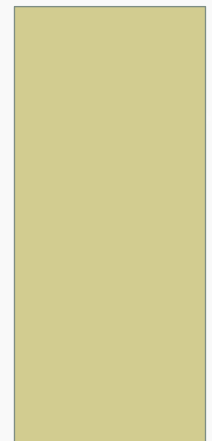


EQUITY AND ACCESS IN A 3RD-GRADE COLLECTIVE INQUIRY OF FRACTIONS

CONNECTING DIVERSITY WITH ACADEMIC
EXCELLENCE



“SOMETIMES WE ARE SMARTER THAN WE THINK WE ARE”

RACHEL ANDRIECA, 3RD GRADE STUDENT

Focusing on equity and empowerment in teaching mathematics has the potential to transform students' patterns of participation and relationship with mathematics.

Equity and access-All students are given rich and connected opportunities to make sense of mathematics.

Empowerment-All students see themselves as part of a community that is invested in using mathematics as a tool to promote full political, social, and economic participation.

Goal of presentation: to present a multifaceted view of the complexities faced in emergent teaching practice that addresses equity and empowerment for diverse learners.

CONTEXT OF MY SCHOOL

- Title 1 School with 70% free and reduced lunch
- 25% of students in my classroom receiving ELL support
- 10% on IEP
- Resource based mathematics curriculum
- Workshop approach to teaching mathematics
- Little professional development to help address CCSSM and diverse learners
- Uneven distribution of equitable learning opportunities across classrooms

INCLUSIVE AND SUPPORTIVE COMMUNITY OF LEARNERS

- Relevant Research
 - Discourse
 - Classroom discourse is shaped by sociomathematical norms that are co-created as students and teacher share authority about what counts as a contribution (Yackel & Cobb, 1996).
 - Students develop conceptual and linguistic resources as they are pushed to use their language resources to communicate mathematically (Moschkovich, 1999).
 - Careful attention must be given to language supports that provide access as opposed to language supports that takes away rigor (Bay-Williams & Livers, 2009)
 - Equalizing status/growth mindset
 - Students benefit from explicit discussion of social norms and habits of mind that give access to inquiry based mathematics (Dweck, 2006; Featherstone, et al., 2011)
 - Focusing on children's sense making towards meeting specific CCSSM standards
 - Understanding learning progressions and anticipating strategies as well as errors allows the teachers to facilitate powerful learning experiences (Empson & Levi, 2011; Fosnot & Dolk, 2002)).
 - Bridging everyday mathematics contexts with academic mathematics abstractions
 - Students cultural and linguistic resources are important starting points for mathematical explorations (Civil, 2007; Gonzalez, Moll, Amanti, 2005)
 - Students are given access to mathematics as they move from concrete and familiar to progressively more abstract representations and academic language (Moses & Cobb 2001).
 - Teaching Math for Social Justice
 - Mathematics is an important tool for full political, social, and economic participation (Gutstein, 2006).

FAIR SHARE PROBLEMS: CONNECTING TO PRIOR EXPERIENCES

- Connecting to Funds of Knowledge/Background experiences
 - Students interviewing parents
 - Teacher listening and noticing
 - Lunch focus group
 - Connections across curriculum
 - New years resolutions
- Context for several lessons: Planning a celebration
- Position students as experts: Marta as caretaker of younger siblings
- Anticipating solutions and connections
- *At our celebration we would like to serve sandwiches. Each table of 6 people will get 8 sandwiches. How could we cut the sandwiches so they would be easy to share?*

CLASSROOM DISCUSSION



- Joey: *"We gave each person a whole sandwich and then gave each person one of the halves from the leftover."*
- Hector: *"I agree with how you split up the sandwiches but I disagree with how you named the pieces. I think the each person got one and a third because you cut the last sandwich into three pieces."*
- Emily: *"I also agree with Hector. When you cut something into three pieces it is called thirds. Thirds mean three pieces and half means two pieces. Like if you cut a pie in half it is two pieces of pie."*
- Teacher: *"Turn and talk to your group, what makes sense to your group?"*
- Joey: *The answer is really supposed to be one and a third because we split the last sandwich into three pieces and it wouldn't make sense because halves are two pieces."*
- Teacher: *"I noticed your group changed their thinking, can someone else from your group explain why?"*

LOOKING BACK

- Connections to CCSSM
 - What content standards is this addressing?
 - What mathematical practice standards?
- Connections to children's thinking
 - How was children's intuitive thinking capitalized?
- Connections to student's Funds of Knowledge
 - How did students Funds of Knowledge/background experience support their engagement?
- Students make sense using their language resources
 - How was rigor maintained while access created?

