Connecting the CCRS and the LOI
RSD Principals and Assistant Principals

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Desert Willow Conference Center

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Outcomes

Increased ability to observe and coach teachers by

• deepening knowledge of the Standards for Mathematical Practices (SMPs) and Rigor in Mathematics
• experiencing the learning of mathematics in a manner that exemplifies the instructional shifts required by the CCRS
• examining the connections between the SMPs and specific elements of the Learning Observation Instrument (LOI)
• developing awareness of tools that can be used in support of the work of a teacher observer or supporter
• examining a sequenced lesson plan that uses the Balanced Math Framework
• practicing identifying evidence for specific elements of the LOI
Agenda

8:30   Welcome
8:45   Introductions, Agenda and Outcome
       CCRS 101- Instructional Shifts
       Standards for Mathematical Practice and the
       Learning Observation Instrument
10:15  Break
10:30  Mathematics Activity, Balanced Math Framework
12:00  Lunch
1:00   Mathematics Continued
       Examining the Lesson with an LOI and SMP lens
2:45   Closure and Evaluation
3:00   Institute Overview
Mathematics
Instructional Shifts

• Focus
• Coherence
• Rigor
Key Shifts in Mathematics Standards

- **Focus** strongly where the standards focus
- **Narrow** and **deepen** the work of each grade level
- **Switch** to a curriculum that is a mile deep and an inch wide so that students gain strong foundations
Key Shifts in Mathematics Standards

Implementation requires a shift in
• How we plan
• How we allocate instructional time
• How we assess mastery that involves a deeper knowledge of the mathematics content
Key Shifts in Mathematics Standards

- Connect major topics within grades and across grades
- Build new understanding onto foundations built in previous years
**Key Shifts in Mathematics Standards**

**Implementation requires a shift in**

- Teaching so math makes sense
- Helping students see the connections between topics
- Linking what is learned in one grade level with those in other grade levels

**Shift 2**

**COHERENCE**

- Not as set of isolated skills or domains
- Not teaching the same concept over again in the next year
- Not intended to be broken down into a set of microstandards
Key Shifts in Mathematics Standards

- **Pursue** conceptual understanding, procedural skill and fluency, and application with **equal intensity**
- **Emphasize** conceptual understanding of key concepts
- **Support** accuracy in calculation
- **Use** mathematics flexibly for application
Rigor . . .

Rigor is not a measure of the quantity of content to be covered. Rather, rigor is a measure of that content’s quality.
Rigor requires a shift in balance – a balanced approach...
Rigor is impacted by the Standards for Mathematical Practice

<table>
<thead>
<tr>
<th>Habits of Mind of a Productive Mathematical Thinker</th>
<th>Reasoning and Explaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP. 1 Make sense of problems and persevere in solving them.</td>
<td>MP.2 Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td>MP. 6 Attend to precision.</td>
<td>MP.3 Construct viable arguments and critique the reasoning of others.</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Modeling and Using Tools</th>
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<tbody>
<tr>
<td>MP.4 Model with mathematics.</td>
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<tr>
<td>MP.5 Use appropriate tools strategically.</td>
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</table>

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<tr>
<th>Seeing Structure and Generalizing</th>
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<tbody>
<tr>
<td>MP.7 Look for and make use of structure.</td>
</tr>
<tr>
<td>MP.8 Look for and express regularity in repeated reasoning.</td>
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</tbody>
</table>
Thus, **rigor** is also impacted by

- The tasks teachers pose
- The questions teachers ask during discussions
- A teacher’s mathematical understanding
- A teacher’s ability to listen
- A teacher’s expectations
- Teachers collaborating in a meaningful way
K–8 Publishers’ Criteria for the Common Core State Standards for Mathematics

**Focus:** focus strongly where the standards focus

**Coherence:** think across grades, and link to major topics in each grade

**Rigor:** in major topics, pursue with equal intensity
- conceptual understanding,
- procedural skill and fluency, and
- applications

CCSSO 2013
Task

What are some things you want to remember about the instructional shifts?

• 3 minutes to journal
• 4 minutes to share with a partner (2 mins. each)
• 1 minute to record one thing you heard that you do not have in your journal
Reflect

What are some implications that arise for you in your role in supporting the implementation of the shifts?

