ERIKA ISOMURA: My name is Erika Isomura. I'm a 4th/5th-grade teacher here at Glassbrook.

MIA BULJAN: My name is Mia Buljan and I teach 2nd grade at Glassbrook in Hayward. When we first talked about this, you talked about this idea of teaching decimals. Like the notation and the -- well, this is what we were asked to do, teach decimals. So the notation, and the sort of, operations, and the place value-ness of it. Your first response was kind of like, “Decimals are sort of a non-issue if they know fractions really well.”

ERIKA ISOMURA: Right.

MIA BULJAN: “And if they can understand the patterns and place value.” So your idea was to really open this series of lessons using a bunch of number talks.

ERIKA ISOMURA: Yes.

MIA BULJAN: So what I want to do is walk you through the number talks and the decisions that you made, and how -- what the kids said, and then how you used that to plan your next number talk. Because as a teacher, that's what I want to hear.

ERIKA ISOMURA: Okay.

MIA BULJAN: So it shows in the corner, or in one of the corners, you've marked the date that you did this.

ERIKA ISOMURA: Right.

MIA BULJAN: So the first thing I was going to ask you was, like, could you just talk about your process in terms of -- there's different kinds of number talks. There's like, there’s different kinds of mental computation. And you right away said, “I want to use something called a number string.” So can you describe that?

ERIKA ISOMURA: So the number strings are a series of equations that are all related to each other. Typically, when I do them, they tend to be related to place value. So those are the ones I'm most comfortable with is -- times 10, 100, 1,000, 20, 200,000. I've done them with fractions where you do something like one-half, one-fourth, one-eighth, those -- but I'm personally most comfortable when I'm using the base-10 number system in the talk because I think that gives them a lot of understanding of why the numbers are turning out the way they are and how the number system that we work with really is helpful. If you understand our number system, then a lot of the number work we do isn't really challenging. It's almost trivial because I understand place value so well, that I'm not struggling with “how many zeroes? Where am I? How did this become 100,000?” It's very automatic because it just -- like, they have it internalized.

MIA BULJAN: So a lot of times this is taught as rules. Like how many times you move the decimal point, or how many zeroes that you add. And what you're really talking about is do your students have an understanding of magnitude, which is, you know, like 10 times the number. Roughly how much should that be? What does that look like? And so there's a lot of number sense buried in there. This particular number string strategy helps them see how the numbers

are growing and those relationships. So I've seen this done different ways, and number talks are typically like mental computation. Do they do it in their heads, do you give them calculators? How does that look?

ERIKA ISOMURA: So it depends. Some of these were 100% in their heads. Some of these were just call out the answers, we write it, if there's disagreement we'll talk about it later. Some of these were we did it and then somebody had a calculator and verified.

MIA BULJAN: Right. Can you talk about why you do that? Why did they have to have that right answer basically, the calculator check?

ERIKA ISOMURA: There comes a point later on where we calculator check because we want to verify the pattern we think we're using is correct.

MIA BULJAN: Okay.

ERIKA ISOMURA: So at the beginning, if they see the pattern or not, it's more me getting information on what's going on so that I can set up the next ones of “Oh, they didn't get this, so let me poke a little harder and see where the fall-down is.” Or “Oh yeah, they're getting it. Great. So now let me try this and see, do they still get it when I go into things like fractions and decimals.”

MIA BULJAN: Right.

ERIKA ISOMURA: And then towards the end, like this week and end of last week, we pulled out calculators because we thought we knew what we were doing, and ...

MIA BULJAN: And maybe not?

ERIKA ISOMURA: Yeah, and having wrong answers up there just would confirm that yes that wrong answer must be right because she left it up there.

MIA BULJAN: Yeah. Yeah. And also I think sometimes those wrong answers obscure patterns that could emerge also. So if they, right. So three weeks ago roughly, you started doing this number talk, and the purple is -- did you have the string all written or did you write it in front of them?

ERIKA ISOMURA: I wrote it one at a time.

MIA BULJAN: Okay. So you wrote 10 times 1 equals, and they told you?

ERIKA ISOMURA: Yes.

MIA BULJAN: 10. Okay, so and then you wrote 10 times 10 and waited for them to answer. So all the purple is what you captured just answering the question.

ERIKA ISOMURA: Right.

MIA BULJAN: So I see that you're using here the powers of 10. Basically, they're getting multiples of 10 larger. This first factor is always 10. And that this one is growing. So when I look at this, the blue is their conversation that you recorded.

ERIKA ISOMURA: Right. So for some of the number strings, we'll debrief by talking about what do you see as far as patterns, and other number strings we just stop. We got what we got and we may pick it up later or we may just leave it.

MIA BULJAN: Okay.

ERIKA ISOMURA: So on the first one, I wanted to know where they saw things. So the blue was trying to capture the patterns they think are present in the factors, and the orange was what's happening with the products.

