

READING WRITING IN THE DISCIPLINES

Science Literacy: Reading and Writing Diagrams Video Transcript

Mike Viney:

If you look at your learning target up on the board, it says, "I can model and explain how the relative positions of the sun, Earth, and moon determine moon phases, eclipses, and tides. We'll probably not get to the tides today, but we will next time. This diagram... so, there's quite a bit here, so make sure that you're giving me your source..."

We start out our class by looking at a learning target that will help kids understand the skills that they're going to be trying to gain during that day. And then, I started out with a journal question to kind of activate that background knowledge.

We all need a common language with which to share our observations. What I need you to do is to activate that background knowledge from when we were studying from the CMAS test. In your interactive notebook, see if you can draw those eight diagrams that I have up there of the moon phases, and see if you can remember what they're called.

The interactive notebook is always central to my lessons. Students record their thinking in that notebook, they do drawings, they answer questions, keep track of some of the things that they were discovering during the lesson, and it's a way for me to establish their growth over the year.

So is there someone that would like to identify one of these phases? Carmen?

Carmen:

The one in the top left hand corner is a new moon.

Viney:

Yeah, that's the new moon.

Student:

One in from the right, it'll be a quarter moon.

Student:

Why is it called a first quarter when it's a half moon?

Viney:

That's a really good question. I think that you're going to be able to discover that as we go through this activity. I think that's an excellent question. Zeb.

Zeb:

One in from the bottom, would that be a last quarter?

Viney:

Bingo. Nice.

I wanted them to learn the relationship between the relative positions of the Earth, moon and sun to learn how those phases are created. I had a hands-on activity. It's called "Moon on a Stick." And I wanted just to make observations about what was happening with the phases during that time.

You take your moon on a stick. You're going to have it revolve around your head. Your head is the earth. And so your eyes are seeing what the moon phase looks like. And I want you to think about the moon phases that we just defined together and figure out what you're seeing as you revolve the moon, and really pay attention to where you're seeing the different phases.

Lauren:

The moon on a stick, that was really cool because you got to see the actual shading of the moon and how it would wane and wax. You would think that when you were looking at the light, it would be a full moon, but it's actually not. So when you're facing away from the light, the moon would have a full moon, and that was kind of interesting to see because that's not what I would have hypothesized.

Viney:

Sometimes it's really good to have another perspective. I'm going to have Jade use this large moon on a stick. First, can you show us a new moon?

By design, they came up with the idea that the moon's orbit must be tilted.

So, can you show us, where would it have to be a full moon?

One of my students who was demonstrating to the whole class, when she got that full moon position, there was this kind of a-ha moment of where that moon had to be relative to her head, which was the Earth, and the sun.

Is that a full moon?

Student:

Yeah.

Viney:

Show us the new moon again.

All of a sudden, she has some understanding of moon phases and the relative positions of the Earth, moon, and sun.

As you were rotating your moon around, did anyone notice at any one time how much of the moon was lit up no matter where it was?

Student:

Half of it?

Viney:

Half of it was always lit up. That'll be an important thing to consider. I want you to go ahead and see if you can draw up that orbit that Jade was showing us, new moon to full moon.

I wanted them to be able to critique diagrams that you often see on the internet and the book because I think that there's something that's misleading about them and I wanted my students to discover that. Hopefully they can see that when you're looking at diagrams and you're trying to figure out how to interpret them, that maybe you have to think a little bit deeper and figure out what is good about that diagram and what might be misleading or maybe even inaccurate.

Go ahead and grab your computers.

We looked at a website that's an excellent website but does have one of those misleading diagrams.

From what we've done with the moon on the stick activity, is there anyone that can tell me why I'm confused about this diagram?

Student:

Although on that diagram it looks like the Earth is blocking the moon, the moon is farther up, so the sun's ray's can still reach it.

Viney:

Ah, so you guys have figured out something that's really important.

Hopefully, they can see that when you're looking at diagrams and you're trying to figure out how to interpret them, you have to think a little bit deeper and figure out what is good about that diagram and what might be misleading or maybe even inaccurate, and to think about the value and the reliability of the source that they're using.

I've got this little diagram for you to go through and describe the moon phases. But then on the back side, you're going to draw your picture with the moon's orbited tilt and then you're going to start composing a rough draft of a letter to make some suggestions on how maybe they could change the diagram so that it would be less misleading.

Lauren:

But we already know that that's waning crescent right here. Two is waxing crescent.

Student:

Then we have to explain.

Student:

For one, there can only...

Student:

Since only half of it can be lit up... We see the dark side.

Student:

We see the dark side.

Viney:

We're trying to explain, why do we see a new moon when the moon is in that position? Ooh, I like this drawing a lot. So now I'll start composing a letter.

My students are doing a lot more writing than any of my students have done in the past. I'm going around the room constantly interacting with students and looking at their work and getting them to revise it and explain their thinking.

If you had to explain to someone why you see a new moon, how would you explain that to them? I want you to share your thinking around why this diagram might be educationally a better option.

I like to end my class with questions because I want them to carry the class with them after the lesson is over.

As you become an expert, you'll notice that when you look at books or you look at the internet, you find things that are misleading or just absolutely incorrect. So one question I have for you to contemplate: how would you approach diagrams differently in textbooks or on the internet? And then another question I have for you: why is it that we only ever see one side of the moon? And we'll see you next time.