



RAMP-A


November 14, 2013

Year 3 theme: Studying our teaching and students' learning of mathematics

$$\begin{bmatrix} \cos 90^\circ & \sin 90^\circ \\ -\sin 90^\circ & \cos 90^\circ \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

- * Share Ten-Minute Talks and consider next steps.
- * Do an exploration to examine conceptual understanding, procedural fluency, and levels of the SMP.
- * Share resources and consider how they may be used to help all students.
- * Examine conceptual understanding, procedural fluency, and SMP in several common Algebra 1 topics.

*** Goals for the Day**

 **Ten-Minute Talks:
Examining responses
for student thinking**

* Share students' responses from your Ten-minute Talk.

* Use the table to categorize the responses by ways or levels of understanding of the math involved in the talk.

* **Sharing**

- * Use the provided table to show three different ways that your students may use to solve the following mixture problem.

If Marissa mixes 6 tsp of red food coloring with 8 cups of water, how much water should she use with 15 tsp of food coloring?

- * Read the chapter about proportional reasoning by Johannah Nicula.**

- * Describe reasoning in each category using unitizing, building up, reasoning up and down, and multiplicative comparison.**
 - * Unitizing**
 - * Building up**
 - * Reasoning up and down**
 - * Multiplicative comparison**

- * Compare the four ways of reasoning in terms of developmental levels.**

- * Reflect on the categories created by your students' response from your Ten-min Talk
- * Discuss the differences in reasoning about your Ten-min talk in each category.
- * Discuss what you wonder about the students' understanding in each category.
- * Discuss critical understandings needed to move to the next level of their reasoning in each category.

- * Find one or two responses you are most interested in from your Ten-minute talks.
- * Devise a question or prompt to elicit more reasoning of the students who provided the target response.

*** Target response**

- * What part(s) of the process:
 - * Writing a prompt
 - * Using the prompt in class
 - * Collecting student responses
 - * Categorizing student responses
 - * Describing categories
 - * Reading and understanding the research
 - * Comparing responses and categories to research
 - * Discussing ideas within your PLC
 - * Wondering further about student understanding
 - * Devising a new prompt

do you think will most help you to improve students' learning?
Why?

* Reflection 1



* Break!
.. Break!

* Think to yourselves about what you mean by conceptual understanding and procedural fluency. How are they related?

* How are these aspects of knowing and learning math related to the SMP?

* **Concepts and procedures**

Adding It Up:

- * Conceptual understanding: comprehension of mathematical concepts, operations, and relations
- * Procedural fluency: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately

* **How do your ideas relate to these?**

*When you are planning a lesson, how do you think about the relationships between conceptual understanding, procedural fluency, and the SMP?

*Teaching and Learning

* Given two lines in standard form (regarded as two equations), then the sum is again a linear equation. How could you graph this sum given the graph of the two lines? Geometrically represent the slope and relate it to the original two lines.

* Discuss for 5 minutes to understand and brainstorm how you will approach.

* **Exploration**

- * What definitions and constraints do we need to agree on? Why do we need them?
- * What questions will we all pursue? What makes these questions worthwhile?
- * Put others in a 'parking lot'
- * Choose someone to keep notes on what SMP you use and how you use them.

* Discuss

What questions do you still have?

Clarify those, then choose a spy to go to other groups to see if s/he can find an answer to your questions.



* For each idea:

How do you think students who have low, medium, or high levels of motivation would respond to your use of this resource? How would you change it or use it with students with different levels of motivation and also maintain cognitive demand?”



* Lunch and Sharing

- * Share conjectures, solutions, ideas about the exploration.
- * As you watch others present, write specific evidence of where you see specific SMP used, and describe how it is used. Ask questions to better understand what SMP they used and how they used it.

*** Notice SMP in others' explorations**

* How could you describe levels of SMP on a continuum of less sophisticated to more sophisticated?

* **Levels of SMP**

* How did using SMP relate to developing conceptual understanding and procedural fluency?

*** SMP support of learning**

* Reflection 2:

What ideas do you have for students' development of the SMP?

What role(s) do the SMP play in students' learning?

* Reflection



* Break!!
.. Break!!

- * Examine procedural fluency, conceptual understanding, and the SMP in several Algebra 1 topics.
- * Groups of 3. No Talking, only writing for first six rounds.
- * Procedural fluency: describe aspects of procedural fluency related to the problem.
- * Conceptual understanding: describe the conceptual understanding that could be used in the problem.
- * What SMP could be used when learning to solve this problem?

