MICHELLE MAKINSON: [Speaking to coach Sally Keyes] I've taught fourth grade for eleven years, all of them at Bagby. Um...local girl; I went to Independence High School and went back east for college. And you know, this was the first job I got in teaching, and I stayed.

[Speaking to class] Raise your hand if you've been in this room when we've done a math talk, whether that was a dot talk or a number talk. Raise your hand if you existed in this classroom and you did that. Okay, so that's what we're going to do. We're going to do a math talk. Are you ready for that? Nod your head if you're ready.

STUDENT: Yes.

MICHELLE MAKINSON: Okay. And you need to be listening and watching to what I write, okay? Okay, you ready? Mrs. Clark has twenty students in her class. How many students does she have?

STUDENTS: Twenty.

MICHELLE MAKINSON: Eight of her students are boys and twelve are girls. What part of the students in her class are boys? So read that again in your head so that you can remember what we're working on. Please use the manipulatives...the manipulatives to help you solve this problem. You are to think and work silently. Give me a thumbs-up when you are ready to share your thinking.

[Speaking to coach Sally Keyes] Well, um...this class is a very diverse class, not just in terms of ability level but in terms of needs level. I have a lot of ELs [English learners], I have a lot of kids that are RSP [Resource Specialist Program], um...504's [covered under Section 504 of the federal Rehabilitation Act of 1973]. I have one child that just exited an SDC [Special Day Class] program. He had been there his entire life and this is his first entry into a regular classroom. And the class is most marked by the high level of behavior issues that are going on. So there are a lot of emotional issues there interrupting the educational flow and so that takes a lot of my time. Um...so...I mean my thought about this was if this can be done with this class, it could really be done with any class. Um...and I think people can see that in the film.

In terms of where we are in fractions, we were building our understanding of unit fractions: understanding how they get put together to create a whole, understanding what it means in terms of the size of the individual pieces or parts if the wholes are different sizes, and starting to move towards coalescing and understanding of what something is when it's equivalent. And so this lesson falls exactly in there and seeing different representations. And in fact, I told them when you're being filmed you're making a representation of yourselves, so you might want to think about that in how you choose to behave today. And it looks like they all chose to do the right thing.

[Speaking to class] Are you ready to share? Solve your problem. If you and your partner have both done a thumbs-up, please share with your partner...decide who's going to go first and then let the other person go. Explain what you did and why you did it.

STUDENT: Twenty students, so that would be eight twentieths. Do you agree?

STUDENT: Yeah. I did eight twentieths as well and I did eight red for boys and the other twelve for girls.

STUDENT: Um...boys are here and girls are here. So when I counted...when I read the problem again, and I counted the boys and the girls, and then I got eight twentieths.

MICHELLE MAKINSON: Shark-fin if both of the partners have shared and keep it that way. If you haven't both shared, keep sharing.

[Speaking to coach Sally Keyes] We've done some number lines, we've done area models, we've done sets, but seeing them all together, and seeing them in different ways, because kids get used to one way, and then, you know, like it's still a number line but they're like, "But that's going in a different direction. How can that be? Oh well, because they can."

MICHELLE MAKINSON: First of all, what's the question being answered?

STUDENT: Um...how many are boys?

MICHELLE MAKINSON: How many are boys? Okay. Is that the exact question?

STUDENT: Yes.

MICHELLE MAKINSON: What do the words say?

STUDENT: Mrs. Clark has twenty students in her class. Eight of them are...eight of her students are boys and twelve are girls. What part of the students in her class are boys?

MICHELLE MAKINSON: Okay. So what's the exact question that you are answering?

STUDENT: How many boys are in Mrs. Clark's class?

MICHELLE MAKINSON: Okay. Um...what do you think the answer is for that?

STUDENT: Um...eight twentieths of them are boys.

MICHELLE MAKINSON: Okay. Does anyone have a different answer? Fletch, what is your answer?

STUDENT: I have eight twelfths.

MICHELLE MAKINSON: Eight twelfths. Okay. Anyone have a different answer than either one of those? Jack?

STUDENT: One fifth.

MICHELLE MAKINSON: One fifth? Okay. Nathan, do you have a different answer than what's up here?

STUDENT: Four tenths.

MICHELLE MAKINSON: Four tenths. Denis, do you have a different answer?

STUDENT: Two fifths.

MICHELLE MAKINSON: Two fifths. Okay, anybody else have a different answer than eight twentieths, eight twelfths, one fifth, four tenths, or two fifths? Okay. So now, somebody who suggested one of these answers, would you like to justify how you got that answer and come and show your work on the board? Okay. Fletch, would you come up and show yours? So do you understand what your goal is? You want to explain how you got to your answer with your manipulatives.

STUDENT: Well, girls need boys, so I put one group of twelve and a group of eight.

MICHELLE MAKINSON: Okay. And what was the answer that you gave?

STUDENT: Twelve eighths.

MICHELLE MAKINSON: I think you said eight twelfths, right?

STUDENT: Right.

MICHELLE MAKINSON: Yeah. How did you...why eight twelfths?

STUDENT: Because there's a group of twelve there and a group of eight there.

