

DOINGWHATWORKS



Presentation

FULL DETAILS AND TRANSCRIPT

Cupcake Geology: Using Models to Explain Abstract Concepts

Chamberlin Hill Intermediate School, Ohio • May 2008

Topic: How to Organize Your Teaching

Practice: Abstract-Concrete Connections

Highlights

- Wickerham’s lesson on core sampling helps students understand principles of earth science through hands-on activities.
- Models can be used in the classroom to help students learn about abstract ideas like the concept of geologic time.
- It is important that teachers help students learn to identify both the strengths and limitations of models—where the abstract and concrete representations have shared components and where they are different.

About the Site

Chamberlin Hill Intermediate School

Findlay, Ohio

Demographics

89% White

6% Multiracial

32% Free or Reduced-price Lunch

25% Special Education/Disabled

Fifth grade teacher Deb Wickerham makes connections between abstract ideas and concrete situations by using models to help her students understand earth science, life science, and physical science. These models, built with ordinary materials, help students to understand abstract concepts by:

- Providing contexts for students to explore and understand key concepts in science
- Giving students opportunities to see and articulate the connections between the abstract and concrete representations
- Helping students also to see the limitations of a particular model

Full Transcript

Slide #1

Welcome to Cupcake Geology: Using Models to Explain Abstract Concepts

Slide #2

My name is Deb Wickerham. I teach 5th grade at Chamberlin Hill in Findlay, Ohio.

Slide #3

Today in the lab we are going to be looking at the layers of the earth and how to take core samples using various different food items as models.

Slide #4

The goal for my lesson is to teach the children how scientists use models to understand concepts that are very abstract.

Slide #5

By using concrete items it's easier for them to understand the earth's layers, what the core samples show us, and how these layers from the soil samples are able to change or what causes them to change over various times.

Slide #6

In this lesson I will be using a hard-boiled egg, three different types of candy bars, and cupcakes that have been created so that there are different colorings in them.

Slide #7

The materials I use are very easy to get, but it enables them to see the layers of the earth. It enables them to see what a soil scientist does as he or she takes the soil sample. But it also makes them think about what these soil samples tell the scientist.

Slide #8

Are there layers? What order are the layers in? What has caused those layers to form? And it can also talk about the earth processes that can change the layers,

Slide #9

what causes them to be lifted or—earthquakes, volcanoes, mountain building, or even man changing things.

Slide #10

They can read about it in a book, but to actually take the core samples, it helps them visualize what they are seeing and lets them internalize the concept.

Slide #11

The students need to predict what they think they'll see and then actually do the core samplings and make drawings and record what they see. Then following that have them make a prediction of what the cupcake would be if it were cut in a cross-section, and then they compare the results.

Slide #12

When we get to the candy bar geology, that—in an essence—is a practice to show them how to take a core sample, how to look at layers coming out of the different candy bars, and that leads right into the cupcake geology.

Slide #13

Geologic history is very abstract for 5th graders, so during this lesson the students are able to be reinforced with the concept that there are layers to the earth, and they can visually see them using the hard-boiled egg. But it also helps them understand and reinforce the idea that usually the lower layers are the older layers and that as time goes on the layers build upon themselves.

Slide #14

Models are very important in teaching science to—especially—elementary children. Those abstract concepts are hard for them to understand and internalize.

Slide #15

But as a teacher, I need to teach them what limitations are, how that model is not exactly the way it is truly out in nature and inside the earth. So we need to talk about the word limitation and what it means.

Slide #16

Then, we need to ask them what are the limitations? I use a chart on the board or on an overhead and have the children list what is correct about the model and then on the other side, what are the limitations, what are not exactly correct and what need to be understood that are a little different in the real earth.

Slide #17

For example, with the hard-boiled egg and the earth's layers, yes it shows the shell as the crust, the white part as the mantle and the yellow yolk as the core.

Slide #18

But some of the limitations are the shape of the egg, the size of the different layers in proportion to what they really are, coloring. And so the children would be able to look at the egg, tell me how it works to show the earth layers, but they will also tell me the limitations that come with it.

Slide #19

In this lesson, I have noticed that the students' learning of the concept—the scientific concepts presented was easier for them to understand. They could see it while they were doing it.

Slide #20

I am using familiar objects that are easy for them to understand but also easy for them to relate to what are in the real core samples. They enjoy it. They have longer retention with a better understanding, and I have noticed that they do better on classroom and state achievement tests.

Slide #22

To learn more about using models to explain abstract concepts, please see the additional materials on the Doing What Works website.