Evaluate Simple Procedure/Evaluate observations and Measurements
4th Grade
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References:

“Evaluating Observations and Measurements” by Megan Miller.

Benchmark:

Columbus Public Schools’ 4th Grade SLC #6 and SLC #8

Objectives:

Students will design and conduct experiments, identifying the constants and variables. This will help the students interpret results from observations and measurements.

Materials:

- 2 flashlights with detachable bulbs
- Science journals
- Fresh batteries

Initial Demonstration:

The class should spend a few minutes brainstorming a working order for scientific procedures in an experiment (i.e. observe, hypothesis, data collection/test, analyze, conclusions). The demonstrator should list these items on the board. The students should also record them in their notebooks under the title scientific procedure.

Target Observation:

- A good experiment is not just a test, but the designing of the test, collection of data, and making conclusions.

Target Model:

- The scientific method should be employed when doing a scientific experiment.
- The scientific method consists of making initial observations, coming up with a hypothesis, collecting data, analyzing the data, and reaching conclusions.
Procedure:

The demonstrator will help create a scientific procedure for testing battery charge. The students will be shown a flashlight with batteries (the bulb should be unscrewed so that the flashlight does not work). The students will be asked to hypothesize why the flashlight is not working.

Target Observation:

- The flashlight is not working.

Target Revised Model:

- The batteries are dead - this is our hypothesis.
- We can check to see if this is true by putting in new batteries.
- After the new batteries are put in, the flashlight should work.

Procedure 2:

The demonstrator will lead the class in determining how to test for battery charge. The class should list and identify the constants variables in their notebooks (same flashlight, being turned on in the same way, etc.). Eventually the demonstrator should put new batteries into the flashlight, and it still will not work. The students should perform analysis, and come up with conclusions. The discussion may include other possible reasons for it not working (i.e. the bulb).

Target Observation:

- The flashlight is not working, even after a battery change.
- Something else is wrong with the flashlight (bulb).

Target Revised Model:

- By using the scientific method and properly identifying the variables in our experiment, we were able to solve why the flashlight was not working.

Procedure 3:

Ask the students if it would have been fair to take out two of the “dead” batteries and put in only one of the “fresh” batteries. Why or why not? Would it have been fair to test the old batteries with one flashlight and the new batteries in another? Why or why not? Have the students run through the “Evaluating Observations and Measurements” worksheets by Megan Miller (attached).
**Target Observation:**

- We kept using the same flashlight to test the batteries
- We used the same number of batteries in each part of our experiment

**Target Revised Model:**

- It is important to keep as many things as possible constant (the same) in a scientific experiment.
- This keeps the experiment simple, and allows us to focus on one thing at a time.

**Summary:**

Good scientific experiments follow the scientific method of observation, hypothesis, experimentation, analysis and conclusion. They also try to keep as many things constant as possible, and focus on a small number of variables. This allows us to learn the most we can from our experiments.
What is wrong with my experiment?

Dionne wants to know which brand of stain remover works best. She has 2 different brands of stain remover (Tide and Ajax). She puts some of both on a grass stain on a pair of her favorite jeans, and she puts some of both on a tomato juice stain on her favorite T-shirt.

Dionne should____________________________
________________________________________________________________________
________________________________________________________________________

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What is wrong with my experiment?

Greg and Kate have just learned about evaporation in their science class. The girls are wondering if water evaporates faster or slower at different temperatures. The girls put a cup of water on the refrigerator and put \( \frac{3}{4} \) cup of water over a furnace on the same day.

They should____________________________

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