Systemic Empowerment with Hands-On Fraction Activities

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Goals

- Share our experience with a content (fraction) focused 5-day professional development.
- Discuss how we are enacting systemic change as a result of the professional development.
- Share activities we experienced and adapted from the content training for use with students.
- Share student behaviors observed during engagement with the activities.
- Provide advice on how to accomplish similar reforms.

Math Academies

- 2016-2017: Prince George’s County and Carnegie Learning
- 3rd grade and 5th grade focus
- Academies adapted/designed for district
- 5-day academies spaced over time

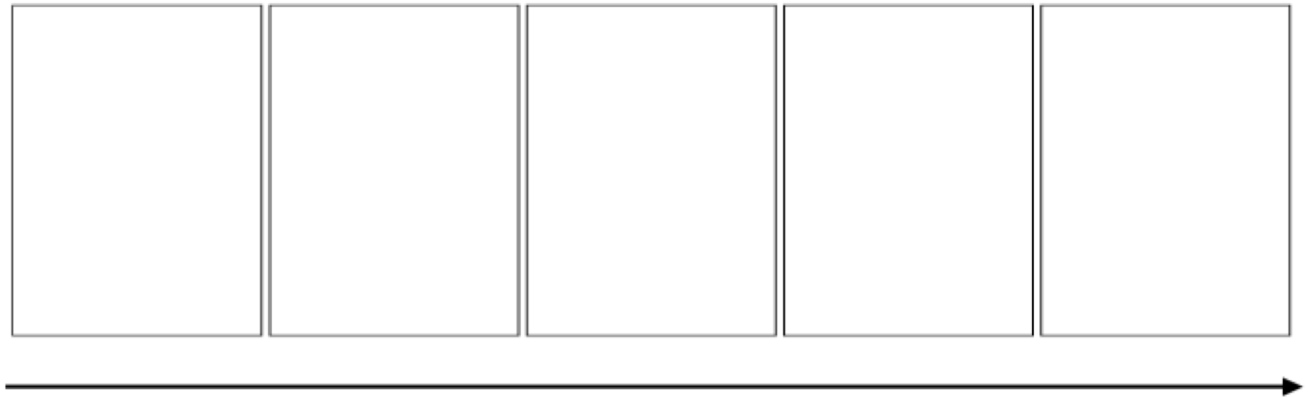
- 3rd grade focus: Whole Number Operations and Fraction Representations
- 5th grade focus: Fraction and Decimal Operations

Math Academy Goals

- Teacher content knowledge
- Broaden toolbox of pedagogical strategies
- Focus on hands-on activities and discussion of mathematics
- Overview of the 5 days
  - High cognitive demand tasks (task sort and classification)
  - Standards for Mathematical Practice
  - Solve and discuss tasks, misconceptions, strategies
  - Concrete-representations-abstract

Let’s Frac-O!

- Play
- Share strategies and reactions
- Advantages of the game



Reflecting on the Learning Experience

- Ah-ha moments & reactions
  - “Ah-ha” was “looking at fractions in a ‘non-computational’ way.”
  - “My students need a stronger understanding of fractions that are closer to 1, ½, and 0.”
  - “I didn’t think about the denominator as an important part of a fraction while comparing fractions.”
  - “I want to go back and apologize to all my students. Did I mess them up?”
- Anticipated impact
  - Beginning to use tools: cuisenaire rods, fraction strips, pattern blocks
  - Teaching concepts, not just procedures

Reflecting on the Learning Experience

- Big Takeaways
  - Promotes a sense of community where mistakes are opportunities for learning and growth
  - Focus on allowing students to be active participants in their learning
  - Standards for mathematical practice in action
  - Deeper understanding of how conceptual understanding supports procedural fluency
- “The Carnegie High”
  - “Felt like I have the tools to conquer the math world”
  - Belief in self and commitment to discovery
  - Learning to be comfortable with the uncomfortable
  - All students deserve to be challenged at a high level

In the Ballpark

Round 1: Estimate whether the sum or difference is more or less than 1.

a. $1\frac{3}{4} - \frac{2}{3}$

d. $\frac{1}{3} + \frac{5}{8}$

In the Ballpark

Round 2: Estimate to the nearest half.

b. $3\frac{1}{8} - 2\frac{4}{5}$

e. $\frac{11}{12} + \frac{3}{4}$

In the Ballpark

Round 3: Estimate the sum or difference as accurately as possible.

b. $2\frac{9}{10} + 2\frac{7}{8}$

f. $\frac{2}{3} - \frac{1}{2}$

In the Ballpark

- What would you learn about student fraction knowledge from this activity?
- What would you expect your students to do?
- How would you expect your students to perform?
- What are the advantages of this activity?

From Coach’s Learning to Teacher Learning

- What did we do during planning?
- How did you feel about the math and about how students would do with the tasks?
- How did we adapt the tasks for use with students?

Reflections from the Classroom

- Student Behaviors
  - Students are more open-minded to a different way of learning.
  - Students are excited to have the opportunity to use manipulatives.
  - Students are able to explain “why” when they use a **context** to build foundation.
  - Students are engaged in more meaningful discourse around mathematics.
  - Students become active participants in their learning.
- Lessons Learned
  - Start small and build
  - Teachers need opportunities to be learners
  - Addition of written component for students to reflect and explain their reasoning

Next Steps

- Coach & teachers continue collaborating
- Encourage more teachers to collaborate with coach
- Future Professional Development: Embed collaborative planning opportunities
- Increase buy-in from school administrators

Research on Effective Professional Development

(NCTM, 2014)

Effective professional development develops teachers'

- Pedagogical mathematical knowledge
- Ability to notice and respond to student thinking
- Dispositions towards continual learning
- Collegial relationships

High-quality professional development

- Is sustained over time
- Has systemic support
- Provides opportunities for active learning
- Provides teachers with opportunities to study the math they are teaching

Creating More Change

- Identify district/school-based leaders to facilitate overall organization
  - Determine the content focus
  - Determine a professional development provider and materials
  - Determine time, place, and funds
- Identify coaches and teacher leaders to participate in professional development
  - Arrange release time and substitutes
- Implement professional development
  - Provide protected time and ‘safe space’ for participation and collaboration planning
- Continuing the discussions
  - Provide protected time for follow-up collaboration
  - Support with in-classroom implementation and dissemination to other teachers

Contact Us

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