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Lesson Science Analysis and Adaptation

“What is the Temperature?” is a lesson plans that is listed as a Supplemental Resource on the Hillsborough County Curriculum Map for 3rd grade. This lesson was published in AIMS: Primary Physics, which is a resource that I’ve often seen recommended because of its engaging and thorough lessons. As popular it they may be, however, it is still important to be sure that even well respected lesson plan resources are providing accurate and complete scientific content, allowing students to use and fine-tune their science process skills, and expose children to the true nature of science.

Science Content

The science content topic of this lesson is on reading thermometers to find temperature. This concept fits within the “big idea” of properties of matter, and the lesson’s purpose is to instruct students on how to use the thermometer so they will be able to apply their skills and understanding to measure and compare temperatures of solids and liquids.

I believe that this lesson is appropriate for third grade as it meets the standard without going too-deep or too-shallow with the content. The information in this lesson is consistent with the Wenhams & Ovens course textbook. Within the lesson plan, there is section of background information to help the teacher understand how thermometers work (mercury or alcohol within the tube expanding and contracting) as well as what is

actually being measured when taking a temperature (the average, random translational kinetic energy of the molecule of a substance). Though this information is not required for the students to know, I feel it is important to include so the teacher is supported by an accurate foundation of content throughout the activity; this helps prevent him/her from inadvertently instilling misconceptions in the students. Overall, I believe that the science content of “What is the Temperature” is complete and accurate.

Science Process Skills

With the organization of this plan, it is clear to see the process skills this lesson aims to achieve. The skills students are using include: observing, collecting and recording data, interpreting data, comparing and contrasting, and communicating. As the students change the situation of the thermometer, they observe how the liquid inside the thermometer changes and record this data in the units of degrees.

At the end of the activity, students have a class discussion to communicate their results and discoveries. It is during this discussion that students are about to compare their results, come up with explanations for the changes in temperature from one situation to another, as well as apply their understanding to hypothetical scenarios. Students justify why knowing what temperature is and how to measure it with a thermometer is important in the world around us.

I believe that students are really doing science in this lesson because they are able to make sense of how a tool (thermometer) is used to observe the property of temperature as opposed to simply being told upfront. Though this is a generally strong lesson, it could be adjusted to be more inquiry-based if the students were given the chance to observe and

record the temperature of anywhere (within reason) in the classroom as opposed to being limited to the three pre-selected areas (inside room, outside room, inside fist).

The Nature of Science

This particular lesson lends itself most obviously to the idea that science demands evidence. By using the data they observed, recorded, and interpreted to inform their discussion, they are able to support their understand with evidence from the activity. Though the lesson does cover this NOS standard, adjustments could be made to the lesson in order to incorporate more.

Lesson Modifications

To increase student learning with this lesson, my recommendations are not necessarily specific to particular procedures, but address the lesson as a whole. First, as I had mentioned before, this activity would benefit from being more inquiry-based. As stated by Thomas Shiland in *Decookbook It!*: “By having students modify traditional activities, it is possible to introduce them to the principles of experimental design.” Students could generate the questions or situations that they want to explore to find the temperature, therefore their data becomes more meaningful.

Something that goes hand-in-hand with the inquiry process would be establishing an explicit connection to a specific science field. By asking, “what questions would a scientist have about this?” the stage is set to bring purpose to the content and skills. In the original lesson plan, the discussion briefly mentions the importance of thermometers in our daily lives (the Weather Bureau, farmers, airlines) but I think these connections could

be elaborated on more in order to solidify that the students are DOING the work of scientists.

Something that seems to be absent from this lesson is a diagnostic assessment. Though many students by third grade have prior experience and/or background knowledge on temperature or thermometers, there is not an opportunity in the original lesson plan to elicit these ideas. An example of something I might do to engage my students' think would be to tell them a personal story that involves a change of temperatures (running a fever while sick, dressing for warm and cool seasons, baking, etc.) and then ask them to think-pair-share their experiences or connections in order to assess how much they understand already about what temperature measures and what tool to use.

Finally, though the lesson adequately enforces that science demands evidence, I think that the nature of science could be more fully represented if the adjustments mentioned above are executed. By moving towards a more open inquiry, probing students to think and conduct science as scientists do, and eliciting their thinking along the way, then the NOS standard "science is a complex social activity" will emerge authentically. The explain phase of the 5 Es is what separates an "activity" from a "lesson", and allowing students to discuss and share their ideas is the best way to make the most of the content that has been uncovered in the investigation.

Resources

Shiland, T. (1997, November/December). Decookbook it!. *Foundations for Children*.

AIMS Education Foundation (1994). What is the temperature? In *Primary physics: Investigations in sound, light, and heat energy*.