MICHELLE MAKINSON: Okay. So which one is the numerator in eight twelfths? Say the number.

STUDENT: The twelve.

MICHELLE MAKINSON: The twelve is the numerator?

STUDENT: No, the eight.

MICHELLE MAKINSON: The eight. Okay, um...so explain that fraction. What does that fraction mean?

STUDENT: So there's twelve eight there and twelve here, so it's eight twelfths.

MICHELLE MAKINSON: So eight out of twelve are boys?

STUDENT: No, eight out of twenty.

MICHELLE MAKINSON: Oh, so do you still stick with your answer?

STUDENT: No.

MICHELLE MAKINSON: No. Why not?

STUDENT: Because it...it doesn't work.

MICHELLE MAKINSON: It doesn't work. Can you explain why it doesn't work because I love the way that you got to that?

STUDENT: Twenty people...

MICHELLE MAKINSON: Oh! So what's the whole in this question, um...the complete thing, the whole? Let's go back to the story problem. What's the whole that we're talking about?

STUDENT: Um...how many are boys?

MICHELLE MAKINSON: Is that the whole?

STUDENT: How many...twenty.

MICHELLE MAKINSON: Twenty. And twenty is the number of people in the...?

STUDENT: In the class.

MICHELLE MAKINSON: Oh, the class is the whole. Thumbs-up or thumbs-down? What do you guys think? Sean, that's right. Do you have a different way of explaining how you got to eight twentieths or do you like what Fletch said?

STUDENT: I like what Fletch said.

MICHELLE MAKINSON: Okay, but we had other ideas didn't we? So who would like to explain their idea? Denis, what was your answer?

STUDENT: I was too fast.

MICHELLE MAKINSON: Okay, so you go up there, tell us what question you're answering and how you got to that answer.

STUDENT: So as you can see, um...I put in eight twentieths over here because that is how many there were in the entire class and how many were boys. But I saw that both of them were divisible by two, so I divided both the numerator and the denominator by two and got four tenths. So divided by two, divided by two again, and got two fifths, which both of them are not divisible by the same two.

MICHELLE MAKINSON: Okay, so what does that mean about the relationship between eight twentieths, four tenths, and two fifths?

STUDENT: They are exactly the same.

MICHELLE MAKINSON: And what's the word we use for that?

STUDENT: They're equal.

MICHELLE MAKINSON: Is that the exact word we use?

STUDENTS: No.

MICHELLE MAKINSON: Call on somebody to help if you can't remember.

STUDENT: Uh...

STUDENT: Equivalent.

MICHELLE MAKINSON: Agreement? Disagreement?

STUDENT: Agreement.

MICHELLE MAKINSON: Agreement? They are...those fractions are all equivalent. What does it mean for them to be equivalent? Nathan?

STUDENT: They're equivalent, they equal the same thing. Like, let's say ten twentieths is the same as five tenths.

MICHELLE MAKINSON: Is five...are those two fractions in every single situation always naming the same amount?

MICHELLE MAKINSON: [Speaking to coach Sally Keyes] Well, we're starting to see a wider array of being able to access that information. So all the kids were able to at least at some point get to the fact that if there's twenty kids and eight of them are boys and twelve are girls that the fraction is some version of eight out of twenty. Some pick the wrong...they were trying to simplify the fraction and rename it, but they did some mathematical errors instead of...they were trying to get fancy. They didn't want to just do eight out of twenty, they wanted to jump to that equivalent fraction, and they made some mistakes along the way, but they were able to regroup, and it was good modeling about what you do when you make a mistake.

Do we have some other things to talk about? Who would like to justify their answer for one fifth or four tenths? Did we already kind of do that one already? How so, Jack?

STUDENT: Because the ten is divided the...the eight. Eight twentieths is down by two, which is four tenths.

MICHELLE MAKINSON: Why? So that was one of the things he stopped on. Now, who said one fifth?

STUDENT: I did.

MICHELLE MAKINSON: Would you like to justify it?

STUDENT: I realized that I made a mistake.

MICHELLE MAKINSON: Well, okay. And are mistakes okay?

STUDENTS: Yes.

MICHELLE MAKINSON: Because we learn from them. What did you learn?

STUDENT: I learned that I accidentally divided wrong.

MICHELLE MAKINSON: Oh! How so? Tell me more details.

STUDENT: Um...I started...I went down to a four tenths and then I divided two tenths, but I kept the ten by accident and then I divided again.

MICHELLE MAKINSON: Okay. And it makes sense to you now?

STUDENT: Yes.

MICHELLE MAKINSON: Okay. So, what's the answer?

STUDENT: Two fifths.

STUDENT: Or four tenths or eight twentieths.

MICHELLE MAKINSON: Okay, because they're all...?

STUDENTS: Equivalent.

MICHELLE MAKINSON: What was that?

STUDENT: Equivalent.

MICHELLE MAKINSON: Oh! Okay.

MICHELLE MAKINSON: So I can see that we've made a lot of progress already in terms of being able to identify equivalence and how do we go about doing that. What are our procedures? What are the ways that we can analyze that? Some are purely, you know, mathematical in terms of number sentences and some are actually partitioning visual representations and seeing how they group together, and that work is paying off.