

SCIENTIFIC OBSERVATIONS IN THE CLASSROOM

My version of "Sewer Lice" a common laboratory demonstration

J. Flint, Granada Hills High School/CSUN Math, Science and Technology Magnet School

Frequently students have difficulty describing a scientific observation without influencing the reader with their own opinion. Usually the difficulty is a lack of understanding of the difference between observation and hypothesis. Phrases such as "I think it is..." and "it looks like..." can be construed as hypothesis rather than observation. This simple demonstration, seen many times in many sources, can be altered and enhanced to illustrate the importance of making clear concise scientific observations without slanting the reader's perspective.

Materials:

Tall glass demonstration cylinder and beaker, 7-up (other sodas are not as effective), raisins, lab tongs, large bucket, water, dirt and a few leaves. (an optional piece of parafilm to cover the mouth of the cylinder.)

Preparation:

Just before the demonstration put soda in glassware and add 5-6 raisins. Have a bucket ready with water, a handful of dirt and leaves and 10 or so raisins thrown in for effect. Place the bucket directly next to the demonstration cylinder. (My students practically have to straddle the bucket to observe the demonstration.) It is also important to dress appropriately for a serious scientific experiment with impressive lab equipment and tools easily viewed within the observation area. (In other words, set the scene for credibility.)

Demonstration:

Discuss the difference between observation and hypothesis. Ask the students to make a scientific observation, and write a short paragraph describing what they observed in the demonstration. Allow the students up to the demonstration area in small groups of 3. Stress the importance of not discussing what they observe with anyone. They must form their own opinion and wording as to what they are seeing. No conversation may take place. Upon completion of the students' written observations, give a moment to have a few students read aloud their observations and consolidate each unique observation for the class to see on an overhead projector. Do not acknowledge the correctness or error in their observation. Take the bucket with water, raisins and leaves and circulate through the classroom asking each student to take a good look into the bucket. It is very important that you make sure each and every student looks into the bucket.

Explain that (*your own story here...this is mine*) this morning on the way to school that you stopped off at the Sepulveda Dam Basin on Burbank Boulevard, down by the bridge and walked down to the creek. There you noticed these funny brown things along the water's edge. Interestingly, when you went back and crossed over to the other side, you observed that wherever there were lots of these brown things there was no algae however where they were absent there was a tremendous amount of yellow-green algae. Express the possibility that these things may be alive, that perhaps they actually consume algae. What if these things could actually be used to control algae growth without the use of harmful chemicals that eventually enter and pollute our water supply? Who knows, maybe these little guys could be used in our swimming pools to combat the growth of algae. Obviously, studies need to be made. The really interesting thing is that if you look at these things up close... (*at this time take a pair of (new) lab tongs and very dramatically attempt to capture one of the raisins... walk over to the nearest student and begin to show it to the student close up.*) Yes, the really interesting thing is that if you look very closely that...(*just as he or she begins to look very closely and you observe the other students begin to crane their necks, pop the raisin into your mouth and chew it up*) Hey, these things are edible! (*I've never failed to gross them out.*) Then survey your audience. With a surprised look on your face, ask them what seems to be the problem (*all the while still chewing*). Conclude with "What is the matter? It's only a raisin in 7-up!" Follow the groans and responses with a complete explanation and discussion of what has just occurred and what they need to remember when making a scientific observation as well as a full description of the scientific concept observable in the demonstration cylinder.

It has been my experience that through story telling the students generally are caught off guard and I am able to completely change their perspective and mind set as to what they had originally viewed. In fact, I have been able to alter their perception even though they not only smelled the 7-Up, felt the sticky table top and declared it was soda and raisins in their writing, but then believed me when I suggested they were alive and told them "the story."

The point of this demonstration is to illustrate to the students the ease in which one's perspective can be altered through suggestion, the obligation of a scientist to keep an open mind when reporting an observation and the important difference between observation and hypothesis. One must not slant the reader's perspective as I did by "telling the story."

Explanation:

As the carbon dioxide bubbles out of the soda pop solution, the bubbles are trapped in the folds and grooves of the raisins and buoys up the raisin to the surface, the bubbles pop and the raisin drops to the bottom of the solution. In terms of density, the attached bubbles increase the effective volume of the raisin by displacing the solution without increasing its mass, thus decreasing it's effective density. It becomes less dense than the solution and therefore rises to the top. Once the bubbles pop, the raisin returns to it's actual density and drops to the bottom due as its density is greater than that of the solution. Density = Mass/Volume