PAM BROUSSEAU: Tell me about -- you mention sense-making. So tell me about how their sense-making has evolved from kind of the exploration to where you saw it ... especially evolved today.

MELISSA NIX: Yeah, so I mean, we started kind of, I -- last week in kind of showing them about expressions in general, and that if I had like 3 times 5, plus 3, what visual representation could I make of that? So I showed them, you know, three groups of five and three just using units. And that kind of bridged us to using the algebra tiles. So now let's start talking about these concrete representations of, you know, abstract variables. So they kind of got to see what happens with an *x*, and an *x*, and a *y*, and a *y*.

Um, and we explored a little bit yesterday with a MARS [Mathematics Assessment Resource Service] task called Rectiles, and that explores that *xy* and the combination of those patterns. And then today, again trying to bridge this whole connection of ... you know, you start with these expressions, then we went to the algebra tiles, then we went to more of like a visual model, and now it's just sort of numbers. Still visual arrays, but they're getting that whole, like, "Oh, my dimensions multiply to get my area."

And that was a big conception that came out today, because it was a misconception that was highlighted when they thought with the pink rectangle that they were looking for the area. But they were actually asked to look for the dimensions ... Or I was going to be asking them to look for the dimensions. So to highlight, oh, the area as a convention, we label on the inside, and the dimensions on the outside. So now, what do you think I'm asking? And then at the very end, to have my last two students talk about well, wait a second, if this is my total area, then the way that I can un-area this is to …

PAM BROUSSEAU: [laughs]

MELISSA NIX: ... is to do my inverse operation. Like, if I multiply to get here ... I mean, they were working on that a lot. And to see that ... I mean they -- they actually got it back down to um, I think it's 4 and 2*y* or 4*y* and 2, what the dimensions were. They were able to take all of those components out and then multiple ... I said -- I was asking them if they can multiply it to check that I really got that area.

I'm excited, because I get to see them tomorrow and -- and kind of ... I planted that seed with the students to see what's going to come out more tomorrow when we visit it.

PAM BROUSSEAU: What teacher moves did you make to help them -- support them. What teacher moves did you make to support them in their sense-making?

MELISSA NIX: Um, well for starters, I think I -- I think it's really important to let every student individual think time. But there's also that relief when you're like, okay, I need to confer with you because I'm really lost, or I'm not lost. So I do really value that opportunity to kind of check in. Throughout the lesson I wanted to offer out examples of how other people were making sense of it to help any -- to nudge anyone along.

So, for example, when I came up with Heaven's example of the [inaudible], to say, "Oh, explain to me how you multiplied this to this to get this area. Now can you use that to get to the next area?" Use that same structure and, you know, application to find the area down here. Might that help push you forward?

PAM BROUSSEAU: So using their thinking.

MELISSA NIX: Mm-hmm. [affirmative]

PAM BROUSSEAU: So the agency ownership, or authority ownership identity piece, usually -- really using their thinking to move them along and help them make sense.

MELISSA NIX: Right, and kind of integrating that, you know, SMP of structure of like, you know, is this the same pattern? So if I know I can multiply this dimension to this dimension, to get this area, and I agree that this is 2*y* plus 3 because it's a rectangle, and these are parallel, and this is 2*y* plus 3, then can I use that 5*x* and 2*y* plus 3 to get this next area? So trying to connect all -- how it's all connected.

But yeah, not me just telling them, because I don't want to just tell them all the time. It's a lot more powerful to hear it from somebody else. And it's a lot more powerful for that student who showed that example to be able to explain it, as well.

PAM BROUSSEAU: Absolutely.

MELISSA NIX: And so the more that I can have them explain it, the more empowered they will be, the more ownership they will have of it, and um, if I can facilitate that happening as often as I can, I think it's a powerful math classroom.

Uh, I do wish it wasn't so much just them sitting. I try to do an accordion. I'll show you a little, and bring it back, and show you a little, and bring it back, and let you work together. Um, because it is kind of long. But they--

PAM BROUSSEAU: Mm-hmm. Well that had a nice flow.

MELISSA NIX: Oh, thank you.

PAM BROUSSEAU: You -- you did that. They worked some, you brought them back. You give them a little more, highlighted -- illustrated some of their thinking, planted another seed, worked some more. And so that was kind of a nice -- nice flow.

MELISSA NIX: You asked how did I help build some of the conceptual stuff with students. I went around and helped and a few students weren't sure, so on one student's page I like, turned it over and was kind of helping them draw. They were telling me what to draw, but I was trying to draw for them, what would the algebra tiles look like if you were to multiply this? But because we had such a cursory introduction and play time with that, I didn't quite have ownership of that visual.

PAM BROUSSEAU: Mm-hmm. [affirmative]

MELISSA NIX: But as I kind of illustrated it for them, they were able to evolve with that visual and kind of make sense of ... Because they asked me this, "I don't understand how Heaven got that first area. How did -- how did that one student get that area for [inaudible]?" And you know, 1 and a half *x* times 2*y*, how did that end up getting a 3*xy*? So by showing them with the concrete representation of the tiles, you're like, oh, I see, that's an *xy*, that's an *xy*, and those are both half *xy*'s. I can make that into a 3*xy*. So try to move their conceptual thinking forward using models.