• 2 minutes to journal
• 5 minutes to share using a round robin process
• 3 minutes for a table discussion
• 1 minute to reflect on your listening
Standards for Mathematical Practice

• What do you recall about the SMPs?
• How many are there?
• What are they?
• Use your journal as a reference.
• As a group, name all of the SMPs.
A Tool for Supporting the Implementation of the SMPs

<table>
<thead>
<tr>
<th>Mathematical Practice</th>
<th>Student Dispositions</th>
<th>Teacher Actions</th>
<th>Related Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make sense of problems</td>
<td>• Have or value sense-making</td>
<td>• Provide open-ended and rich problems</td>
<td>• How would you describe the problem in your own words?</td>
</tr>
<tr>
<td>and persevere in solving</td>
<td>• Use patience and perseverance to listen to others</td>
<td>• Ask probing questions</td>
<td>• How would you describe what you are trying to find?</td>
</tr>
<tr>
<td>them</td>
<td>• Be able to use strategies</td>
<td>• Model multiple problem-solving strategies through Think-Alouds</td>
<td>• What do you notice about...</td>
</tr>
<tr>
<td></td>
<td>• Use self-evaluation and reflection</td>
<td>• Promote and value discourse and collaboration</td>
<td>• What information is given in the problem?</td>
</tr>
<tr>
<td></td>
<td>• Be able to show or use multiple representations</td>
<td>• Cross-curricular integrations</td>
<td>• Describe the relationship between the quantities?</td>
</tr>
<tr>
<td></td>
<td>• Communicate both verbally and in written format</td>
<td>• Make student responses (correct or incorrect) for understanding and multiple</td>
<td>• What purpose does the activity serve?</td>
</tr>
<tr>
<td></td>
<td>• Be able to deconstruct a problem as a reasoning step</td>
<td>approaches</td>
<td>• What are some other strategies you might try?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide solutions</td>
<td>• What are some other problem-solving methods similar to this one?</td>
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<td></td>
<td></td>
<td></td>
<td>• How might you use one of the previous problems to help you begin?</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• How do you organize, represent, show...</td>
</tr>
<tr>
<td>2. Reason abstractly and</td>
<td>• Create multiple representations</td>
<td>• Develop opportunities for problem solving</td>
<td>• What do the numbers used in the problem represent?</td>
</tr>
<tr>
<td>quantitatively</td>
<td>• Reason about problems in contexts</td>
<td>• Provide opportunities for students to listen to the reasoning of others</td>
<td>• What is the relationship of the quantities?</td>
</tr>
<tr>
<td></td>
<td>• Make connections</td>
<td>• Give connections and clarifying</td>
<td>• How is related to...</td>
</tr>
<tr>
<td></td>
<td>• Make connections and clarifying</td>
<td>• Tie context elements together to help make connections</td>
<td>• What is the relationship between...</td>
</tr>
<tr>
<td></td>
<td>• Make computations and clarifying</td>
<td>• Give real-world solutions</td>
<td>• What does E mean to you? (E is symbol, quantity diagram)</td>
</tr>
<tr>
<td></td>
<td>• Make computations and clarifying</td>
<td>• Think aloud for student benefit</td>
<td>• What properties might we use to find a solution?</td>
</tr>
<tr>
<td></td>
<td>• Make computations and clarifying</td>
<td>• Value invented strategies and representations</td>
<td>• How did you decide in this task that you needed to use...</td>
</tr>
<tr>
<td></td>
<td>• Make computations and clarifying</td>
<td>• Less emphasis on the answer</td>
<td>• Could we have used another operation or property to solve this task?</td>
</tr>
<tr>
<td></td>
<td>• Make computations and clarifying</td>
<td>• Develop opportunities for problem solving</td>
<td>• Why or why not?</td>
</tr>
<tr>
<td></td>
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<td>• Provide opportunities for students to listen to the reasoning of others</td>
<td></td>
</tr>
</tbody>
</table>
<pre><code>                                                                                                                                                                                             |
</code></pre>
<p>| 3. Construct viable         | • Ask questions                                                                       | • What mathematical evidence would support your solution?                       | • What evidence would you provide that...                                       |
| arguments and critique the   | • Use examples and non-examples                                                      | • Will it still work...                                                          | • How could you prove that...                                                    |
| reasoning of others          | • Analyze data                                                                        | • What were you considering when...                                              | • How did you decide to try that strategy?                                     |
|                              | • Students develop ideas about mathematics and support their reasoning               | • How did you decide whether your approach worked?                              | • How did you test whether your approach worked?                                |
|                              | • Encourage the use of mathematics vocabulary                                         | • How did you decide whether the problem was solvable?                          | • How did you decide whether your approach worked?                              |
|                              |                                                                                     | • What if you were doing the same thing?                                         | • How could you reframe this approach?                                          |
|                              |                                                                                     | • What is the same and what is different about...                               | • How could you demonstrate a counter-example?                                  |
|                              |                                                                                     |                                                                                   |                                                                                   |
| 4. Model with mathematics    | • Realize they use mathematics (numbers and symbols) to solve real-life situations   | • Provide time for the process to take place (model, make graphs, etc.)          | • What number could you construct to represent the problem?                    |
|                              | • When approached with several factors in everyday situations, be able to pull out  | • Model desired behaviors (think aloud and thought processes (questioning, revision, reflection)) | • What are some ways to represent the quantities?                              |
|                              | • Show evidence that they can use their mathematical reasoning to think about a      | • Make appropriate tools available                                               | • What is an equation or expression that matches the diagram, number line, chart, |
|                              |   problem and determine if the results are reasonable, if not, go back and seek    | • Create an emotionally safe environment where thinking is valued                 |   table, and your actions with the manipulatives?                              |
|                              |   for more information                                                               | • Provide meaningful, real world, authentic, performance-based tasks (non-traditional work problems) | • Where do you see one or the quantities in the task?                          |
|                              | • Make sense of the mathematics                                                       | • Model desired behaviors (think aloud and thought processes (questioning, revision, reflection)) | • How would you make a diagram graph, table?                                   |
|                              |                                                                                     | • What are some ways to visually represent...                                    | • What formula might apply in this situation?                                   |</p>
Misinterpretations of SMPs

