TEACHER: I want to thank you for the lesson too. I liked during the huddle of how you helped make them accountable for being good listeners, or for continuing to do their own thinking. Because you'd ask somebody to explain something, and then sometimes you would stop and not let them explain and have everybody else try to say "Why did you put them together?" I just thought that was a nice mix of keeping everybody actively engaged of what was going on during that sort of abnormal routine for them. And I liked how they didn't just go sometimes with just all the equal signs. I think it was maybe the third group, they had one equation that had an equal sign in it, and then they had three expressions, and they put them altogether and they were quite comfortable having those all together, even when you pointed it out to them, they really stuck to their guns of what they were thinking about. It was interesting to me that the property ones came up so early in the discussion. I didn't think that they would see that $x+y=y+x$, as a property, would just jump out at them so quickly. When we went back to the subgroups I was really amazed how that category disappeared, because it was probably the second category or something that came up, and all of a sudden that category wasn't up there anymore, and you go "What happened to that?" Their confusions were really interesting. The group at the front here, on all of their papers they say "Equations are things that you can solve, and the inequalities are things that can't be solved," which is puzzling because there is a solution, it's just not a single number... But I think they might be the only group of papers I saw that were talking about, like, the boundaries...So when they got into just examining inequalities they knew a lot about how that looks like in terms of a graph, about the open circle, and if it's included or not included. So they had a lot of knowledge about that, and so it makes me think how difficult this notion of what it means to solve something is for students, you know, how can we make that more explicit for students? It's something that I sort of take for granted when I'm teaching. It also came up when we were looking at these solving for unknown equations, with the $y=2$ is different because it's just an answer; there's nothing to solve so what do those solutions mean? It seemed interesting to me, I don't seem to have heard personally a group talk about what the f$l=f$ is, or the a=lw, which to me at least, the area one would have been more obvious then the property ones... but I've never heard anybody think about how to name that as a category. Or the idea that you can combine like terms on the equations and on the expressions because you have the $3x+2x=5x$.

JACOB DISSTON: In expressions you can combine like terms so I kind of probe that a little, so like, "Is that the only place you can combine like terms?" I think what really was interesting is how fragile their use of language is, and when you talk about solving, what does it mean to solve? A number of kids were talking about it but Maya did specifically, the idea of open and closed. I think it was actually this group that said the variable is a solution on the less-than-equal-to or greater-than-equal-to, but it's not a solution... so the idea that the value of x, when you set them equal and you solve for that boundary point, is included or is not included... you know, they don't have a sort of way to talk about what solution means, that solution can be a set, that this is the boundary point. They are starting to but it takes lots of unscripted opportunities to have to put those words together that they begin to develop the language for it.

TEACHER: Yeah, I mean I think that's what was really interesting about the lesson is that that sort of awareness was starting to come more towards the surface, so it did pick at some of those big ideas that you wanted to surface for kids.

JACOB DISSTON: I think solving is a big one that we haven't really talked about -- "What does it mean to solve," you know, that fits with equality and with variable, and what's it mean to do the math that we call solving? They were talking about solving...You can solve an expression and it can be changed, if the terms can be combined; that's solving the equation. Do you want us to solve that expression?

TEACHER: Yeah, so finding like terms is solving.

JACOB DISSTON: Exactly, solving just means doing...

TEACHER: Getting an answer.

TEACHER: I can do something to it to change it.

JACOB DISSTON: Right, so they'll say "That expression can't be solved, but that one can be," meaning you could combine like terms...

TEACHER: ...Because they said "It doesn't have an equal sign so we think it's an expression," but, you're not combining like terms, you actually have to solve it, because it was like m-squared times m to the fourth, something like that... So there was something about it that made it feel like solving, and not combining like terms. So they had this discussion about it: "Are you solving it, or are you combining like terms?" Versus $3x+1x$, they were sure that that was combining like terms, but they didn't see m-squared times m to the fourth as like terms. I'm not sure if they could've verbalized it, but they saw one was m squared and one was m to the fourth. They didn't see those as like terms, so they decided it wasn't combining like terms, so it must be solving, because you have to do some calculation to do those exponent operations...

TEACHER: They have a really difficult time with the whole idea of operation, like, it couldn't fit into the same category if it was adding versus dividing or multiplying versus some other thing. To them, "like" meant it somehow had to have that same operation. I mean that was really the first thing they always said.

JACOB DISSTON: Which is evidence that whatever we're doing through this grade, and the previous grade, on back... they're focusing on whether it's addition or subtraction... We teach them addition, then we teach them subtraction, then multiplication, then division, then powers... and those are the things they pay attention to, not the more global things.

TEACHER: I think this really pushed them to start paying attention to other things, because when the one person brought up the idea of values, then as you walked around to listen to other groups they were all picking up on that idea of values, and I don't think anybody reached a solid conclusion about it, but they were all struggling to find a conclusion of what that meant in their discussions so I think that's a really good thing, that there needed to be values in there somewhere, you know, "What does that mean...?"