MIA BULJAN: Okay. So they saw these as growing multiples of 10?

ERIKA ISOMURA: Right.

MIA BULJAN: Powers of 10. And then over here, when they talked about the products, they're getting bigger and they're saying, “Add the zero from the first factor and the second factor.” So this has two zeroes, and this has one zero, so the product will have three zeroes.

ERIKA ISOMURA: Right. And they specifically were saying, “Put … have these zeroes and put that one zero on.” I'm not sure that it made a difference for them, but that's how they saw it. They saw it as the zero from the 10 got added to the second factor.

MIA BULJAN: It's a little bit interesting, right? Like they see the 10,000 intact and then that sort of like multiple more.

ERIKA ISOMURA: Right. And then there was a conversation about “I can count by 10s that many times.”

MIA BULJAN: Oh gosh.

ERIKA ISOMURA: Which then also brought up a conversation of …

MIA BULJAN: “Why would you?”

ERIKA ISOMURA: …well if I count by 10s one time, yeah, that's fine. If I count by tens 10 times, that's fine. And then there was a little bit of a back and forth about “Do you really want to count by tens 10,000 times, or do you want to count 10,000 ten times?”

MIA BULJAN: So this was, they kind of came up with this rule. So John Van de Walle talks about this, this idea that if you do things like patterns and operations with kids, instead of teaching them algorithms, the students will kind of create their own rules like this that you're talking about. And that you can capture that to become the algorithm for your classroom. And so this is where you came up with this sort of recipe of one times one, and then the number of zeroes inclusive of both factors. Okay. So this was their words and like a little algorithm they could use?

ERIKA ISOMURA: Yeah. I saw the multiplication was fine and I was curious to see if they'd translate to the division.

MIA BULJAN: Okay. So now you're dividing by the 10.

ERIKA ISOMURA: Right.

MIA BULJAN: Okay. And you're starting with the largest instead of the smallest.

ERIKA ISOMURA: And I did have the multiplication poster up so that …

MIA BULJAN: Next to each other, so they could see a pattern.

ERIKA ISOMURA: … the kids who were still a little bit fuzzy could see that "oh yeah." And they did talk about we can do the reverse, so that I know that that's going to be my quotient because I know that on the other poster we saw that multiplication problem.

MIA BULJAN: So they relate that multiplication and division. What a pleasant surprise, yeah.

ERIKA ISOMURA: That's something we've worked on all year. There are these partners, yay. So.

MIA BULJAN: Okay. So this is where they've come up with their rules. Dividends have one less zero each time, divisor is always 10. So this is how, this is if you think about the math practices, maybe math practice six, where we ask them to be really precise with their language and not just it's getting bigger, it's getting smaller, but really *how* is it getting bigger and *how* is it getting smaller to help them maybe form an idea around it. So tell us a little bit about the orange, which is where you captured their thinking.

ERIKA ISOMURA: So zeroes, fewer zeroes each time. This quotient's got -- went from greater to smaller. They were thinking "I can solve this by thinking what times 10 takes me back to that first number," the dividend. So that was, they said, "That's how I figured it out because I don't necessarily want to divide." And then they said, somebody said at the end, "It's just backwards. I just flipped the first string that we did this morning around and it's right there."

MIA BULJAN: At what point do you talk about inverse, or do you introduce that language at all, or do you wait?

ERIKA ISOMURA: I don't necessarily teach it as a vocabulary word. We've talked -- I've used the word inverse when we've done some work with fractions.

MIA BULJAN: So in context, you'll use a word like that, so when they say "backwards from the first string," that's fine.

ERIKA ISOMURA: Right. That's what they said, so I wrote it down.

MIA BULJAN: So tell me about this.

ERIKA ISOMURA: So the whole point to the number strings was to eventually get into decimals. And before decimals, to know I can do this as fractions and then fractions can easily be translated into decimals, especially when I have those 10, 100, 1,000 denominators. So …

MIA BULJAN: So linking it to place value.

ERIKA ISOMURA: I wanted to see what they would do here. We haven't talked explicitly about that. We've talked in stories about having one cake and 10 people sharing. What would you do? With one cake, four people sharing, and so forth, but I haven't actually written it as a division problem. So I threw it up there, and I said, “Think about it, then go back to your desks, write and draw. We'll address it later. Just what do you think.” And I heard them murmuring as they walked away. “Can't do it. It's impossible. You only have one. There's no way you can pass it out to 10 people.” And I just kind of left it. And we came back to it later, or we will come back to it later. Yeah.

MIA BULJAN: Okay. That was all the same -- this is all on the first day.

ERIKA ISOMURA: Right.

MIA BULJAN: And really this is something they should be very comfortable with. Multiples of 10, dividing and multiplying by multiples of 10.

ERIKA ISOMURA: Right. That was done a lot with whole numbers in the fall, so …

MIA BULJAN: Of course. Yeah. Okay. All right.