



PRESENTATION

6:44 min

[Full Details and Transcript](#)



Representations of Part-Whole Relationships

Howard County Public Schools, Maryland
February 2011

Topic DEVELOPING EFFECTIVE FRACTIONS INSTRUCTION FOR K-8

Practice INITIAL FRACTIONS CONCEPTS

- Highlights**
- » Goals are presented for building second graders' understanding of part-whole relationships, including fair sharing with an even number of objects, sharing one object, and developing an understanding of equivalence among fractions.
 - » The teacher introduces a problem that requires fair sharing of objects among three students and encourages students to use counters and pictorial representation to solve the problem.
 - » Children solve the problem in different ways, often using a fraction bar to represent their solutions, post their solutions on the board, and explain them to their peers.
 - » The teacher then provides children with problem challenges, all of which involve sharing one object (a paper square) equally among several individuals.
 - » The teacher helps a pair of students understand how to use a ruler to divide the square into three equal parts.
 - » The teacher introduces the terminology for different parts of the whole (halves, thirds) along with notation ($1/2$, $1/3$) and also discusses the terms *numerator* and *denominator*.

- » Children then use Cuisenaire rods to practice finding the number of rods that are equivalent to a whole orange rod. Their varied responses are recorded on worksheets.
- » The teacher explains that, based on her assessment of children's understanding, the next lesson will involve more about equivalencies.
- » The teacher describes her goals of increasing math discourse during lessons so that children are explaining their thinking, as well as her goals in facilitating discussion.

About the Site **Howard County Public Schools, Ellicott City, Maryland**

Demographics

- » 55% White
- » 22% Black
- » 16% Asian
- » 5% Hispanic
- » 9% Special Education

Howard County Public Schools instituted a consistent, districtwide math curriculum that focuses on problem solving, communications, connections, and reasoning.

The program features:

- » Math coaches supporting classroom instruction in all schools, including working with small groups of students and providing demonstration lessons;
- » Use of models, manipulatives, and visual representations to support fractions instruction;
- » Emphasis on mathematical discourse and communication to explain reasoning;
- » Small professional learning communities to support classroom teachers in strengthening their understanding of math content and reviewing student work.

Full Transcript



Slide 1: Welcome

Welcome to Representations of Part-Whole Relationships.



Slide 2: Introduction

My name is Sorsha Mulroe. I'm a math support teacher at Bryant Woods Elementary School. The lesson today involved some second graders in a classroom of a first-year teacher who I am working with this year.

I was working on part-whole relationships with respect to fractions, and I also was thinking about the different representations that I wanted to expose the students to. It made sense to start with a sharing, equal sharing activity.



Slide 3: Planning the lesson

In looking at the fractions Practice Guide, it really helped me think through the details of my lesson planning. And, in particular with recommendation one, you're starting with something that we think that students already know, with fair sharing, but starting with that and thinking about the numbers that we choose, starting with those even numbers and then moving on. The guide really helped me think about starting with a certain number of objects and then moving onto one object being shared.



Slide 4: Equal sharing problem

So I presented them with a story problem where they had to share, and I was careful to choose the number so that it wouldn't be difficult for them to come up with an even or equal number of shares among three friends.

I really thought they'd use the half sheet of paper more for drawing rather than going right into number, that they would draw cookies and

draw people and assign cookies to each person. Some of them did draw some dots after they worked with counters to show their equal parts, but for the most part I was surprised. All of them actually went with numbers, and they used a fraction bar to represent their thinking.



Slide 5: Fractional parts of a whole

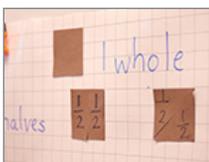
I could tell that I could really move on because they really had a good grasp of the fair sharing and were able to extend that in some cases, and I thought, “We have used fair sharing using several objects divided among people, and now I think we can move on to one object and still use fair sharing there.”

What I intended to do with that activity was to go into not just labeling but then to look at how many fractional pieces made the whole. What was different with that challenge is that they normally don’t have difficulty when they are given one whole and sharing with two people. But as the numbers got larger, I had to guide them through. And they were able to get it, but that was challenging for them.



Slide 6: Scaffolding with ruler

I anticipated that they were going to have trouble with those odd numbers. By telling them this one whole square I presented them with was a three inch by three inch square. And then I had rulers there and I didn’t say to use the ruler, but I was hoping that they’d go to that. And both of them did, but they didn’t know how to use the ruler to evenly divide the one whole. So I had to sort of put the ruler side by side with the whole and guide them through, “Well if you look at how the ruler is divided, how could that help you also make the slices in the whole?”



Slide 7: Fractional parts of a whole

I wanted to look a little bit more at naming fractions, specifically what we call the parts once we divide a whole into certain parts and also how we write the fractional part.

I wanted to get into five-fifths made one whole, if I had three-fifths that that would be three-fifths and labeling it that way. But I wanted to go back and also have them think about, given a part, what that whole might look like, because we didn't really even get into the fact that, depending on what the whole was, that one-half might be different or look different depending on the whole. We didn't get as far as that because I noticed that when they offered that they knew something about numerator and denominator that I would just ask a little bit more about what they knew, and that told me to sort of hold off on getting further with my plans.



Slide 8: Numerator/denominator

I wanted to really focus on what the numerator and denominator meant and the relationship among those two parts in a fraction. We started with the Cuisinaire rods and talking about one whole and then the number of pieces needed to make one whole; whether it was the red pieces or the orange pieces, trying to help them see the relationship between the number of pieces needed being the parts or the denominator, and then what that numerator was in relationship to those number of pieces. I really want them to focus on the numerator and denominator and that understanding with unit fractions before we go into non-unit fractions.



Slide 9: Next lesson

So I would begin there again for next time, and then I think once they got that I would go into how many fifths make one whole, and maybe leading them on to identifying equivalency with halves and wholes. So there is all that to explore before we can even move on into equivalency in comparing and ordering.



Slide 10: Role of mathematical discourse

Something that I am working on with all of our teachers here is the role of mathematical discourse in a math classroom and really looking at not just the questions I ask so that the students respond to me,

but the questions that the students ask of each other, the comments that they make to each other, and the questions that they ask of themselves. And I'm also working on trying to be a better facilitator of that discourse, because my first inclination is sort of to jump in and rescue, but I'm trying to move away from that and really having them explain their thinking to me in their own words, instead of giving them the vocabulary or the ideas.



Slide 11: Role of math specialist

I see my role as a math support teacher as really developing the teacher capacity to think about their lesson planning in particular, to anticipate what students might already know or offer in their lesson, and then to plan ahead for that to guide their instructional planning.



Slide 12: Learn more

To learn more about Representations of Part-Whole Relationships, please explore the additional resources on the Doing What Works website.