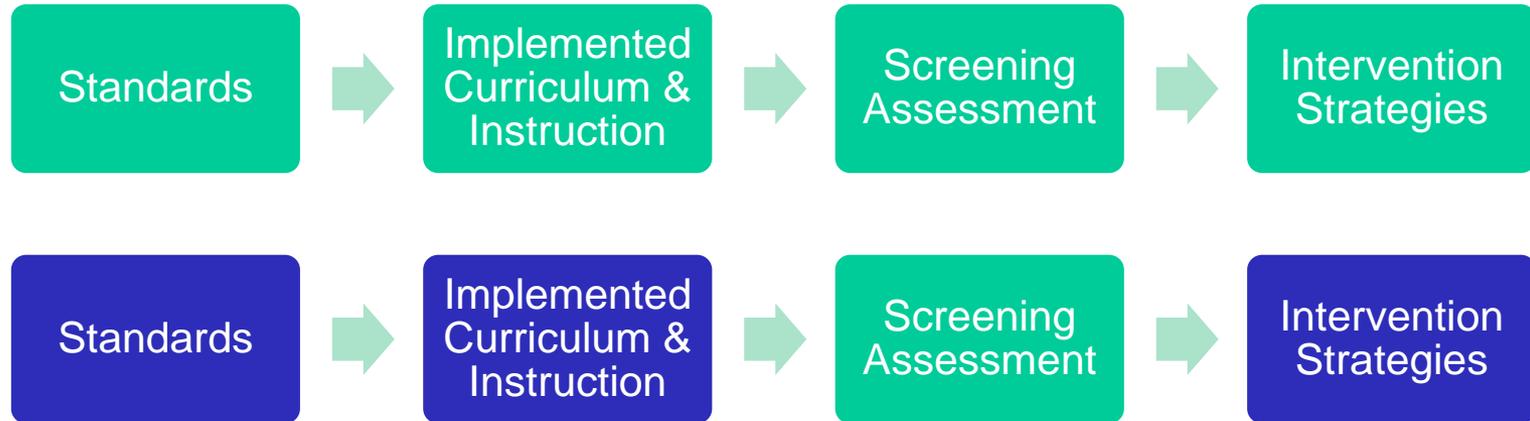
- Problem-based learning
  - Rich problems can motivate concepts and skills
  - To learn problem solving, students must be given opportunities to solve (and struggle with) problems
- Differentiation *within* a task
  - Alternative to differentiation *by* task
  - Given a rich mathematical task, students 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>

# Assessment Validity



- Assessment validity depends upon use
- Will a research-based assessment support valid inferences in a new setting?
- Even with common standards, validity of inferences will depend upon instruction and intervention strategies

# Diagnostic Validity

- Suppose an assessment indicates that Kim has mastered subtraction *without* regrouping but *not with* regrouping.
- Suppose Kim has practiced many exercises like those to the right.
- Consider: What does Kim need to know to succeed on these exercises?
- Does Kim have a learning issue or an instructional issue?

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$$\begin{array}{r} 57 \\ - 23 \\ \hline \end{array}$$

$$\begin{array}{r} 48 \\ - 15 \\ \hline \end{array}$$

# Diagnostic Tools

- *Screening is not diagnosis*
- Must provide insight into student thinking
  - Teacher-designed and curriculum-embedded assessments can and should be part of the mix
  - Student work samples can play diagnostic roles, if they provide evidence of student thinking
  - Identifying and adapting quality assessments is appropriate work for Professional Learning Communities

# Evidence-Based Assessment Practices

- Use evidence (data) to make decisions
  - Use assessment data critically
  - Assessment data should provoke discussion of alignment among standards, learning, and instruction
  - Assessments of procedural fluency rarely provide insight into student thinking
- Evidence-based assessment practices
  - Formative assessment (Black & William)
  - Attending to student thinking
  - Feedback through questioning

# Effective Improvement Strategies

- ODE Universal Education study
- Programmatic questions
- Professional development
- Targeting whole schools

# Universal Education Study

- ODE study of 27 districts showing consistent and pronounced gains in both reading and math between 2004-05 and 2007-08
- Identified common district-level strategies and practices that promoted consistent improvement for students with disabilities

Report available at <http://www.ode.state.oh.us>, keyword search “Universal Education”

# Universal Education Findings

- Leadership
  - Collective ownership of student learning
  - Full inclusion and intervention strategies
- Universal Access to Core Curricula
  - Common professional development on core content for regular education and special education teachers
  - Co-teaching, team teaching, and strategic coaching
  - Shared accountability

# Universal Education Findings

- Data-Driven Decision Making
  - Commitment to improvement
  - Comparative analysis among disaggregated student groups
- Strategic Collaboration
  - Horizontal and vertical teaming for collaborative data analysis and planning
  - Intervention and enrichment practices that grow out of collaborative structures

# Programmatic Questions for Rtl

- Does your program help low-achieving students catch up?
  - You can't help students catch up by slowing them down
  - Low-track courses are often not safety nets but holding cells
- Do you know what your students know?
- Do all teachers feel responsible for all students?
  
- *Few high schools rise to these challenges*
  
- Put into practice the guiding principle
  - Give all students access to the regular curriculum, AND provide differentiated instruction and support

# Professional Development for Rtl

- Remember: Rtl requires investment in your staff
- High-quality professional development
  - Focuses on the content the teachers are teaching
  - Draws on the curricular materials they are using
  - Involves analyzing student work
  - Takes time

Source: Cohen & Hill, 1998, CPRE Policy Brief. Available at  
[http://www.cpre.org/images/stories/cpre\\_pdfs/rb23.pdf](http://www.cpre.org/images/stories/cpre_pdfs/rb23.pdf)

See also: Blank, de las Alas, & Smith, 2008, CCSSO Report. Available at:  
<http://www.ccsso.org/publications/details.cfm?PublicationID=364>

# Targeting Whole Schools

- Combine Rtl with *focused* school improvement efforts
- Include all appropriate teachers (including special education teachers) in high-quality mathematics professional development
- Make it safe for teachers to engage in deep conversations about content, teaching, and learning
- Ensure there is sufficient expertise (in content, pedagogy, leadership, and special education) to facilitate high-quality interactions among teachers
  - In each building
  - In each professional learning community

# Implementation Questions for You

- Can we empower mathematics 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