

Lesson Title: The Scientific Method

Lesson Author: Matthew Gudenius (mgudenius@calistoga.k12.ca.us)

Grade Level: 5th grade

Subject Area: Science

Time Allotted for the Lesson: *Express in number of class meetings and/or number of hours.*

1 hour

Short Description of Lesson: *Write a brief, yet concise, description of what occurs in this lesson (50 words).*

In this lesson, the students will learn the scientific method and its related vocabulary, identify the purpose and sequence of each event in the scientific method, and identify when scientific method is (or should be) applied to different scenarios.

Classroom Layout and Grouping of Students: *Where will learning take place? How will the room be organized? How will students be grouped? (whole group, individuals, pairs, small groups, etc).*

Whole group instruction, paired practice

State Curriculum Standards met in this lesson: *Go to the state curriculum standards at <http://www.isbe.net/ils/Default.htm> (use state standards where you are in preparation) and select the grade content/level appropriate standards that are being met in this lesson. Copy and paste below:*

[Science Content Standards for California Public Schools – Investigation and Experimentation \(5th Grade\)](#)

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

National Education Technology Standards for Students (NETS•S) met in this lesson: *Go to the <http://cnets.iste.org/index.html> and select NETS•S 2007 grade level profile (K-2, 3-5, 6-8, 9-12) the appropriate indicator(s) and standard) that are being met in this lesson. Copy and paste below.*

Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

- a. plan strategies to guide inquiry.
- b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

- a. understand and use technology systems.
 - b. select and use applications effectively and productively.
-

Instructional Objective(s): *Each instructional objective [learning outcome] for this lesson should identify the A, B, C and D – Audience, Behavior, Condition, and Degree. (Activities are NOT learning outcomes).*

1. After viewing the video and partaking of the lesson, students will score 80% or higher on a 10-question multiple-choice post-test.
 2. Students will order the correct sequence of events in the scientific method with 80% accuracy.
 3. Given 4 example scenarios, students will accurately identify the use or lack of scientific method with 75% accuracy.
-

Materials, Resources and Technology:

List all materials (textbook, other books, maps, crayons, research guides) technology resources (computers, printer, scanner, internet connection, cameras, etc) and web addresses that are needed for this lesson. If you are using copyrighted materials, you must include title, author, date, city and publisher.

Materials and resources needed for this lesson.

1. Discovery Education videos (see Web Addresses)
2. Pre-test, post-test, and video quiz sheets
3. Methods of science crossword puzzle (<http://www.uga.edu/srel/kidsdoscience/games/sci-method-x-word.pdf>)

Technology resources needed for this lesson

1. Computer with Internet access

Web Addresses needed for this lesson:

Website name (e.g. Yahoo), followed by the site's complete web address (e.g. <http://www.yahoo.com>)

1. How Scientists Work video: <http://player.discoveryeducation.com/index.cfm?guidAssetId=2A63EC31-9A53-4254-9ABF-1C5295A4A26D>
2. Creating a Rainbow video: <http://player.discoveryeducation.com/index.cfm?guidAssetId=EEDD9A4C-930B-484A-8B0F-5EB4FB189A82>
3. Interactive multimedia Scientific Method lesson (Flash): <http://edtech2.boisestate.edu/gudeniusm/506/method.swf>

Student's Present level of Performance and Knowledge: *Do the students have the adequate knowledge to complete the lesson successfully? What pre-requisite skills must the students have to complete the lesson content? Include technology skills.*

Students must be able to use basic web browser navigation techniques and to write complete sentence responses to prompts/questions.

Instructional Procedures

Lesson Set:

How will you open the lesson to motivate the students? How will you relate this lesson to previous learning & to real life experiences, to explain the importance of the learning to the students? (requires student involvement)

"What is a rainbow?" Present this question to the students as soon as they are in, with the stated expectation that there are no wrong answers. If any students answer correctly, ask them "How do you know that is what causes a rainbow? How do you know it's not magic... or electricity... or leprechauns?" Introduce students to the very process we can use to explore and answer our wonderings about observations – such as observing a rainbow – using the "Creating a Rainbow" video on DiscoveryEducation to show this scenario.

