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Formative Assessment Lessons

Randi Womack

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Making Mathematics Matter

http://www.youtube.com/watch?v=ga1WZ14o1TI

The Big Question

- Can students recreate the math several years later?
  - Do students have the math tools in their mental toolbox to problem solve?
  - Do students simply memorize steps and processes for a short time in order to “jump through hoops” and make us happy?

Goals of This Session

- Share research on the importance of teaching and assessing for learning
- Identify the Five Strategies of Assessment for Learning
- Describe the design and purpose of a Formative Assessment Lesson

Math Design Collaborative

- Funded by the Bill and Melinda Gates Foundation
- Group of curriculum designers, assessment developers, professional learning specialists, and district and school network

Big Ideas

- Use evidence of learning
- To adapt teaching and learning
- To meet immediate learning needs
- Minute-by-minute, day-by-day

Teaching for Learning

- 5 Strategies- can use daily for effective teaching
- Medium-cycle formative assessment lessons- challenge problems; challenging tasks that are out of the ordinary and involve problem solving
- Short-cycle formative assessment lessons- day-to-day lesson; teaching by problem solving

Five “Teaching” Strategies of Assessment for Learning

1. Clarifying and sharing learning intentions and criteria for success
   - Clearly defined learning targets
   - Students should know what skills they are about to learn
   - Give them the destinations and the map to get there-don’t chauffeur or “GPS” them

Five "Teaching" Strategies of Assessment for Learning

2. Engineering effective discussion, questions, and learning tasks that elicit evidence of learning.
   - Classroom tasks should engineer discussion about math
   - Problem-solving basis
   - Productive struggle with meaningful math

Five "Teaching" Strategies of Assessment for Learning

3. Providing feedback that moves learners forward
   - Immediate feedback as you circulate about the room
   - Feedback from fellow students
   - Feedback through group discussions and presentations
     - "Show me what you know about…?"
     - Have students produce posters
     - Use whiteboards

Five "Teaching" Strategies of Assessment for Learning

4. Activating students as the owners of their own learning
   - Students take responsibility for their own learning
   - As teachers, we are not the GPS system, our activities are the map that lead students through their own learning journey
   - Encourage students to find different routes to a solution

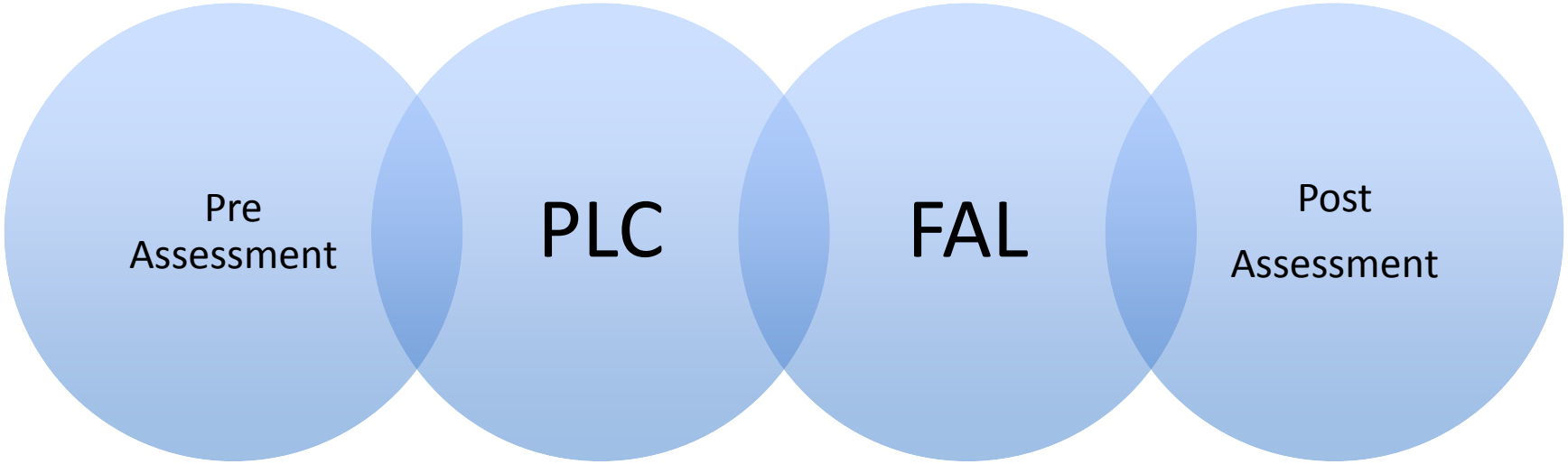
Five "Teaching" Strategies of Assessment for Learning

5. Activating students as instructional resources for one another
   - Want the students discussing math
   - If we want students to make sense of mathematical concepts, we need to give opportunities for them to discuss, share, and work with each other.

Medium Cycle Formative Assessment Lesson

- Given about ½ - 2/3 of way through the unit
- Assessment lessons that measure student understanding and student growth during the lesson
- Unique, difficult, collaborative, and problem solving based lessons
- Middle/High school lessons written by a research team
- Elementary lessons being developed by KY math content network

Medium Cycle Formative Assessment Design



Let’s Model a Medium-Cycle Formative Assessment Lesson

Increasing and Decreasing Quantities by a Percent

- Read through the questions and try to answer them as carefully as you can. The example at the top of the page should help you understand how to write out your answers.

Teaching Strategy 1: Clarify Goals

- The goal of this activity is to assess how well you can interpret percent increases and decreases.

Money Cards

$100

$150

$160

$200

Teaching Strategy 2: Engineer Tasks

- I want you to work as a team. Take turns placing a percentage card between each pair of money cards.
- Each time you do this explain your thinking clearly and carefully. If your partner disagrees with the placement, challenge him/her. It is important you BOTH understand the placement.

Teaching Strategy 2, 3, and 4

- As pairs work, the teacher circulates to listen to the approaches students take with the task.
- Make note of any common misconceptions which may be addressed as whole class.
- Productive struggle: Use scripting as a strategy to guide the problem solving process.

Possible Questions

- There are two ways to tackle this task. Can you think of what they are?
- How can you figure out the percentage difference between two cards?

A Different Way of Interpreting the Situation

- When finished placing percentage cards, pick up Card Set C: *Decimal Multipliers* and place between the dollar amounts. You may use your calculator to check your arithmetic.
- Students who finish early: Find the percent changes and decimal multipliers that lie between the diagonals.

Teaching Strategies 4 & 5

- Encourage students, through questioning, to challenge their own thinking.
- Encourage students, through questioning, to challenge their partner's thinking.

Finishing the Formative Assessment Lesson

- Students will receive a clean copy of the assessment questions.
- The teacher will use the data to inform the continued instruction.

What I learned

- The best way for students to develop confidence in problem solving and understanding math is to create a student-centered classroom where they are activated as owners of their learning.
- Engage students in collaborative learning from the first day of school and continue day-to-day.

What I learned

- Be patient. It will take time for students to realize you will not give them the answer.
- Let them have “productive struggle”.
- Return a student question with a question. Make them think! Good guided questions will move the learning forward.

Where are these resources?

map.mathshell.org

What questions do you have?