

Scientific Inquiry into Ancient Fossil Life

Lesson Plan

Grade Level: 6-8

Curriculum Focus: Scientific Inquiry

Lesson Duration: One or two class periods

Student Objectives

- Discuss the tools of scientific inquiry.
- Develop a template to solve scientific problems.
- Use the template to work through a problem in science.

Materials

- Discovery School video on *unitedstreaming: Fossils: Windows Into the Past*
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- Dinosaurs: How Fossils Help Us Learn About Prehistoric Life
 - Excavating and Preparing Fossils
 - How Fossils Help Us Learn About the History of the Earth
 - Amateur Archaeologists Help Excavate Fossils
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- Paper and pencils
 - Newsprint and markers
 - Computer with Internet access

Procedures

1. Begin the lesson by asking students if they know the steps of scientific inquiry. Write their ideas on a sheet of newsprint. Students may respond as follows:
 - Inquiry is the way that scientists ask questions.
 - Inquiry has something to do with conducting experiments.
 - Inquiry involves solving problems.
2. Next, have students discover scientific inquiry for themselves. They can find information on the following Web sites:
 - <http://regentsprep.org/Regents/biology/units/laboratory/scientificmethods.cfm>
 - <http://w3.dwm.ks.edu.tw/bio/activelearner/01/ch1c8.html>

3. Have each student develop a template to solve a problem using the steps of scientific inquiry. The steps should include the following:
 - Identify a problem.
 - Hypothesis, or prediction, of the solution
 - Steps required to solve the problem. (The steps may be an experiment, library or online research, or interviews.)
 - Examine and organize the results.
 - Conclusions based on research or outcomes of the experiment
 - Comparison of the initial hypothesis and the conclusion based on research or experimentation
4. Have students use their templates to solve a scientific problem. Divide the class into small groups, and have each group select one of the following problems:
 - Why did the dinosaurs die out?
 - Why do scientists think that birds may be descended from dinosaurs?
 - Why did the woolly mammoth die out?
 - What evidence do scientists have for global warming?
5. The Web sites listed below have information on each of these topics. If a group selects the first topic, have them watch the segment entitled “The End of Dinosaurs” for information about why the dinosaurs died out.

Why did the dinosaurs die out?

- <http://pubs.usgs.gov/gip/dinosaurs/die.html>
- <http://www2.worldbook.com/wc/popup?path=features/dinosaurs&page=html/dieout.htm&direct=yes>
- <http://teacher.scholastic.com/researchtools/articlearchives/dinos/extinct.htm>

Why do scientists think that birds are descended from dinosaurs?

- <http://teacher.scholastic.com/researchtools/articlearchives/dinos/evolut.htm>
- <http://www.dmtturner.org/Teacher/Library/4thText/VerPart5.html>
- <http://www.ucmp.berkeley.edu/diapsids/avians.html>
- <http://www.bbc.co.uk/dinosaurs/howdoweknow/q62.shtml>

Why did the woolly mammoth die out?

- <http://www.crystalinks.com/woollymammoth.html>
- <http://www.unmuseum.org/missingm.htm>
- <http://www.explorenorth.com/library/weekly/aa032400a.htm>
- <http://www.exn.ca/mammoth/Extinction.cfm>

What evidence do scientists have for global warming?

- <http://www.insightmag.com/news/2001/03/12/Symposium/Q.DoScientists.Have.Compelling.Evidence.Of.Global.Warming-213451.shtml>



- <http://www.insightmag.com/news/2001/03/12/Symposium/Q.DoScientists.Have.Compelling.Evidence.Of.Global.Warming-213462.shtml>
 - http://www.ucsusa.org/global_environment/global_warming/page.cfm?pageID=497
 - http://www.ecobridge.org/content/g_evd.htm
6. Give students time in class to work on this activity. Complete templates should include the following information:
 - identification of the problem
 - hypothesis
 - steps taken to solve the problem
 - organization of results
 - conclusion
 - comparison of the initial hypothesis with conclusion
 7. Ask groups to share their findings with the class, following the steps of scientific inquiry.
 8. Conclude the lesson by asking students: Is scientific inquiry an effective way to solve problems? Can it be used to solve other kinds of problems? How can this approach help in other academic areas? (A social studies example is determining the cause of death of a 5,300-year-old mummy found in the Alps; see segment entitled “Frozen in Time.”)

Assessment

Use the following three-point rubric to evaluate students’ work during this lesson.

- **3 points:** Students participated actively in class discussions; developed a complete template for the steps of scientific inquiry; used the template effectively to solve a problem.
- **2 points:** Students participated in class discussions; developed a mostly complete template for the steps of scientific inquiry; used the template somewhat effectively to solve a problem.
- **1 point:** Students did not participate in class discussions; developed a mostly incomplete template for the steps of scientific inquiry; had difficulty using the template to solve a problem.

Vocabulary

evidence

Definition: A group of animals or plants presumably related by descent from common ancestors

Context: In conducting an experiment, scientists collect evidence to support their hypothesis.

hypothesis

Definition: A prediction about what caused a particular event to take place

Context: Developing a hypothesis based on prior knowledge is the starting point in the problem-solving strategy defined by the steps of scientific inquiry.



observation

Definition: Information gathered to determine how to solve a problem or answer a question

Context: Young children may make the observation that dark clouds mean that rain is on the way.

scientific inquiry

Definition: The approach that scientists use to study the natural world; it involves asking questions, developing a hypothesis, collecting evidence to answer the question or prove or disprove the hypothesis, organizing information, and developing a conclusion.

Context: Scientists using scientific inquiry have been able to determine that an asteroid struck Earth, which may have led to the extinction of the dinosaur.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Science as Inquiry: Abilities necessary to do scientific inquiry; Understandings about scientific inquiry

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science—Nature of Science: Understands the nature of scientific inquiry
- Language Arts—Viewing: Uses viewing skills and strategies to understand and interpret visual media

Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>

