

ANTOINETTE VILLARIN: Hi, my name's Antoinette Villarin. I teach at Westborough Middle School in South San Francisco, and I teach eighth-grade math.

CECILIO DIMAS: Hi, I'm Cecilio Dimas. I have been working with Antoinette and her students as a coach, and I'm also with the Silicon Valley Mathematics Initiative, where I work as a partner and director of innovation and strategy. As we've been working together with your fourth-period class -- 8th grade students -- we find ourselves today working on a formative assessment lesson [FAL], and I'm curious if you could help share with us the mathematical goals that you have been working on in this unit, and why did you select this specific FAL.

ANTOINETTE VILLARIN: Okay. So in this FAL, students are being asked to compare a real-life situation of liquid flowing out of a prism that we have a container for, and it has a top prism and a bottom prism. And so they're supposed to take that real-life situation and compare it with a graph, and also with an equation. And so the current unit that I'm working on is having students look at rate of change and interpret slope, and slowly lead their way to...to writing an equation on...in slope intercept form.

So I chose this FAL because I thought it was a perfect real-life situation where I can have students represent a constant rate of change graphically, and then also an equation -- algebraic form. And I...it fits so nicely, and so I chose it because my learning goal is for students to be able to interpret slope as rate of change, and be able to justify and build an argument based on that in a real-life situation.

CECILIO DIMAS: One of the things I noticed as you've been working on this unit with your students is the use of multiple representations. So I'm curious about, um, where...where is the class with their understanding of the various types of representations you've been working on, and if you could share what those representations are?

ANTOINETTE VILLARIN: So when we started the unit, I started basically with multiple representations. We were taking, like, real-life situations, like a plant growing or a family saving money, and we were taking these representations and turning them into numerical representations in the form of a table. And then we were taking it graphically, and graphing it in the form of a graph, and then taking it algebraically to represent it algebraically. And that's where we started the unit for a couple of days.

We moved slowly into slope and what that might mean in terms of rate of change. So I taught slope in terms of rate of change, and what that means is one quantity changes, what happens to it as the second quantity changes. So they're going into the lesson basically with that background when we started the unit. They...they haven't had that much experience with writing equations on their own. All they have been doing is looking at rate of change, and what that might look like in the four different representations.

CECILIO DIMAS: Okay. As we continue with this idea of looking at the math content, integrating the Standards for Mathematical Practice is an important part of lesson planning as well. So can you tell me about the use of precision -- math practice number 6, and then math practice number 7 -- structure? That's something that you had shared earlier with me, that that's what you're going to integrate into this FAL experience. So could you tell us more about that, please?

ANTOINETTE VILLARIN: Yes, definitely. So, with math practice number 7, I thought it was really important for students to see this idea of rate of change in different formats, like where is it...where is it in the situation. Like, if I were to give you a real-life situation, where is the rate of change, and how is it changing, and what does that mean in the context of the problem? Then we moved to the table, and we

talked about where students might see the rate of change in a table, and what that looks like as your dependent variable is changing, and what happens to your independent variable. And the same thing with the graph -- we were starting to make connections with what that means for the rate of change in a graph, and how it's equivalent, basically, to your slope of the graph.

And we were slowly moving to equations, and a couple of students were finding that the coefficient that you were multiplying the independent variable by was often the rate of change, and students are kind of there, but they haven't really mastered it or understood it. So I felt like the structure of seeing this very common rate across all multiple representations is something that I, like, really want to reinforce and I'm hoping this FAL will kind of pull that together a little more tightly for a lot of the students. So definitely math practice 7 was chosen with...or this FAL was chosen with the intent that I wanted students to look at structure.

With the precision piece...with math practice 6, it was on...a lot of it was a scaling. I think students, like, understood this idea of slope and rate of change is seeing how, maybe your vertical change changes as your horizontal change changes. But a lot of them weren't being precise about the units and how much it was changing by, and I found that a lot as I was starting the unit. So I think this FAL will be wonderful to use. It's a perfect opportunity, because a lot of the graphs had either the numbers missing on the scale, or it's not going by a one-unit or two-unit that the students are used to.

CECILIO DIMAS: So students are going to be looking for changes, in -- in -- all in a similar context. So the rate of change is something that they're going to be analyzing, and you're really wanting them to be precise with the language they use with that.