Project Focus
Best Lesson Plan
6th Grade

Title of Lesson: The Mysterious Milk Experiment
Theme: Investigating Scientific Method
Georgia Standards Covered: S6CS1, S6CS2

Enduring Standards (objectives of activity):

1. Habits of Mind
    A. Asks questions ✓
    B. Uses numbers to quantify
    C. Works in a group ✓
2. Uses tools to measure and view
3. Looks at how parts of things are needed
4. Describes and compares using physical attributes ✓
5. Observes using senses ✓
6. Draws and describes observations ✓

Content (key terms and topics covered):

- Formulating a question
- Formulating a hypothesis
- Understanding variables
- Collecting/Observing Data
- Analyzing Results
- Formulating a conclusion
- Understanding surface tension

Learning Activity:

- Abstract: Students investigate the scientific method through an experiment involving how different types of milk are affected by soap molecules.
- Details:
    - Introduce the lab activity and the general precautions of the experiment.
    - Come up with a reasonable question for the experiment with the class. For example, the question could be, "What will happen to the different types of milk when a drop of soap is added to the center?"
    - Allow the class to formulate a hypothesis.
    - Allow the class to perform the experiment with the following procedures:
        1. Fill the container with room temperature milk (both fat-free milk and whole milk)—1/2 inch
        2. Let milk settle—**do not disturb it**
        3. Very carefully-put 2 drops of each color of food coloring on opposite areas of the dish
        4. Write an observation
        5. Put 2 drops of liquid soap into the center of the dish. **Make sure dropper does not touch the milk.**
        6. Observe the dish for 1-3 minutes
        7. Write another observation

- After performing the experiment, allow some discussion time about what happened during the experiment.
- Lead them towards formulating a conclusion. Explain in detail about what happened. The reason why the food coloring continued to spread when soap was added to the whole milk was because the soap reduced the surface tension of the milk by dissolving the fat molecules.
- After explaining the factors that played part in the experiment, ask the class what would happen if some of the variables were changed in the experiment. For example, "What would happen if we used a different type of milk, such as chocolate milk?"

Materials Needed:

- Fat-free milk
- Whole milk
- Food coloring (at least 2 different colors)
- Shallow Containers
- Dish soap
- Pipettes

Safety Issues:

- Make sure they do not consume any of the materials that are used in lab, especially the milk. The milk has been sitting out for many hours to ensure proper temperature.

Notes and Tips (suggested changes, alternative methods, cautions):

- Make sure to explain the different steps of the scientific method.
- Make sure to emphasize that the milk needs to be kept still and that the pipette used to transfer the soap should not touch the milk.
- Try using different types of milk other than fat-free milk and whole milk. I repeated the experiment again with chocolate milk, and the kids were excited to see the difference.
- Give each group an opportunity to answer questions.
- Students had the misconception that the food coloring was moving and not the fat molecules. Therefore, make sure that you correct this common misconception.
- Fat-free milk also caused the food coloring to spread; however, explain that the fat molecules are continuously moving in the whole milk, while the motion eventually stops relatively quickly in the fat-free milk.

References:

- http://www.coolscience.org/CoolScience/KidScientists/tiedyemilk.htm