* For your poster, how are conceptual understanding, procedural fluency, and SMP related? Discuss and write your ideas in the fourth quadrant. (You can talk! 😊)

* Relationships

- * Discuss and add your ideas about relationships between conceptual understanding, procedural fluency, and SMP.
- * What meanings and structure would support students' conceptual understanding and procedural fluency?

* Gallery Walk

* Reflection 3:

What 2 ideas stick with you from this activity?

What question do you want to ask?

* Reflection 3

Thank you for your thorough and candid feedback!



*Evaluations

* Username: RAMP-A

* Password: G9S5y3g7

* **Happy Saturday!**

- * Reflect on our learning and plan for continued growth.
- * Consider: Why is change difficult?
- * Deepen our understanding of teaching for coherent learning.
- * Share plans to use STEM-PD technology.
- * Launch Lesson Study

*** Goals for the day**

- * Time of change in math education
 - * CCSS
 - * TPEP
- * Teacher comments about “changes”
 - * Little mention of CCSS or RAMP work
 - * vs Evidence
 - * Wallpaper issue?
 - * Exploration and Reflection

*** Learning and Growing**

- * Data collection
 - * DTAMS
 - * Student surveys
 - * Observations using protocol
- * Results
 - * Effects on math content and pedagogical content knowledge
 - * Effects on instruction
 - * Effects on students

* Data Collection & Results

- * Individually, then as groups:
 - * Thinking back over the last 2.5 years
 - * Which of the changes in the data, if any, had you **noticed**?
 - * Which changes **surprised** you?
 - * How do you see these changes reflected in the way you **think about** and **conduct** instruction?
 - * How do you see these changes reflected in your **students' responses**?

* What further changes would you like to see in your

* Mathematical understanding?

* Teaching practice?

* Student behaviors and responses?

* Why?

* **Next Steps**

The constantly underestimated challenge of improving mathematics instruction, by Jim Hiebert.

- * Hiebert describes three reasons he believes improving instruction is so difficult. Think about the title and jot down up to three reasons *you* think improving mathematics instruction is difficult.
- * Predict what you think Hiebert will say are the reasons improving instruction is so difficult.
- * In your groups, each person take one minute to describe what they have written in response to the two prompts.

*** Why is change difficult?**

Read the Hiebert article using reading strategies:

- * Everyone read the first section (to the bottom of page 46) underlining up to 3 statements that you somewhat or strongly *agree* with and 'squiggly underlining' up to 3 statements that you strongly or somewhat *disagree* with.
- * Discuss: what could be controversial in this section and why would it be controversial?

- * One person reads page 47, the second person reads page 48, and the third person reads p. 49 and the top of p. 50. Underline the main idea in each paragraph and be ready to provide a summary of the section to your group.
- * Share in order of the reading: 1-2 minutes to provide a summary and the most important points.
- * As a group, discuss what you agree with and what you disagree with. Come to a consensus on what you think the most important ideas for the entire section are for your group, then post on <http://padlet.com/jcoomes/2jqf5hcnnajp>

In groups of 3

* Split pages 50, 51, and 52 (to the start of the last section) among you and use the same strategy you used to read the previous sections: Come to a consensus on what the most important ideas are for your group, and post again.

* **Read next section**

* Before reading the last section, think about the efforts you have been involved in to improve your own instruction (the source of these could be school-wide improvement, state or national efforts, individual, department, PD, etc.) and jot a line about the type of effort it has been (e.g. setting goals, new standards, book study, Little Changes, etc) and how you think it has helped you improve your instruction.

How does Mathematics Teaching Improve?

Each person read the last section:

* What do you agree with? What do you disagree with? Discuss as a group and devise a joint statement about the vision Hiebert provides for how he believes teaching can be learned.

* **Read and Discuss**

- * What is the essence of the two paragraphs on the bottom of p. 53?
- * How is this vision of learning the same as and different from the other opportunities you've had to grow professionally?

* Compare

1. Teaching is a moral act founded on an ethic of care
2. Teaching is an act of inquiry and reflection
3. Teaching and learning are each a constructivist/developmental process
4. Understanding subject matter in evolving ways is essential
5. Teaching is a collegial act supported by collaboration
6. Teaching is essentially a political act

To what extent do you agree?

*To what extent do you think teacher learning and change should be self-directed? What resources do teachers need to improve teaching?

*Reflection 1

* If you do not have a Lesson Study group (in most cases, your PLC) come see Jackie or Janet.

* Sit with your PLCs when you get back.



* Break!

Think to yourself:

- * How do you currently understand coherence?
- * How do you use your understanding to teach for coherence?

**Expanding our understanding
of Coherence**

- * Meanings of coherence from previous workshops and CCSS documents are posted around the room.
- * Each PLC choose three of the meanings and write an example of how you have incorporated or can incorporate this meaning of coherence into your teaching practices.