MULTIPLE GROUPING PROBLEMS: CONTEXTUAL TO ABSTRACT

- Positioning students as decision makers: baking a pizza from scratch
- Anticipate solutions and connections
- *We are cooking pizzas for our celebration and need to make 16 small pizzas. Our recipe says that we need $\frac{2}{3}$ cup cheese for 2 pizzas. How much cheese will we need for 16 pizzas?*

“I USE MEASURING CUPS WHEN I MAKE MAC AND CHEESE FOR MY FAMILY”

First Rachel thought we should do measuring cups for a pitcher so we did. and it was larger than I thought. we found out that it is 2/3 and you're tripling it or something like doubling the 3 would stay the same. so we did 8 measuring cups because we then know that it is 16 pizzas. we added ~~2/3 up and it was 4 2/3~~ and now it was found out it was 8/3 but we also found out that it was 4 of the 2/3's after we did that we did the same two paper thing

half recipe and Parmesan. And Parmesan 8 recipe 4 recipe and 1/3 Parmesan. 4/3 4/3 8/3 2/3 2/3 2/3

3/3 IS A WHOLE

$2/3$ $2/3$ $2/3$ $2/3$

1 whole 1 whole 1 whole 1 whole

$2/3 \times 8 = 5\frac{1}{3}$

$3/3 + 3/3 + 3/3 + 3/3 + 3/3 = 5$

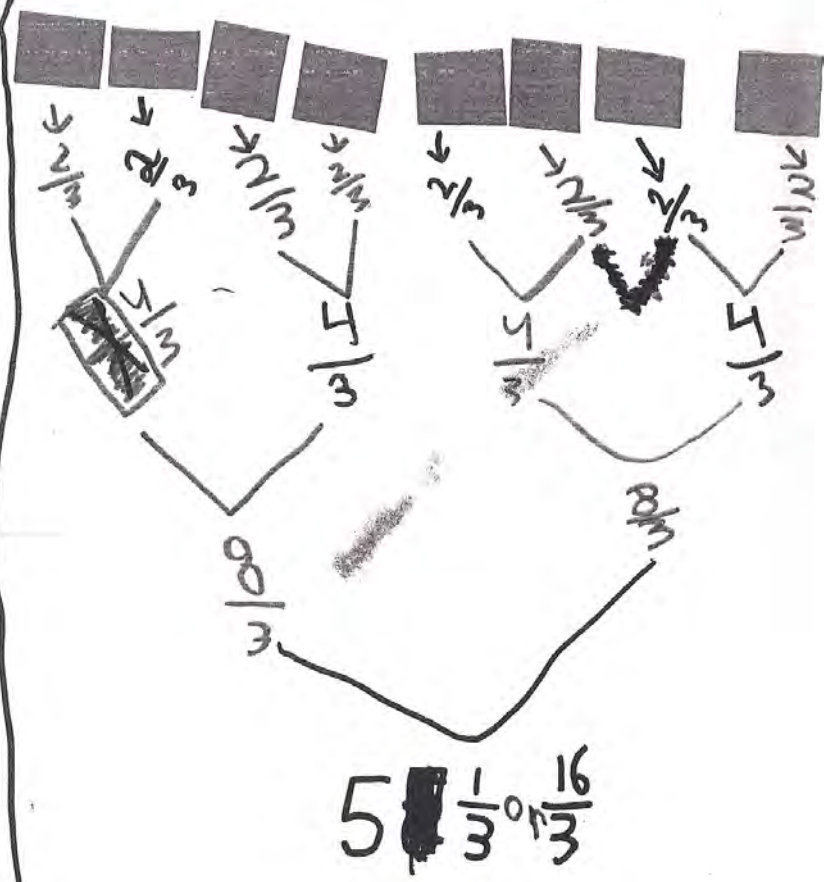
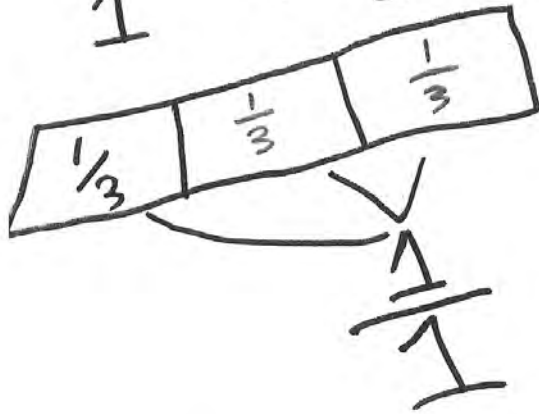
$5 + \frac{1}{3} = 5\frac{1}{3}$

