READING WRITING IN THE DISCIPLINES

Creating Opportunities for Mathematical Discourse Video Transcript

Sarah Langer:
So we've been doing all of these questions about the graphs, right?

Student:
Yep.

Langer:
So you're going to now work in groups. You've been doing them mostly by yourself at your own pace. You're now going to work in a group, and you're going to choose one of these. There's six questions here.

For me, the largest part of math literacy is saying, "Here's a problem." And let's make sure it's engaging, and let's make sure it's not too hard or too easy. But then, "You have a lot of tools. What do you think?"

Student:
Start with this triangle, then...

Langer:
So as a group, read through these questions. You're going to make a poster that answers it, and a video explaining your work, okay?

Student:
So what question do you want to do? You want to do number one?

Student:
It seems...

Student:
Yeah.

Student:
All right.

Student:
Go.

Langer:
The way the project was set up over two days meant that the students could spend time first working together and using language and each other in discussion to really understand the question and the answer. Because they had done all of that group discussion, when they actually go to make the video and write what they're going to say, I think it'll be more clear, because they had that whole process of talking about it together first.

Student:
You can pick any one.

Langer:
Graph theory is the study of points and lines, which are called vertices and edges, and how they interact. There's, like, a whole bunch of questions that you can ask and answer.

Does it matter where you start on a circuit? So which ones of these are circuits? Start with that.

Student:
These are circuits. We'll put circuits over here.

Jayson:
One question that we picked was, does it matter where you start and finish on a Eulerian circuit? We said no, it does not matter. We got the shapes that were circuits, and we tested it out.

That's a path?

Student:
That's a path as well.

Student:
That's a path?

Student:
Yep.

Student:
Hold on. It can either be a path or neither.

Student:
I think it's a neither. Try again, do it again.

Jayson:
We outlined one diagram of how we can do it one way, and then we outlined another diagram of how we could do it a second way.

Langer:
Well, I had noticed that some of the groups did have the challenge of remembering which graph had Eulerian circuits.

Jayson:
Okay, so these are all circuits.

Langer:
Okay.

So I came over to Richard and Jayson and Christian's group, and they had four graphs, and one of them wasn't a circuit.

So I challenge one of your circuits.

Student:
Which one?

Langer:
You've got to figure it out.

And so I told them that I disagreed with one, but then had them figure out which one was not a circuit.

Are you convinced? Convince Jayson.

Student:
Dude.

Jayson:
Ms. Langer let us struggle at first, which is always good. Then she started giving hints, not to give us the answer, but a hint where we could start off from.

I started here and ended here. And my route to the finish line was, like, coming from here to here.

Student:
You ended at the same spot you started?

Jayson:
Yeah, so I...

Student:
No, I've got it.

Jayson:
So one, two...

Langer:
Do you want to try putting it in here, and I'll give you a marker?

Jayson:
Ms. Langer gave us a plastic thing to put the shapes in where we were able to draw in it and easily erase.

So we go here.

Also, one hint was for us to do it twice with different colors.

Langer:
Depending on the student and how they process information, colors can be really useful for keeping different solutions separate.

Student:
The Eulerian circuit is the one that starts and ends in the same place. So there's one, there's one, there's one. This one doesn't.

Langer:
So one group of four very quickly sort of got the answer to whether you can start anywhere on an Eulerian circuit. So there's a lot of way I deal with that. One is that if that one group that finished first really gets through the whole thing, they might go back and do a second problem. And I also had four people working together, but I wanted them to be in two groups. And so the second group that I had thought helped less with the first question, I pushed them to do a different question so that they would do more thinking.

Student:
If I start here, I'll go around. If I start here, I'll do the same.

Langer:
Okay, so now let somebody else show me about this one.

Student:
So say we start right here, right? We can't cross another line twice.

Langer:
Right.

Student:
So if I start here, one, two...

Student:
I do it like this.

Langer:
I am going to push you guys to think about the second one also. Do you think you could get stuck when you're going around?

Student:
Yeah, because when I first started I thought we didn't... you couldn't pass through the same point. So I got stuck because of that.

Langer:
Okay.

Student:
But now that I know that we can cross the same points, except in lines... I mean, there's a way you could get stuck there, because if you think that you can't go through the same points, you'll get stuck, I guess.

Langer:
Okay. So I'm going to have you guys do the first one, and I want you guys to do the second one. Because that was a cool way of explaining it.

Student:
All right.

Langer:
Okay?

Today there was a student who wanted to work alone. So my student teacher came over and checked in with him to make sure that he had someone to talk to, even if he was mostly going to complete the project by himself.

Student Teacher:
Okay, under, then up. Then you went around this here, back here.

Student:
I feel like I should go up, but then at the same time...

Student Teacher:
Want to try it?

Student:
I'm going to just go over there. One, two, three.

Jayson:
One way that it helped me understand it was talking about it, interacting.

Langer:
If you're going to say it out loud, it needs to make a little more sense than when you figure it out in your head.

So did you get stuck?

Student:
Yep.

Langer:
Okay, so now explain it.

Student:
When I was trying to do the inside, I couldn't, because I'd already passed by.

Langer:
Okay, so show it and write it. You guys feel like you're ready to do the poster?

Student:
Yeah.

Langer:
So the goal is that you'll be able to use it in the video.

Tomorrow they're really focusing on explaining and teaching. Before the students make the video, they need to make the poster to make sure that they have all the information, and the problem, and the answer, and the examples really set in stone before they start going in front of the video camera. When they actually go to make the video and write what they're going to say, I think it'll be more clear because they had that whole process of talking about it together first.

Student:
I would assume, like, for a circuit, each vertice must have at least an even number of edges connecting to it.

Jayson:
Yeah, right there.