What do teachers need to know about re-engaging students in mathematics classrooms?

Providing resources to help teachers meet the needs of students in math classrooms
Who are we?

- Kyle Radcliffe
- Nell Cobb
Who are the participants?

- Please provide your name
- School or organization
- Teaching grade level, if applicable
- What do you hope to gain from this session?
What are we going to do today?

Part I

- Discuss CCSS Teaching Concerns.
- Examine Student Products using the CCSS-Math Progressions to design re-engagement lessons

Part II

- Analyzing formative assessment Re-Engagement Lessons using a CCSS coding sheet
Teaching Concerns

- What are your concerns around teaching using the Common Core State Standards in Math?
Here are some from other teachers:

- How could teachers address students’ lack of content knowledge required for a grade level standard?
- Where can teachers find the precursor ideas and instructional resources for their students?
- How can teachers better prepare students to perform successfully at the next level?
What resources are you using to help with your math teaching concerns?

- Websites?
- Books?
- Other?
A possible resource: the Math Progressions

The standards math progressions evolve:
- from each other,
- coordinate with each other, and
- cluster together into coherent bodies of knowledge.
Why are Math Progressions Important?

• Grade-level coordination of standards across domains.
• Connections between standards for content and for mathematical practice.
  - Key ideas that develop within one domain over the grades.
• Key ideas that change domains as they develop over the grades.
• Key ideas that recur in different domains and conceptual categories.
  - Grade-level coordination of standards across domains or conceptual
K-8 Domains - important precursors to the concept of Algebra

(From CCSSatlas_2011_12_1257.docx - p. 6)
Examining Student Products
Math Challenge (First Grade - Student Work Samples)

Focus on Equal Parts
Student Products
A - D
### A student may not be able to meet this expectation:

| Different pattern blocks compose a regular hexagon |

**G.3**
Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

### Without being able to meet these:

Students learn to combine their composition and decomposition competencies to build and operate on composite units (units of units), intentionally substituting arrangements or composites of smaller shapes or substituting several larger shapes for many smaller shapes, using geometric knowledge and spatial reasoning to develop foundations for area, fraction, and proportion.

Students also explore decompositions of shapes into regions that are congruent or have equal area. For example, two squares can be partitioned into fourths in different ways. Any of these fourths represents an equal share of the shape (e.g., “the same amount of cake”) even though they have different shapes.

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Math Challenge (First Grade - Student Work Samples)

Focus on Area Model
Student Products
A & B
A student may not be able to meet this expectation:

<table>
<thead>
<tr>
<th>3.NF.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction $a/b$ as the quantity formed by a parts of size $1/b$.</td>
</tr>
</tbody>
</table>

In each representation the square is the whole. The two squares on the left are divided into four parts that have the same size and shape, and so the same area. In the three squares on the right, the shaded area is $1/4$ of the whole area, even though it is not easily seen as one part in a division of the square into four parts of the same shape and size.

Without being able to meet these:

Two important aspects of fractions provide opportunities for the mathematical practice of attending to precision (MP6):

- Specifying the whole.
- Explaining what is meant by “equal parts.”

Initially, students can use an intuitive notion of congruence (“same size and same shape”) to explain why the parts are equal, e.g., when they divide a square into four equal squares or four equal rectangles. Students come to understand a more precise meaning for “equal parts” as “parts with equal measurements.” For example, when a ruler is partitioned into halves or quarters of an inch, they see that each subdivision has the same length. In area models they reason about the area of a shaded region to decide what fraction of the whole it represents (MP3).

Math Challenge (Fifth Grade - Student Work Samples)

Focus on Decimal Addition
Student Products
A - H
<table>
<thead>
<tr>
<th>A student may not be able to meet this expectation:</th>
<th>Without being able to meet these:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</td>
<td>4.NF.6 Use decimal notation for fractions with denominators 10 or 100. Fractions with denominators equal to 10, 100, etc., such as 27/10 or 27/100, etc. can be written by using a decimal point as or 2.7 and .27, respectively. The number of digits to the right of the decimal point indicates the number of zeros in the denominator, so that 2.70 = 270/100 and 2.7 = 27/10.</td>
</tr>
<tr>
<td>5.NBT.7 Because of the uniformity of the structure of the base-ten system, students use the same place value understanding for adding and subtracting decimals that they used for adding and subtracting whole numbers. Like base ten units must be added and subtracted, so students need to attend to aligning the corresponding places correctly (this also aligns the decimal points). It can help to put 0s in places so that all numbers show the same number of places to the right of the decimal point. Although whole numbers are not usually written with a decimal point, but that a decimal point with 0s on its right can be inserted (e.g., 16 can also be written as 16.0 or 16.00). The process of composing and decomposing a base-ten unit is the same for decimals as for whole numbers and the same methods of recording numerical work can be used with decimals as with whole numbers. For example, students can write digits representing new units below on the addition or subtraction line, and they can decompose units wherever needed before subtracting.</td>
<td></td>
</tr>
</tbody>
</table>
Part II

Formative Re-engagement Lessons:
- Inside Mathematics
- Mr. Kyle Radcliffe – Newberry Academy
  Chicago Public Schools
Re-Teaching vs Re-Engagement

- What is the difference between these teaching strategies?
What’s the difference?

Re-Teaching vs. Re-Engaging

- teaching the unit again
- addressing missing basic skills
- do the same problems over
- more practice; learn procedures
- focus mostly on underachievers
- cognitive load usually lower

- revisiting student thinking
- addressing conceptual understanding
- examine the task from different perspectives
- critique approaches, make connections
- engage entire class in mathematics
- cognitive load usually higher

http://www.insidemathematics.org/index.php/formative-re-engaging-lessons
Candies – Problem 1

This is Amy’s box of candies. She has already eaten 6 of them.

What fraction of the candies has Amy eaten?

http://www.insidemathematics.org/index.php/formative-re-engaging-lessons
Coding Sheet

- What Math Practices did you observe in the following video vignettes?
Re-Engagement Lesson (1)

Code for Math Practices

- Proportions & Ratios: Problem 1
Re-Engagement Lesson (2)
Code for Math Practices

- Mr. Radcliffe
The Debrief:

- Kyle
- Kyle and Nell
- Kyle, Nell, and the participants
Additional Questions

Did we meet some of your expectations?
References

Websites

- Progression Documents
- Examples of Structure in the Content Standards
- Illustrative Math Project
- Inside Mathematics
Additional Websites:

Problem on worksheet modified from