5 1/3 OR 16/3

$$\left(\frac{1}{3} + \frac{1}{3} + \frac{1}{3}\right) + \left(\frac{1}{3} + \frac{1}{3} + \frac{1}{3}\right) + \left(\frac{1}{3} + \frac{1}{3} + \frac{1}{3}\right) + \dots$$

$$1 + 1 + 1 + \dots$$

$$\left(\frac{1}{3} + \frac{1}{3} + \frac{1}{3}\right) + \left(\frac{1}{3} + \frac{1}{3} + \frac{1}{3}\right) + \frac{1}{3} = \frac{16}{3} \text{ or } 5\frac{1}{3}$$



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“AS THE DENOMINATOR GETS BIGGER THE FRACTIONS GETS LITTLER”

- Story of Issiah
- Working on making comparisons without context with fractions that have the same numerator but different denominators
- Fraction notation paired with a visual representation
- How does a teacher respond when a student is marginalized by another student due to language use?

PREPARING FOR TEST

- What types of thoughts might help us as we are working on a test.
 - Mistakes are part of learning
 - Think about everything you know
 - Double check your work
 - Don't give up
 - Draw pictures
 - Slow down
 - Don't forget who we are...we love math
 - Remember all your teachers
 - Try you best
 - Skip a problem and come back to it
 - Some of the problems will be easy and some challenging

TEACHING MATH FOR SOCIAL JUSTICE

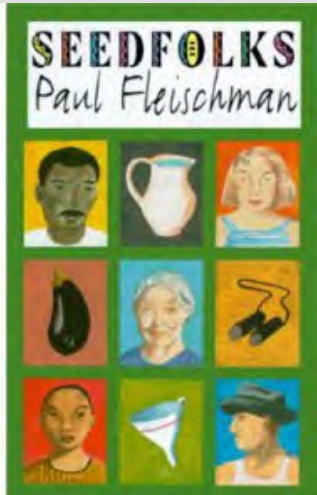
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How am I doing so far?

Reflecting on my practice helped me see strengths as well as weakness and led to the next unit.

GARDEN PROJECT



Percents,
decimals,
fractions,
what does
this data
mean?

Science Fair

Made scale
drawing and
found out
the area
and
perimeter of
plots.



Wrote letters using
data to advocate for
the garden.

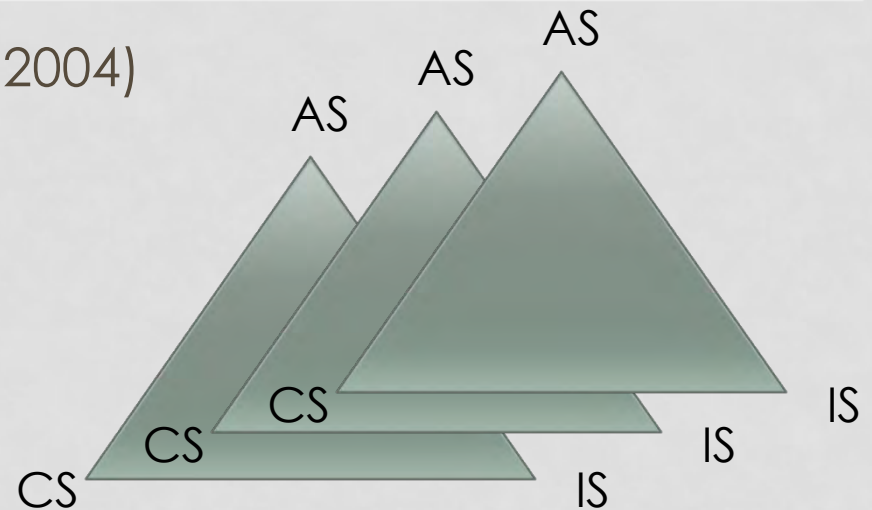
THE NEED FOR DIALOGUE AND APPROXIMATION

- Skovsmose and Borba triangle (2004)
- Transformation through critical research *with* teachers

CS-current situation

IS-imagined situation

AS-actual situation



- What do Teachers need?
 - High Quality Professional development, mentorship, and ongoing coaching
 - Communities of Practice the share common goals
 - Supportive administrators and policy structures
 - Resources-curriculum, time, professional autonomy
 - Examples of practice