READING WRITING IN THE DISCIPLINES

Reading and Writing in Mathematics Video Transcript

Magdalene Lampert:
You need to know how to read math, write math, speak math and listen to math. And not just listen as in hear, but listen as in comprehend.

Heather Lynn Johnson:
Can you show me how, with a graph, every given has one prediction? What does that mean to you?

Student:
It would be on the y-axis. So, like, for each one, there would be just one answer.

Johnson:
Ah, and how is that different for a nonfunction?

Student:
Because for a nonfunction, the given...

Johnson:
When our students are able to communicate mathematically, not only are they able to engage in mathematical processes, but we're providing them with ways of communicating that are meaningful.

Student:
For every given, we would have one answer or prediction.

Jacob Foster:
Ultimately, mathematics is a way of thinking about the world and a way of solving problems that they should be able to apply flexibly.

Student:
180.

Student:
So it equals 90.

Student:
So what are you going to do with it?

Student:
What do you mean?

Lampert:
So what would reading math look like?

Kim Dinh:
Can we see a trend going on?

Student:
Most of the dots are going in a diagonal line, if you put it in a line.

Dinh:
Can you come up here and plot any possible points on my work here? Go for it.

Lampert:
There are lots of graphs and charts that are relevant to all of our lives that we need to be able to read, understand, comprehend.

Dinh:
So how would I know to shade below a line or above a line?

Student:
If it is less than, you shade below the line.

Dinh:
Okay.

Student:
And if it's greater than, you shade above the line.

Dinh:
So if it's greater than, you show above. And you see how, when I ask you guys to write a process, it shows a better level of understanding. How would you explain to someone how to graph linear inequalities?

Student:
First, I would say, graph the points. Like, in slope-intercept form.

Johnson:

When we think about literacy and helping students to be able to communicate meaningfully about something, it goes beyond just being able to say, "This is an example of a function," but also what something being a function might actually mean.

Student:
You would shade in the right or the left, depending on the line.

Lampert:
The Common Core assessments now not only ask students for answers, but why does that answer make sense?

Stephanie Brown:
The purpose of this assignment is that you guys are going to be working together to construct viable arguments, and you're going to be looking at the reasoning of other members in your group to produce a better, collective solution to those that you produced individually.

Student:
To find the area of the square, we must use the area formula A = b x h.

Student:
I didn't do that. I just kind of put, "the area of the triangle is not like..."

Lampert:
Research tells us that people are much more likely to remember something if they know what it means.

Student:
So you do 90 + 2z...

Student:
90 + 2z equals...? Oh.

Lampert:
The key to doing the kinds of things that the standards are asking math teachers to do now is that we begin to focus on meaning. This is about the meaning of the words around numbers.

Laura Mourino:
The information you gave her was not clear to her. What's a more useful word I could have used instead of saying "from 0 to 90"? What is she asking for? What direction?

Student:
Counter-clockwise.

Mourino:
Very good, counter-clockwise. That's why language is so important, okay? Let's be a little bit more specific. Excellent clarification, Vivian.

Lampert:
So, it's the teacher re-voicing in a more sophisticated language. Students learn how to write math by speaking math. And that speaking is scaffolded by the teacher.

Mourino:
Identify who your reader is.

Lampert:
One of the seven practices that is focused on in the Common Core is learning to be precise. One learns to be precise by being told, "I didn't quite get what you said." So then you have to go back and say, "How can I say it better?" And in that moment of reflection, you are learning the math itself.

Foster:
That's where they internalize the mathematics and apply it to particular contexts that are presented in the problem, and that's where mathematics becomes real for them in a learning sense, in an application sense.

Student:
I just multiplied five by ten and 25 by ten. And five by ten equals 50, and 25 by ten equals 250.

Foster:
Part of literacy in mathematics is being able to argue with each other about why you think this certain mathematical concept or this certain mathematical problem works out the way it does. And that process is really reflective of the ultimate goals as much as it is, "Do you know this particular mathematical concept?"

Student:
We always replace the x and the y...

Student:
Yeah, because they swap.

Student:
Why?

Student:
Because it's the inverse. Like, the log is basically the inverse of the exponential functions.

Student:
So we just, like, flip this?

Sheridan:
The y-1, you know, it drops down and then it's to the other side because you switch x and y, you know? Then you have log base-10 because you know that 10 is your base.

Lampert:
One of the most important things is restructuring the classroom discourse so that students know when they have the wrong answer. They don't need to ask the teacher.

Student:
But there's, like, a k, but that's different, yeah.

Student:
That's like a parabola.

Student:
And you were saying, then, Cara?

Cara:
Oh, I think it equals C.

Johnson:
Developing mathematical literacy is not just adding one more thing to our practice that's already full of so many things. It's not just having a definition and getting students to be able to say that definition, but to be able to connect that to something that's meaningful to them. So it's not something that's separate, but rather something that we can embed in what we're doing.

Mourino:
I kind of want to assess what information you have been able to synthesize and analyze and comprehend at this moment.

Lampert:
Math is something that everyone can figure out if they are treated like sense-makers rather than people who need to memorize stuff.

Derek Boyd:
Mm-hmm, so these angles match up because each of them have one line on them. And these ones match up also, because these have two. You're not going to mix them up. c is not going to be congruent to e. b is not going to be congruent to f, because this has one line through it and this one has two. You want to match them up. You want to match them up to everything.

Student:
Oh, okay, I get it now.

Lampert:
I think it has to do deeply with our democratic values that we treat students like people who can figure stuff out.

Student:
So you add all the numbers that's already in the quadrilateral? And then... so it's 360 minus 253, and that's 107. So it equals 107.

Boyd:
Yes, ma'am, yes, ma'am. So I have side ac is congruent to side...