Standards for Mathematical Practice in the Classroom:

Pool Border Problem

An example from

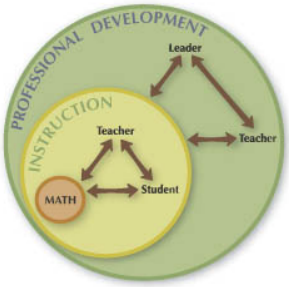
*Learning & Teaching Linear Functions**

*Seago, Mumme, & Branca (2004)

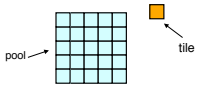
Some Tasks of Mathematics Teaching

- Evaluating mathematical work
  - Analyzing and interpreting what students have done
  - Deciding whether their thinking is mathematically correct
  - Determining whether their approaches would work in general
- Choosing, using, and adapting tasks
  - Deciding which to use
  - Analyzing which will take students deeper
- Using representations
  - Evaluating the advantages and disadvantages of various representations to teach a specific idea
  - Sequencing, linking and making connections across representations
- Presenting and explaining ideas and procedures
  - Making mathematical practices explicit
  - Providing a rationale for a procedure
  - Choosing and developing definitions
  - Explaining concepts

Circles of Teaching & Learning



Pool Border Task



How many 1 by 1 tiles are required to create a border to completely surround a 5 by 5 pool, as shown?

Find a rule to determine the number of tiles required to surround a square pool of any size.

Express the rule as an equation.

Students' Expressions: Your Task

- In all cases ***s*** represents the side length of the pool:
  - A. $4s + 4$
  - B. $2(s + 2) + 2s$
  - C. $4(s + 1)$
  - D. $2(2s + 1) + 2$
  - E. $4(s + 2) - 4$
  - F. $(s + 2)^2 - s^2$
  - G. $2(2s + 2)$
- How can each of these expressions be related to the model of the pool?

Small Group

Considering the Expressions

- How did the expressions map on to the model?
- Were some easier to "see" than others?
- What mathematical ideas were you exploring as you worked to did the mapping?

A. $4s + 4$
B. $2(s + 2) + 2s$
C. $4(s + 1)$
D. $2(2s + 1) + 2$
E. $4(s + 2) - 4$
F. $(s + 2)^2 - s^2$
G. $2(2s + 2)$

Whole Group

Understanding Student Errors

- The expressions below are incorrect. For each, try to determine the nature of the error.
  A. 4s
  B. 2(s + 2) + 2
  C. 4s + 8
  D. 2(2s + 1) + 4
  E. 4(s + 2)

Small Group/Whole Group

7

Implications for Our Work

- Imagine that you were planning to use the original task with students (or helping a group of teachers prepare to use the task)
  - What opportunities might the task provide for students to engage with the Standards for Mathematical Practice?
    - Be specific—as you name a practice, identify specifically what in this task applies to that practice

Small Group

8

Productive Engagement with Cases

- Try to understand other people's ideas (those shared by members of this group and those of the teacher and students in the vignette) to expand your own understanding of the mathematical ideas
- Provide evidence and reasoning to support your ideas and claims
- Treat different perspectives respectfully and use them to compare ideas and to consider the affordances and drawbacks of various alternatives
- Contribute to a mathematical community where questions are raised that push on mathematical thinking and reasoning

9

Lesson Graph Review

- In the video, we will be "dropping in" on the second yellow section
- Take a few minutes to review the lesson graph to get a sense of the flow of the lesson
  - What happens prior to what we'll view?
  - What happens afterward?

10

Caveat

- The teacher and students in this video have given us a gift of providing this instance of practice for analysis. We are examining the practice, not critiquing the individuals.

11

Frame for Viewing

- What seems important or interesting mathematically? Pedagogically?

Link to video

12

Video Discussion

- Take a few minutes to review the transcript individually, then talk with your group
  - What did you see as interesting or important?
    - Mathematically?
    - Pedagogically?
  - What evidence did you see of the Standards for Mathematical Practice in action here?

13

Video Discussion

- What did you see as interesting or important?
  - Mathematically?
  - Pedagogically?
- What evidence did you see of the Standards for Mathematical Practice in action here?

14

Connecting to the Common Core State Standards

- Today's Tasks:
  - Introduction to the Standards for Mathematical Practice
  - Connections Activity
  - Pool Border Task and Video
- How do today's experiences have you thinking about CCSSM implementation?
  - For yourself?
  - For teachers with whom you work?
  - For administrators with whom you work?

15

Connecting to the Common Core State Standards

- How do today's experiences have you thinking about CCSSM implementation?
  - For yourself?
  - For teachers with whom you work?
  - For administrators with whom you work?

16