Teaching for Coherence

Suppose you want students to be able to find the equation of a line through a point that is perpendicular to a given line.

- * What would it mean to teach this with coherence?
- * What ideas would you expect students to develop?

Take notes as you discuss:

- * Generate specific ideas for lessons that would support coherent learning of this goal. Explain why you think your ideas would support coherent learning.

* **An Example**

- * What types of reasoning did you use to support your ideas?
- * What reasoning did you use about the mathematics?
- * What reasoning did you use about students?
- * What reasoning did you use about how students develop ideas?
- * What reasoning did you use about coherence?

Reflect on your discussion

- * Given your ideas for teaching this goal, what you would look for during the lesson as evidence of whether or not students learned with coherence?
- * How is the evidence connected to your justifications?
- * Specifically, how will the evidence either support or refute your hypotheses?

What would you look for?

- * One group comes up with the Rotating Triangles and Lines task, and hypothesizes that they can build on students' prior knowledge of 8.G.1, although they believe they also need to help students recall what they know about 8.G.1. They have anticipated about four different ways that students may solve this.
- * Do the task, anticipating as many ways as you can that students might do it.

Rotating triangles and lines

- * Look at the different solutions: What evidence can we find of student thinking in the ways we hypothesized? In ways we did not hypothesize?
- * In what ways did the task target learning with coherence?

* Evidence

* How would you revise the task to improve it? How do your improvements support coherence?

* **Reflection 2**

*What are your experiences and ideas about Lesson Study?

*Lesson Study

- * ***Collaborative inquiry*** is the essence of Lesson Study. It is a form of action research, and important stances to take are:
 - * To ask questions about our teaching practices and find ways to answer those questions,
 - * To remain open to improving our practices,
 - * To become aware of our assumptions and biases,
 - * To justify our ideas with reasoning related to mathematics, students, and learning, and,
 - * To seek evidence of the effects of our practices.
- * It is a way to critically examine our practices and to continue to grow professionally.

* **Collaborative inquiry**

- * Form a group
- * Determine a theme for the Lesson Study
- * Plan the Research Lesson
- * Teach and observe the Research Lesson
- * Discuss and analyze the Research Lesson
- * Reflect and plan the next steps
- * Share what you have learned

Overview of Lesson Study Process

Inventing Function Notation

- * Skim: What are the major parts of the LS and what roles do they play in the process?
- * Read more carefully: Each PLC guides their planning process by asking themselves **Key Questions**. As you read sections 3-8 of the report, write questions in the margin that you think may have guided this part of planning the Research Lesson.

* **Inventing Function Notation**

Think alone for a minute, then discuss in your group *what criteria would be good for devising:*

- * a Lesson Study theme
 - * the lesson-level goal of the Research Lesson
- * What Key Questions does your group want to use to guide your choice of a theme and goal?

*** *Focus the Lesson Study***

1. What math idea do we want students to learn in this lesson?
2. What math practice do we want students to better develop through this lesson?
3. What do we want to learn about student learning of the math during the lesson?

*** Possible Key Questions**

*What Key Questions arise from Sections 4-8?

*What Key Questions could guide your PLC's Research Lesson?

* *Pre-Planning for the
Research Lesson*

Examine #9: Flow of the Lesson

- * What elements are in the final 'Flow of the Lesson' and what questions might the teachers have asked themselves to come up with these elements?
- * What Key Questions could guide your planning of the lesson itself? Post on: <http://padlet.com/jcoomes/1k8kn0gl0k79>

*** *Planning the lesson***

* We will discuss the rest of the process in the February workshop, and also give you a chance to bounce ideas with others and listen to others' plans.

* What questions do you have?

*When will you meet to work on your next steps?

*Spend a minute to find time

* Groups: if possible, include at least one from each category

* 1: Teachers at schools that have had the STEM-PD technology since **September**

* 2: Teachers at schools that were **just awarded** the technology

* 3: Teachers at schools that **do not have** the technology

* **STEM-PD Ideas & Plans**

- * Category 1: Describe the technology. What is your **PD plan** for this semester? **How will teachers approach** learning about and trying the technology?
- * Category 2: What is your **initial plan**? What **questions and concerns** do you have that teachers in (1) can address?
- * Category 3: Would you like to work with the (1) and (2) teachers to expand your **access to and participation in peer collaboration**? If so, how could that happen? Who will initiate it?

- * **Individual:** Continue to use Ten-minute Talks regularly and share in your PLCs.
- * **PLC:** Meet to design the lesson for your Lesson Study. You will have opportunities for feedback in the February workshop and also have time to work collaboratively during that workshop.

* **Homework**