

EDUCATORS' SCIENCE AND MATHEMATICS INSTITUTE SERIES

LESSON PLAN

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Creative Descriptive Title: "Job Related Geology" – Students act as geologists to study the formation of the Great Lakes and its Region.

Overview: This is a broad-based learning opportunity for students to learn more about the significance of the geology of the Great Lakes region and how the Great lakes were formed.

Purpose: The goal of this lesson is to develop a sense of understanding and an appreciation for the effects of the Wisconsin Glacier on the Great Lakes Area, in particular, the Sleeping Bear Dunes National Lakeshore.

Objectives/Outcomes: The student will be able to discuss the formation of the Great Lakes from the Wisconsin Glacier and discuss the relative importance of the Glacier forming our main freshwater source.

Resources/Materials:

- 1) variety of rocks – both glacial and non-glacial
- 2) geology reference books
- 3) internet sites
- 4) United States Geological Survey
- 5) contour maps

Introduction:

With the huge focus on real-world applications in the classroom in today's schools, this lesson is designed to fulfill that goal. The lesson will be oriented towards students conducting themselves as real-life geologists. They will study rocks, rock structures and contour maps just like a geologist and draw their own conclusions about the formation of the Great Lakes and its surrounding geology.

Science Standards Addressed:

C I.1 – 1 - Design and conduct scientific investigations

C I.1 – 4 - Gather and synthesize information from books and other sources of information.

C I.1 – 5 - Discuss topics in groups by making clear presentations, restating or summarizing what others have said, asking for clarification or elaboration, taking alternative perspectives, and defending a position.

- R II. 1 –1 – Justify plans or explanations on a theoretical or empirical basis
- EG V.1-1 – Explain the surface features of the Great Lakes Region using Ice Age Theory.
- EG V.1-3 – Explain how common objects are made from earth materials and why Earth materials are conserved and recycled.
- EH V.2-1 – Identify and describe regional watersheds.
- PME IV.1-2 – Identify common properties of elements.

Career and Employability Skills Content Standards:

- 2) Acquire, organize, interpret, and evaluate information from career awareness and exploration activities, career assessment, and work-based experiences to identify and to pursue their career goals.
- 5) Display personal qualities such as responsibility, self-management, ethical behavior, and respect for self and others.
- 7) Work cooperatively with people of diverse backgrounds and abilities and contribute to a group process with ideas, suggestions, and efforts.

Activities and Procedures:

This lesson is designed to be very open-ended so students can explore on their own what a geologist would do in their profession. The lesson will be about 4-5 days in length with 45 minute class periods for each day. The first day will be an introduction to the lesson. Also on that day the students will begin inspecting different types of rocks and minerals. The second day will be a wrap-up of the rock lab. Also, on that day we will discuss glaciers and make glacier models so that students can see how sand and mineral deposits came about from the glacier. On the third day, students will fill in contour lines on a contour map and identify watersheds. From their contour maps and rock identification, they will be able to write an essay explaining how the Great Lakes region formed. On the fourth day, we will have a discussion of the mid-continent rift zone and its effect on the geology of the region and its environmental impact on our natural resources. The last day will be used to wrap-up the lesson by having a geologist come in and discuss his profession and the glacier's effect on the Great Lakes Region.

Day One: *Discussion of geology and glaciers*

This will begin with a teacher directed discussion of what a geologist would do at work. Ask students for their input on geology as a science and as a job. Accept all answers but try to lead them towards discussing glaciers and the Great Lakes Region. The goal is to begin asking them questions about how they think the glaciers affected the rocks and rock formations in this region. We will first look at pictures of different types of rocks in this region and compare them to rocks of non-glaciated regions. When we are finished with that discussion we will begin the lab assignment. Explain the lab assignment to the students. They are now geologists for a few days. Their goal for this lab is to work in teams to identify the different types of rocks and minerals, research where these rocks are commonly found, and how they are formed. They will then compare rocks of non-glacier regions to rocks that have been molded by glaciers. They will be given rocks and minerals to examine for this lab just as a geologist would examine field samples at work. The sources they will need are rock/mineral identification books and the internet. When they are finished with the lab, they will write short essays describing their findings.

Day Two: Students will finish the rock identification lab and essays and construct a small-scale glacier model to examine the affect of a glacier on the sediment deposits in the region. We then as a class will discuss their findings. We will then discuss the effects of the glacier on local rock formations in the area. When we finish we will begin discussing how the Great Lakes came about. Ask students how the lakes were formed. Accept all answers. Before we begin working with contour maps each team of student geologists will build a model of a glacier. The model will consist of a layer of ice cubes in a small pan with small gravel and sand poured on top of the ice cubes. This model will sit for the remainder of the period. Students are to make observations of what happens to the sand and gravel as the ice melts. They should notice how the sediment is deposited and relate this model to sediment deposits in the Great Lakes Region, particularly sand dunes. We will then look at a contour map and discuss what different elevations show on a contour map. Key terms that will be learned are valley, hill, depression, watershed, lake, and mountain. Different contour maps of the Great Lakes Region will be passed out to each group of student geologists and they will try to draw in the lines that show contour. Overheads will be made and students will explain how their contour map shows different watershed areas, lakes, hills, valleys, and depressions. Based on this information and the discussion of glaciers the students will be able to explain how the Great Lakes were formed from the movement of the Wisconsin Glacier.

Day Three: This day will mainly be used for students to finish up the previous day's activities. Students should look at their glacier models and discuss how the sedimentation was deposited at the bottom of their pans. Is it thicker at one end than the other? Why? We will also finish any contour mapping and contour map presentations. A discussion will ensue about the students' experience as a geologist.

Then the teacher will go over the requirements for the final essay. The requirements of the essay are as follows: The essay must be typed in 12-pt. Font, double-spaced, and no more than three pages long. They should have no problem coming up with one and one-half pages of material to discuss in their essays. The essays should be mainly done as a team. This means that it should be hand written in class in groups so everyone agrees on what they want to go in the essay. One person may then type it if they want. They can also use the computers in school to type it as a group if they would like.

Day Four: The students will meet with their geological teams to discuss how they will write their essay. The essay must include an introduction or purpose, a detailed discussion of their findings in the rock lab and relate the rocks to the movement of the glacier. Also, they must discuss their opinion on how the Great Lakes were formed based on the contour of the land, the way their glacier model behaved, and the movement of the Wisconsin glacier. The students will have four days to turn in their final essays. They can use this class day to work on their essays.

Day Five: A wrap-up of the experience will follow by bringing in a geologist to discuss mainly his profession. He will also talk briefly about the glaciated Great Lakes region. The intent is to have him talk about the current thoughts and theories on how the Great Lakes were formed along with its surrounding geography. The students will then know at this time how close they were with their theories compared to that of a professional geologist. The main focus is show students geology as a profession and the importance of the Great Lakes region.

Conclusion: Remember, the focus of this lesson is for students to experience what types of responsibilities or activities they would need to do as a geologist. The teacher should be careful about emphasizing right and wrong answers in this lesson. The students will discover on the day of the guest speaker whether or not they were correct in their hypotheses. But, they should not be graded on right and wrong, but instead grade them on their scientific processes and teamwork skills. This outcome will be much more beneficial to the student as an individual.