Talk Science

Professional Development

Transcript for Grade 5 Classroom Case: A Consolidation Discussion

1. What Happens in a Consolidation Discussion?

The purpose of a Consolidation Discussion is to help students solidify their understanding of all the parts of an investigation and the underlying science concepts. Whether an investigation takes one day or thirty, students need time to organize their experiences and ideas so they are able to describe what they did, why they did it, and what they found out. When an investigation extends over many weeks, consolidating learning that's accrued over time becomes especially important. In a consolidation discussion, students find out what's clear and what isn't and the teacher gains insight into her students' progress towards the learning goals. Ideas that are shared publically can be challenged, clarified, and revised.

In this classroom case, students are wrapping up a mini-lake investigation that's been in progress for over a month. They have weighed their mini-lakes several times weekly and recorded their measurements in a data table and on a coordinate graph. They also recorded observations. For example, was the cover of the mini-lake on or off? When did we add salt? What about changes in the water level and the reappearance of salt as the water disappeared? Meanwhile, students completed 16 other investigations of water and its transformations. For example, dissolving, freezing, melting, evaporating, and condensing. These processes are relevant to understanding any changes in the mini-lake.

In the next clip you'll see a class start to consolidate learning by using a change over time graph to tell the story of their mini-lake investigation. The teacher, Colleen, models the interpretation of a sample graph plus annotations. She then provides time for students to annotate their own individual graphs.

In Clip 3 we see the class wrap up their small group work and resume their consolidation discussion. As they talk, listen for evidence that students can connect the actual macroscopic changes in their mini-lakes to the abstract representation, the line graph.

Later students will discuss annotations that explain transformations in the mini-lakes in terms of particles. In the process, they will consolidate learning about processes they can't observe directly, such as dissolving and evaporation.

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2. Consolidating Learning by Interpreting a Graph

Learning science includes learning new skills, new ideas, new language, new scientific habits of mind. We can expect that students are sometimes confused or lose track of what they set out to accomplish.

In this case, students will consolidate learning by using changes in weight to tell the story of transformations of matter in their mini-lake investigations. As they construct the story, students must be able to explain what they did, why they did it, and what they found out. To do this, they annotate a line graph representing changes in weight over time. Interpreting line graphs and annotating are still somewhat new skills for these students, so Colleen illustrates these processes. To prepare for discussion, students, working in pairs, will help each other annotate their individual graphs.

Teacher: This is our main question: What is the story behind this graph? Now this graph might not look like your graph. This is just a typical graph, okay? - that could have been on somebody's page 6, maybe not yours. Okay. We're trying to figure out what kind of story does this graph tell. All right? Are you ready? Who can start the story? Let's start here. Do you want to start at the beginning, this point. This is on what day?

All: One.

Teacher: Day one. What do you think is going on at this point? What story does it tell?

Text on screen:

Using the graph, students try to describe changes in a mini-lake system over time.

This prepares them to annotate their own graphs

Teacher: What you want to do is, you want to go back just like this, it looks like this, you have yours. Can I borrow yours?

You want to be looking at your graph and your line that you have here and labeling the different parts. What's happening as this line is staying straight right here? What does it mean that the line went zoop, straight up, right on the line, right on the day? What does that mean? What does it mean that then the line sort of bounces up and down just a little, but it's kind of the same? And what does it mean if the line drops dramatically? What are those things representing? What is the story – are you with me Joshua? – that happened with your mini-lake? Didn't your mini-lake go through some changes?

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There is a story there. How is it represented on the graph? Are you ready to do this?

Text on final screen:

To help consolidate learning, students with others

- Review steps in an investigation
- Interpret and explain results

3. Consolidating Understanding

In pairs, looking at data in their notebooks, students discuss what they think the graph tells them about changes in their mini-lakes. They are also beginning to consolidate their learning about closed and open mini-lake systems and transformations of water.

When students have a few minutes to prepare for discussion – either in small groups or turn-and-talk/partner conversations – more students join the conversation and the quality of student discussion and debate improves.

[In small groups, students discuss how to annotate their graphs.]

Teacher: We're going to come back to the rug for some brilliant discussion by yourselves, yours truly. Please come back to the rug with your annotated graph open on page 6. Let's go.

Ok, ready? Can we annotate a few more of these points, or would you like to add any to the story here?

