

Older than Dirt

<http://www.scsc.k12.in.us/SMS/Teachers/Elliott/Older%20than%20Dirt%20WebQuest/Older%20than%20Dirt%20Webquest.htm>

Focus on Inquiry

The student will collect and analyze data to determine the age of the Earth using studies of radioactivity.

Lesson Overview

Students will use a WebQuest to gather information about various topics that will help them learn how radioactivity is used to determine the absolute age of the Earth.

Duration 5-7 class periods	Setting Classroom with computers	Grouping Individual students or cooperative groups of 2-3 students	PTI Inquiry Subskills 3.1, 5.3, 7.2, 7.3
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Engage	10 min	None	Internet (WebQuest)	2	Students are engaged in a discussion on how old the Earth is.
Explore	Part 1: 2 days, Part 2: 2 days, Part 3: 2 days	3.1, 5.3, 7.3	Internet, Microsoft Word, Microsoft Publisher	3	Students gather research and write 5 articles for their magazine. Students then design and publish their magazines.
Explain	45 min	7.2, 7.3	None	3	Students present their magazines to the class.
Expand	45 min (Optional)	N/A	Internet (information search)	2	An optional activity for students to explore different time periods and conduct research to determine objects' absolute age.
Evaluate	Varies	N/A	Internet Online Rubric	N/A	Teacher developed rubric for WebQuest project.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Use appropriate tools and techniques to gather, analyze, and interpret data.
Communicate scientific procedures and explanations.



National Science Education Standards – Earth Science

The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.

Louisiana Grade Level Expectations – Inquiry

- Gr. 8, Inquiry GLE#6 - Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
- Gr. 8, Inquiry GLE#16 - Use evidence to make inferences and predict trends (SI-M-A5)
- Gr. 8, Inquiry GLE#19 - Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
- Gr. 8, Inquiry GLE#22 - Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)



Louisiana Grade Level Expectations Earth Science

- Gr. 8, GLE#33 - Use historical data to draw conclusions about the age of Earth (e.g., half-life, rock strata) (ESS-M-B2)

Materials List (per individual or group)

- Computers with Internet access, Microsoft Word, and Microsoft Publisher (or something comparable)
- Printer

Advance Preparation

1. Each student or student group must have access to a computer with Internet access and word processing software, preferably Microsoft Word and Microsoft Publisher, as well as a printer.
2. Prior to teaching this activity, the teacher should familiarize him/herself with Microsoft Publisher and the WebQuest. (The “Notes to Teachers” section may be especially helpful -- <http://www.scsc.k12.in.us/SMS/Teachers/Elliot/Older%20than%20Dirt%20WebQuest/Older%20than%20Dirt%20WebQuest%20-%20Notes%20to%20Teachers.htm>). A tutorial should be given on Publisher so that students are familiar with it and able to utilize it for this activity. Here is one of many tutorials on Microsoft Publisher that can be found using a simple Google search for Microsoft Publisher tutorials: <http://www.bcschools.net/staff/PublisherHelp.htm>.
3. Bookmark the WebQuest website on each computer for easy access.

Other Information

Learning Objective

The learner will:

- use various web resources to learn how radioactivity was discovered and used in absolute dating.
- create a magazine, using Microsoft Publisher, which will include 5 articles about earth age theories and scientific research involving carbon dating.

Prior Knowledge Needed by the Students

- Familiarity with the term radioactivity
- Some knowledge of the science of carbon dating
- Students should know how to use Microsoft Publisher or a similar program to produce the magazine.

Procedure

Engage

1. Have students go to the WebQuest website (<http://www.scsc.k12.in.us/SMS/Teachers/Elliot/Older%20than%20Dirt%20WebQuest/Older%20than%20Dirt%20Webquest.htm>) and read the Introduction section, which offers a discussion on Earth’s age.
2. Click on the Task section to learn what products will be made in this project, for example, 5 articles.

Explore

1. Have students click on the Process section and read over the three parts to this activity (Part 1: Research, Part 2: Write, Part 3: Publish).
2. Explain to students that each part will take about 2 days. Today is the 1st day of Part 1.
3. Students should then scroll down to Resources, read the information provided there and begin on the research provided under the heading Writing Prompts.
4. Over the course of the next several days, have students complete each phase of researching, writing, and publishing.
5. Show students the Evaluation section so that they may refer to the grading rubric given.

Explain

1. Each student or student group should present their magazine and one article within to show their creativity and express their understanding on this concept.

Expand

1. (Optional activity by University of California Museum of Paleontology: Tour of Geologic Time): Students can be given different time periods/eras or different animals and plants in geologic time and research them to determine their absolute age. Have students go to <http://www.ucmp.berkeley.edu/exhibits/geologictime.php> for instructions on completing this game.

Evaluate

1. The rubric found in the Evaluation section of the WebQuest can be used to assess the magazines and articles created. Also, a teacher can create a rubric to assess the presentation using Rubistar (see Supplementary Resources).

Blackline Master

None

Supplementary Resources**Rubistar.com: Rubrics**

<http://www.rubistar.com/>

This website allows teachers to create their own personalized rubrics.

Teachers' Domain: The Dating Game: Radioactive Carbon

<http://www.teachersdomain.org/resources/phy03/sci/phys/matter/date/index.html>

This website contains a media-rich essay that explains how scientists have used radiocarbon dating for many years to determine the age of different objects.

Exploring the Environment: Geologic Time

<http://www.cotf.edu/ete/modules/msese/earthsysflr/geotime.html>

This website provides another way of looking at geologic time. There is a lot of background information that students can use, as well as an interesting geologic activity.