- Practices describe teacher or student actions.
- Model with mathematics means...

A farmer has 2 beehives. He has 15 bees. How many different ways can the bees fit inside the beehive?

15 = 3 + 12
15 = 10 + 5
15 = 8 + 7
Misinterpretations of SMPs

• Practices describe for teacher or student actions?
• Model with mathematics means...

- Attend to precision is about precise answers or work and using precise language, labeling answers with units, interpreting symbols and numbers in terms of the context.
LOI Elements of Focus

- Conceptual Understanding
- Task Analysis
- Instructional Approach
- Practice Aligned Activity
- Student-to-Student Interactions
- Critical Thinking
Task

• Read the assigned LOI element
• Determine a group process to examine all the SMPs for connection to the assigned LOI element
• Each person shares the connections they discovered
• Make a group poster and post
• Walk-about with graphic organizer to take notes;
• Discussion
Reflect

What are some conclusions you can make about the SMPs and the LOI?

What is one thing that you either read or heard about that you can do to support teachers as they implement the SMPs?
Let’s Do Some Math

• Standard: Learn about the relationship between the attributes of a circle.
• What are some things you know about a circle?
• Measure lengths using the available tools.
• Record item you are measuring and the lengths of the diameter and the circumference.
• The circumference is ___________ the diameter.

• The diameter is about ________ of the circumference.

• Pi is ______________.

• For every one unit of measurement in the diameter, there are ___________ in the circumference.
Balanced Math Framework

Daily Math Framework

Math Review (10 minutes)
Skill review:
- Share 3-5 problems a day with students
- Students solve problems in their notebooks or math journals.
- Five minutes of work time and five minutes to correct.
- Correct together and have students share the various ways they solved the problem.

Mental Math (5 minutes) or Fact Fluency (10-15 minutes)
Works to develop students’ mental mathematical abilities:
- Read a number problem aloud for students (should be developmentally appropriate).
- Students solve mentally.
- Students should give the correct answer (or show on a white board) for a quick check.
Build math fact automaticity:
- Have students work at their independent level practicing math facts.

Concept Lesson (30-40 minutes)
Instructional Approach = Construct Knowledge or Explicit Modeling
Helps students develop a clear conceptual understanding of mathematics:
- Problem-based interactive learning should be the foundation in teaching for understanding.
- Provide the focus of the lesson by sharing the purpose of the lesson.
- Use multiple methods and strategies.
- Incorporate concrete models that support the understanding of mathematical concepts.
- Provide a variety of instructional opportunities from whole class to partners and small group activities.
- Make connections to aid students in the application of the mathematical knowledge.
- Provide opportunities for students to discover concepts using hands-on or problem-based learning activities.

Closure (5-10 minutes)
Provides a way to check student understanding:
- Provide time for students to share prior knowledge, reflect on new learning, and make connections.
- Students articulate their thinking (this can be done verbally or in writing, including pictures and words).
- Use formative assessment as a post-assessment or performance task to check for understanding.

Small group, centers, assessments or problem-based activities (20-30 minutes)
Allows for students to be given time to receive additional instruction, remediation or enrichment opportunities:
- Place students in differentiated instruction groups (based on assessment information gathered throughout the week).
- Students in need of remediation should be grouped together and receive direct, explicit instruction from teacher.
Helps students learn how to mathematically communicate how to solve authentic complex problems:
- Provide developmentally appropriate activities.
- Make intentional connections to the concepts being taught.
- Make sure the students understand the expectations of the activity.
- Emphasize how the problem was solved, what strategies were used, and how the answer will be shared.
Balanced Math Framework K-5

Daily Math Framework
Math Review (10 minutes)
Skill review:

Mental Math (5 minutes) or Fact Fluency (10-15 minutes)
Works to develop students’ mental mathematical abilities
Build math fact automaticity:

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Instructional Approach: Construct Knowledge or Explicit Modeling
Helps students develop a clear conceptual understanding of mathematics:

Closure (5-10 minutes)
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Small group, centers, assessments or problem-based activities (20-30 minutes)
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Increased ability to observe and coach teachers by

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