**The Scientific Method**

**Summary:**

Students will participate in an interactive PowerPoint, covering the process of the scientific method. Following the PowerPoint students will form groups and practice setting up experiments, choosing variables, and making predictions.

**Subject:**

* Science:
	+ TEKS: 8.2 A- Plan and implement comparative and descriptive investigations by making observations, asking well defined questions, and using appropriate equipment and technology.
	+ TEKS: 8.2 B-Design and implement comparative and experimental investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology.
	+ TEKS: 8.3 A- In all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.

**Grade Level:**

* Target Grade: 8
* Upper Bound: 6
* Lower Bound: 8

**Time Required:** One class period of about 60 minutes.

**Activity Team/Group Size:**

* The whole class should participate in the PowerPoint. Following the PowerPoint students should be given time to complete the variables student activity for additional practice. Then arrange students into groups of 2-3 and assign the poster project.

**Materials:**

* Pencil/Pen
* “Variables” student worksheet
* Poster board (1 per group)
* Markers/Pens to decorate posters

**Activity Cost Per Group [in dollars]:** All materials about $1 per student for posters.

**Learning Objectives:**

* To teach students about the scientific method. Specifically to influence student understanding of independent and dependent variables.

**Lesson Introduction / Motivation:**

* Introduce the lesson with the “Scientific Method” PowerPoint. Ask students if they know what the scientific method is. Let students share their knowledge, and use student responses as a guide to gauge how well students have absorbed the lesson during the closing activity.

**Lesson Plan:**

* After introducing the lesson as stated above begin the “Scientific Method” PowerPoint presentation. Keep students attention throughout the presentation by clicking through slides and pausing between the appearance of the title on the slide and its explanation text. Take time to ask the students what they know about the title on the slide, can they teach you anything? Be sure that there is class participation during the presentation.
* Following the presentation the students will complete the “Variables” Student activity. Have students fill it out individually, as this is practice on the concept of independent and dependent variables.
* After students have completed the variables worksheet, collect the worksheet, and break them into groups of 2-3 and have them complete the poster activity.
	+ Poster Activity:
		- Each group of students should work together and make up an imaginary experiment. The experiment should be able to actually be performed, though the groups will not preform the experiment for this activity.
		- Students should use the scientific method to state their problem, hypothesis, IV, DV, CG, and have an illustration of the experiment set up. (All of this information should be on the poster board).
			* The experiment name, problem, and hypothesis should be on the front of the board.
			* The IV, DV, CG, and illustration should be on the back of the board.
			* Have students create a witty/catchy experiment name.
			* Students will not need to have an analysis or conclusion section on the poster since the experiment will not be conducted.
		- Once all groups have made their posters have students present their experiment to the class.
			* Presenting students should say their names, title, problem, and hypothesis to the class. (Without telling the class what the independent and dependent variables are.)
			* Have the class guess what the IV and DV of each experiment is.
			* Then let the presenting group finish their experiment explanation, move to the next group, and repeat.
* After all presentations collect the posters and begin the exit activity (This is found in the Day1 lesson closure section below).

**Lesson Closure:**

* For students to leave class at the end of the period there will be a 3-2-1 activity. Ask each student to use a sheet of notebook or scratch paper and pen or pencil. Write down 3 things they learned, 2 things they have a question about, and 1 thing they want the (you) the instructor to know. Collect these as students leave class, and before the next day’s class period begins address the most frequently asked questions from this activity with the class.

**Assessment:**

* Grade all student worksheets for accuracy, and assess the students’ ability to grasp the information based on number of correct answers. Give bonus points for student participation during the PowerPoint and poster presentation. Poster grading should be a participation grade.

**Vocabulary / Definitions:**

* Hypothesis: an educated guess about the outcome of your experiment. Based on your previous knowledge and the research you conducted.
* Independent Variable: The variable that is controlled or manipulated by the experimenter.
* Dependent Variable: The variable that is measured by the experimenter.
* Control Group: The group that is not exposed to the independent variable.

**Background and Concepts for Teachers:**

* Read over the definitions above, and click through the PowerPoint presentation alone before presenting it in class. Be sure to have a grasp of each concept to be able to field student questions if needed.

**Lesson Scaling:**

* To modify the lesson if time is running short, the class poster activity could be eliminated.

**Multimedia Support and Attachments:**

* There is a PowerPoint attached for the lesson presentation.

**References:**

* http://www.ipl.org/div/projectguide/scientificmethod.html
* http://www.factmonster.com/cig/science-fair-projects/understanding-using-scientific-method.html
* http://web.nestucca.k12.or.us/tec/riparian/science/Worksheets/sci%20meth.pdf
* http://www.clcillinois.edu/depts/vpe/gened/pdf/BioScientificMethod.pdf[**http://pbskids.org/dragonflytv/games/game\_dogbreeding.html**](http://pbskids.org/dragonflytv/games/game_dogbreeding.html)
* [**http://pbskids.org/dragonflytv/games/game\_dogbreeding.html**](http://pbskids.org/dragonflytv/games/game_dogbreeding.html)
* [**http://pbskids.org/dragonflytv/games/game\_dogbreeding.html**](http://pbskids.org/dragonflytv/games/game_dogbreeding.html)

**Keywords:**

* Scientific Method
* Hypothesis
* Independent Variable
* Dependent Variable
* Experiment
* Conclusion

**Authors:**

Undergraduate Fellow Name: Beverly Crocker
Date Submitted: 7/11/11

Please email us your comments on this lesson:
E-mail to ljohnson@cvm.tamu.edu
Please include the title of the lesson, whether you are a teacher, resident scientist or college faculty and what grade you used it for.

**Teacher’s Comments:**