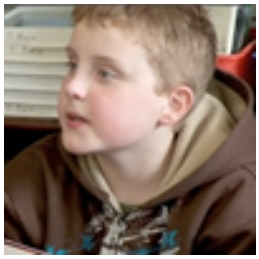
Talk Science

Professional Development



Transcript for Talk Strategies: Goal 3 – Deepen Their Reasoning

1. Deepen Their Reasoning

Notes

Asking for Evidence or Reasoning

Once students are willing to go public with their ideas, they often need to be pressed to cite evidence, dig into the data, or deepen their reasoning by taking into account what others have found. Many students will not do this spontaneously.

There are two families of moves that you can use to help students go deeper into their thinking. These are critical tools in helping students develop their scientific reasoning, with data and models, as evidence to support their claims.

The first move might be called the "**Why do you think that?"** move. Some people call it **"press for reasoning."** There are many, many ways to say this, but all involve probing for evidence, data, or reasoning, by asking:

> "Why do you think that?" "What's your evidence?" "How did you arrive at that explanation?" "Where in the data, do you see evidence for that claim?"

Classroom Video Example 1:

Julisa: I think the water would go up, I think the water would go up.

Teacher: Okay, why?

Julisa: Because um you threw the rock in there and the rock, the rock is going to make the water go up.

Teacher: Why is the rock going to make the water go up?

Classroom Video Example 2:

Student: I think the volume in the water, the cup, will decrease when the water freezes.

Teacher: OK. The volume will decrease as ice? Does that sound like what you are trying to say?

Student: Yeah.

Teacher: Why, though. So we're looking for your claim, and we're going to be looking at this at the end. But also for you to state why. What's your reasoning behind that? So, why did you say you think the volume will decrease?

Student: Because like uh [pause] because like uh [pause] because the solids are like heavier than the liquids.

Classroom Video Example 3:

Student: … water rise.

Teacher: So this group found that it was the volume. What was it about your observations that showed you it was the volume, and not weight? Because you had a different idea than Kyle? How did you **know** it was volume?

Classroom Video Example 4:

Teacher: OK, and Johnny, can you give us some ideas about why you made that claim?

Student: Because um…

Classroom Video Example 5:

Student: …the volume.

Teacher: And how did you figure that you?

Student: Because when you put the um plasticine--plasticine in the water couldn't go nowhere so it—it just rised it up.

Classroom Video Example 6:

Teacher: Do you have some different ideas about what earth materials are? Are there some things up here that need to come off?

Student: Grass.

Teacher: Grass. Why?

Student: Because it's not an earth mat—I mean, yeah um because it's not an earth material.

Teacher: Why? Can you explain why?

Student: Um because it's not like something like gravel or soil…

Challenge or Counterexample

A second way that you can press students to dig deeper is by providing a challenge or counterexample, or tossing back their own question to them:

> "Does it always work that way?" "How does that idea square with Sonia's example?" or "What about Greg's data? Doesn't that contradict your claim?" or "That's a good question. What do you think?"

You can also use a hypothetical example as a challenge.

Notes

"What if we had used the copper block instead? Would it still work the same way?"

The point of a challenge or counterexample, as in playing devil's advocate, is not to tell students that they are wrong, and get them to change their mind. Rather, it's to help them dig deeper, think harder, and complexify their thinking. In the following clips, you'll see different teachers pressing their students to go deeper, using a variety of these moves.

Classroom Video Example 7:

Teacher: OK, now when you said it's still, if I look at these two containers right now, both of those liquids look still to me. Neither of them are moving. So can you kind of expand a little bit more on what you meant when you said one is still and the other isn't.

Student: What I mean is that if you shook the water…

Classroom Video Example 8:

Student: …because the water and mineral oil, they're almost the same except um two grams away.

Teacher: But is almost the same exactly the same?

Student: [pause] Almost.

Classroom Video Example 9:

Teacher: What do you think Lucas?

Lucas: Well, I'm kind of confused about the sandstone, well some of the investigation. How are we supposed to find out—how are we supposed to find out how many—if it had to do with the volume?

Teacher: [Turning the question back to the group] Who-who can answer that question? How can we figure out if it had to do with the volume or weight?

Notes