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Student Experience 05: The Candle

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The “Candle”

When

Prior to the expedition

Discipline

Science observation skills

Description

Sometimes objects turn out to be something other than what we think we are observing. Learning to make careful observations provide the basis for students to engage in further observations of objects that are both familiar and unfamiliar. In this lesson, students make observations while the teacher manipulates an object that appears to be a candle. This leads to the exploration of the differences between observations and inferences.

Learner Outcomes

The student will:

- Identify characteristics of scientific observation.
- Explore the differences between observations and inferences.
- Recognize the impacts – positive and negative – of prior knowledge on observations.

Materials

- Large uncooked potato, turnip, or mozzarella string cheese
- Salt or lemon water and a seal-able container
- Paper towels to dry off potato
- Almond slivers (slightly burnt on one end to simulate a burnt wick)
- Matches/lighter
- A taper candle holder (the silver-plated adds a nice touch!)
- A real white or off-white colored candle placed in the candle holder 48-72 hours prior to the lesson, in a prominent location in the classroom

Background

Observation is a critical tool used in scientific inquiry. However as humans, we are programmed to quickly turn our observations into **inferences**. This particular adaptation is very useful in everyday life. For example, seeing a yellow stoplight, leads to the inference that it will soon turn red. One does not have to wait and observe the change to infer that it will happen. We also infer that cars coming to stop signs will stop and we can proceed safely through a crosswalk.

Making inference can get in the way of making objective observations. The following activity can be used in many ways, but for the purposes of this curriculum it is used to demonstrate how we can be “fooled” by our inference-making abilities.



Suggested Procedure

The teacher will:

BEFORE class:

The potato needs to be “carved” into a taper candle shape. I use an apple peeler-slicer like the one pictured here:



Image from: <http://www.preserveshop.co.uk/images/apple-peeler-and-corer.jpg>

Your “candle” will have ridges on it that can be easily smoothed off with a peeler.

You can also use a knife and peeler to carve it into the correct shape. It takes a little longer and some practice! It should be carved in the morning and then stored in salt or lemon water until you need to use it. (It is a good idea to make an extra one, in case one of them gets too many dark spots during the day.)

The almond slivers should be burned ahead of time and stored in a baggie with the paper towels. Cut a slit at the top of the potato with a knife so it slides in easily. The paper towels can be used to wipe water off the “candle” during set up, away from the students’ view. A mozzarella string cheese stick may also be used instead of a potato. The less expensive brands work best, as they contain less moisture and are firmer.

It is best to try this out ahead of time. Make sure the “candle” fits in the candle holder. Practice lighting the almond sliver to see how it burns. Practice eating the “candle”. Practice will ensure the demonstration looks realistic and runs smoothly.

DURING class:

- 1.** Instruct students take out a piece of paper and number it from 1-3 leaving 4-5 lines between the numbers. With lights a little dim and no one looking very closely, you set the “candle” in the holder in the front and ask your students to write 3-5 observations about the two objects you have placed in front of them at #1 on their papers. Be sure to NOT call it a candle. If the students ask, “Do you mean the candle?” you may reply that you want them to take observations about the object(s) in front of them (The “candle” is one object, the holder is the second. Sometimes this needs to be clarified. Do so by pointing to them, but continue to call them “objects”). There are often a few children who want a closer look. Students should be discouraged from getting up to see the “candle” better.
- 2.** After a few moments, ask the students to write down (at #2) 3-5 more observations as you “do something” to one of the objects. This is when you light the almond sliver. It will burn for about 30-45 seconds, so you will need them to write their observations fairly quickly. Make sure everyone is looking for the final step – you must hold up the holder, blow out the “candle” and then immediately take a bite out of it. The almond sliver will be hot! To prevent a burnt tongue, make sure there is plenty of saliva in your mouth before biting into the “candle”. For additional drama, walk around the room chewing on it, acting as though it tastes really good.
- 3.** There is always great excitement at this part. Try not to burst out laughing! Have students write down 3-5 more observations at #3 on their papers, after they calm down.

Student Experience LESSON: The Candle

- Next, lead a discussion. Ask the students about their first set of observations. Any students who have described the objects with specific names like candle and candle holder have made inferences, those who have choose words like “cylindrical”, “off-white”, “about X inches tall” have made observations. It is important that students are not chastised for making inferences. The key is that they will be able to identify the differences between inferences and observations.

One strategy that could be used to make this more visual is to make and fill in a 3-part T-chart with quantitative and qualitative observations on in the first two parts and inferences in the third spot. There will most likely be few quantitative observations and many qualitative observations and inferences.

- Other discussions that follow could revolve around questions such as the following:
 - What do you think I (as the teacher) wanted you to get out of this activity? (*It is best if you have this secure in your own mind before you begin the activity. However, you should also be open to their suggestions; they may surprise you with their perceptions.*)
 - If we were only making observations, what would they be (*brainstorm*)?
 - What do you think the “candle” or object was made of?

Think-Pair-Share is a good strategy to use for the discussion portion of this activity. It allows students who might not volunteer their thoughts to the whole group to have them come up in the sharing part of the discussion.

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For older (7th grade and up) students:

- What do you think the following quote means:
“Recognition is perception arrested.”
–John Dewey
- How does it apply to this activity?

Final notes:

The students will naturally want to know what the “candle” was made of. They often will guess apple, cheese, and sometimes potato. You will need to decide whether or not to tell them – at that time, later, or ever. If you have to do this with more than one group, the first group(s) should be sworn to secrecy, and reminded that knowing that it is not a candle will ruin the effect for future groups. Surprisingly, in our experience, students will be careful not to tell the other students because they do not want to spoil the surprise.