Techniques and Activities:

List the step-by-step activities in sequential order as they occur in the lesson. They clearly identify what is to take place in the lesson. Within the procedures a variety of classroom teaching strategies (methods) are identified. Student centered activities are included as well as guided practice of the learning is included.

1. After the video, conduct a classwide brainstorm to answer the question "What is science?" The students will contribute their ideas to the teacher, who will write them down in a concept web (on a whiteboard, overhead, paper projected via document camera, or using software such as Inspiration/Kidspiration/Webspiration)
 2. After spending 5 minutes brainstorming, look at the results and review what science is: "The word [science](#) comes from the Latin "scientia," meaning knowledge. How do we define science? According to Webster's New Collegiate Dictionary, the definition of science is 'knowledge attained through study or practice,' or "knowledge covering general truths of the operation of general laws, esp. as obtained and tested through scientific method [and] concerned with the [physical](#) world.'" What does that really
-

mean? Science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. The term science also refers to the organized body of knowledge people have gained using that system. Less formally, the word science often describes any systematic field of study or the knowledge gained from it." (from <http://www.sciencemadesimple.com/science-definition.html>)

3. Have students complete the 10-question pre-test to determine what they already know and to prepare them for the upcoming overview of the scientific method.
4. After going over the answers (students self-check their pre-tests), provide students with the "video quiz" questions to be used in conjunction with the "What is the Scientific Method?" video.
5. Show students "The Five Steps of the Scientific Method" (4 min. 42 sec.); Afterwards, have students "think-pair-share" in 3 ways: (a) Students will compare the true/false answers they wrote for the video quiz statements. (b) Each student will explain one recent thing they observed that they have a question about and they believe they could find out more through the scientific method. (c) Do you agree that they could use the scientific method to answer the question they have or prove why or how it happened – why or why not?
6. Students will practice knowledge of the scientific method by completing the "methods of science" crossword sheet; again, paired teams may work on this cooperatively.

Lesson Closure:

How will the lesson come to a close? The content should be summarized and related to future lessons, and actively involve the students.

Students will use an online tool which will serve as both an interactive concept-map/organizer as well as an assessment tool. Students will answer the post-test questions, identify scenarios of scientific method, and place the required activities in order using an online website.

Adaptations for Special Learners: *How will you adapt the learning/equipment for students with special needs?*

Think-pair-share discussion will help students fill any gaps in their knowledge due to attention or comprehension. Use of multimedia (both the video and the website) will assist all learners by applying audio-visual support in a "dual-coding" structure.

Supplemental Activities - Extension and Remediation: *Extensions are additional activities to expand learning on the lesson content. Remediation activities include methods to re-teach the learning for students who need more instruction/practice.*

Remediation is available via the visual interactive lesson tool on the website. As an extension, students may create their own learning aid for other students, using art and/or technology (such as PowerPoint) to illustrate the sequence and important steps of the scientific method.

Assessment/Evaluation: *How will you measure the student's success? Formally or informally? Formal evaluation of student work requires that a grade is taken while informal might be monitoring of work, or class discussion. This section should contain a description of the assessment process, the criteria for achievement, and performance levels. The criteria should directly align to objectives and instruction. Describe your plan for providing feedback to your students.*

Informal assessment of student knowledge will occur by rotating around the room and listening to think-pair-share discussions as well as by collecting the video quiz responses and crossword sheets. Formal assessment will include a multiple-choice post-test, vocabulary-matching, and scientific method ordering/sequencing.

Student Products: What artifact(s) or products will result from the lesson? (such as a report, newsletter, diagram, slideshow, drawing, etc.)

Since this first lesson is an introduction to conceptual knowledge, the focus will be on lower-order knowledge and vocabulary acquisition which will later be applied in higher-order tasks in upcoming lessons. Students will: successfully complete a post-test including use of terms and definitions; arrange scientific method events in correct order; and identify examples and non-examples of scientific method.

Adapted from PDF: *Preparing to Use Technology: A Practical Guide to Curriculum Integration (2007)*