Student: I think that when it goes up, I think that's when it goes up, I think that's where it, the, you add the salt.

Teacher: Be specific. When it goes up on day …?

Student: Nine.

Teacher: Eight, here?

Student: Eight.

Teacher: Right here?

Student: Yeah.

Teacher: So you want me to mark this right here as adding …

Student: 20 grams of salt.

Teacher: Adding…

Notes

Student: Salt.

Teacher: Adding 20 grams of salt. Okay.

Michael: When it dropped down I think like before it all dropped down, I think that's a day we took off …

Teacher: This piece?

Michael: Yes.

Teacher: Right here at this point?

Michael: Yes.

Teacher: Oooh, oooh, Tell me.

Michael: That's when we, um, took the cap off, and then it slowly evaporated and the weight went down, down, down.

Teacher: Took off cover.

Michael: And when it stayed the same, that means like it stayed the same

Teacher: Oh, you're getting too far ahead of me. I was just looking for someone to add to "took off the cover."

Johan: I think Michael forgot a part. Like when it's going, when it's decreasing down, I think he meant to say that the water is evaporating.

Teacher: Yes, before you got here, we definitely need to label this part, and we need to say something, and Michael is saying something, and Johan's saying something. I was hoping someone would add something to "took off the cover."

Kyle: I was going to say when we took off the cover it was an open system.

Teacher: Okay. Took off cover. Open-

Student: Which caused the water to evaporate.

Teacher: System. Now tackle this part. What's the story here? So Michael said something.

Julia: I have something to say. Were you looking for someone to say something about particles?

Teacher: Not yet. Pink is for particles. We're getting there. Go ahead.

Johan: The water, it evaporated when it was moving down.

Notes

Teacher: The water is evaporating. Do you think that adequately describes it?

John: I think that at the end where it's just a straight line, I think that's the part where it's all done evaporating and there's no more water left.

Teacher: We could add more details to this. Remember an annotated drawing and annotated graph is incredibly detailed. Incredibly detailed.

Kayla: Can you repeat yourself?

Teacher: Yes. Can you repeat yourself?

John: I think the last part where it's just a straight line, I think that's where all the water evaporated and there's no more water left.

Michael: It also stayed the same because we also never add anything. We never added anything, and also like –

Johan: I was going to add onto what Michael was saying. I think he's trying to say that, when the line was just moving along the way, staying the same, is because we put the cap back on. And it was now a closed system. And nothing got in and nothing got out, which made it stay the same.

Teacher: Here?

Johan: Yes.

JD: I respectfully disagree. Because if we look over there, none of them have like an open, none of them still have the cap on. So it's probably just because, like the air, I mean, well, not the air, but like it's just that like when Day 4 evaporated, the, it would just like stay the same because we don't add anything. And we just don't add anything.

Johan: That was what I was trying to say.

Kyle: I wasn't to say that I've noticed with all the lakes that the reason, like after we put in the salt and the we made the mini-lake an open system, and we took off the top, I think that like at first, I didn't know why it was so dry, but then I thought about it and then I said, "Where's the water?" And then I thought that maybe the water evaporated, and when the salt dissolved inside the water, it didn't really dissolve, it just sunk to the bottom, and that's why now when it's dried up it's still there. The salt's still there.

Michael: I was going to say, like, something that kind of deals like both before and after that I noticed. Well,

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when the water was not evaporated, you couldn't see the salt.

Teacher: Here?

Michael: Yes. And then when it went down there, you could see the salt that was, like, stuck to the rock.

Teacher: Where on the graph could you see the salt stuck to the rock?

Michael: There, that straight line.

Teacher: This straight line. Very good.

Lorie: I actually disagree with Kayla when she says that the salt didn't dissolve. I think it did dissolve, like when we did the bottle system, when we saw that all the food coloring, it was mixed into the water, but then when the water evaporated, the um, the food coloring stayed there. So I think that happened to the rocks too, I mean to the salt. Because when we mixed it in, then it was dissolved into there. But when after the water started evaporating, it probably pushed all the salt out so it just stayed there, and then just stayed there, and the water evaporated.

Text on final screen:

Consolidation Discussions can be framed by 3 questions

- What did we do?
- Why did we do it?
- What did we find out?