Sunset Crater Volcano Web Quest

Lesson Overview

This lesson is designed to help teachers bring a little part of the National Park Service and one its unique monuments into the classroom, and hopefully inspire young students, their classes, and families to come and visit this park in person. After completing this lesson, teachers have the opportunity and are encouraged to plan a field trip to Sunset Crater Volcano National Monument.

This web-based activity will guide the students through a few of the concepts associated with volcanism and then walk the students through a virtual tour of the park while helping the students learn about the processes that make this area so unique. Students will conduct an internet based inquiry investigation focusing on understanding what causes volcanoes, what are some volcano hazards, and examples of volcanoes from around the world.

The web quest itself is broken up into 3 distinct investigations, each targeted at answering a key question. Students will be given one of 3 investigation sheets to complete at the computers, which will create the groups for part 2 of this lesson. For the second part of this lesson, students will group up based on which investigation they completed. In these groups, students will compare the answers they found, and then create a poster or whiteboard presentation that answers their key question. These presentations can be as simple or detailed as the teacher would like to make them.

This lesson may work as a standalone lesson for students to "virtually" visit the monument without having to leave school, or can work well as a pre-field trip introduction.

Target Grade Level

This lesson was designed for grades 5-12, but can be modified or adjusted to fit other grade levels depending on the students' level and proficiency with computers and the internet. This is left to the discretion of the teacher, and can also be used as a basic guideline for other grade levels and activities. For younger students, it is suggested that teachers focus on one webpage and modify the questions for the students" reading levels.

Duration

Part One ~ 50 minutes on the computer.
Part Two ~ 50 minutes or more depending on detail of the presentation desired.

Objectives

Guiding Questions: What causes volcanoes? What are some examples of global volcanoes? What are volcano hazards?

Critical Content: Learn how the Sunset Crater Volcano is an example of a recent volcanic eruption, and how that eruption did and has affected the area.

Student Objectives: Students will …

- conduct an internet based inquiry investigation focusing on understanding what causes volcanoes, what are some volcano hazards, and examples of volcanoes from around the world.
- use critical thinking techniques to answer volcanic process and impact questions.
- explore a National Monument using virtual technology.

Standards

Common Core ELA Standards:

- SL.5.2; RST.6-12.3; RST.6-12.4
- W.5.7; WHST.6-12.6

Arizona State Science Standards:

- S1C1: Observations, Questions, and Hypothesis
- S1C3: Analysis and Conclusions: Organize and analyze data; compare to predictions
- S1C4: Communicate results of investigation.
- S1C2 PO1: Demonstrate safe and ethical procedures (e.g. use and care of technology, materials, organisms) and behavior in all science inquiry.
- S2C2 PO4: Describe how scientists continue to investigate and critically analyze aspects of theories.
- S6C2 PO5: Demonstrate the relationships among earthquakes, volcanoes, mountain ranges, mid-oceanic ridges, deep sea trenches, and tectonic plates.

Lesson Prep

~ Sign up for a day to use the computer lab.
~ Photocopy the worksheets (3) for the web quest.
~ Decide if the groups will be presenting from a poster or whiteboard.
~ Gather presentation materials and supplies.

Procedure:

Part 1: Day 1

Step 1: Divide the class into 3 groups. Each student will receive a computer lab worksheet that associates with that group and its primary question.

Step 2: Go to the computer lab. Students should work on answering the questions on their worksheet either individually or in partners. This is dependent on how many computers are available and up to the teacher's preference.

Step 3: Students will complete the worksheet, and explore the websites to gain knowledge and ideas to present to the class. Each student should focus on answering the question at the top of their worksheet.

Part2: Day 2

Step 4: Students will group up in the classroom according to the worksheet they completed. In these groups students will need to compare the answers they got to the rest of their groups.

Step 5: Hand out either whiteboards or poster paper and drawing materials to each group.

Step 6: As a group, students will create a presentation that answers their key question associated with their groups' worksheet. Post these additional topics somewhere on the board for the students to include in their presentations as well.

- ? Pick 2 specific questions from page one of your web quest and answer them.
- ? How does your virtual tour of Sunset Crater Volcano support your answer to your group's primary question?
- ? Name one more interesting fact about Sunset Crater Volcano that you learned during this investigation.

Step 7: Each group will present their findings to the class, and show how they answered their primary question. It is up to the teacher to decide how to grade these presentations, and how the students are made responsible for the information. It is recommended that students take notes.

Step 8: OPTIONAL but recommended. Take a field trip to Sunset Crater Volcano!

Assessment:

Students will complete a worksheet in the computer lab, and a group presentation to share their answers.

Site Visit:

It is suggested that classes visit Sunset Crater National Monument and compare what they saw in the lab to what they can see at the monument itself. Sunset Crater Volcano National Monument is a great place to see how natural disasters caused people to move and adapt. Check out a lava flow and see which plants have come back and taken root out of the lava flows. Check out the displays, information and seismograph at the Visitor Center.

You may also contact the monument directly to see if there is any availability for a Ranger lead program that could focus on Sunset Crater Volcano's eruption, or how the U.S. Geological Survey monitors this site and the entire San Francisco Volcanic Field for activity.

Possible Extensions:

~ Research a volcano.
~ Map out the volcanic evidence around the San Francisco Volcanic Field.
~ Make a model of a volcano.

The Author:

As part of the Teacher-Ranger-Teacher Program, through the National Park Service, and the America's Best Idea Grant, Amanda Stalvey was hired for the summer of 2013 to design and develop lesson plans that could bring the National Monuments around Flagstaff into the classroom, and spark interest to bring both classes and the community to the Parks. Amanda is a Flagstaff native who teaches science at Coconino High School and has a background in Natural Resource Management. The photographs depicted in this lesson are also taken and provided by Amanda Stalvey.

Appendixes:

Below you will find the three worksheets for this activity.

Name: _____

Date: _____ Class: _____

Sunset Crater Volcano Web Quest!

Group 1: What causes volcanoes?

Make sure to read and follow the directions for each section of this web quest carefully and answer the questions for each page that you navigate to. The more detailed your answers the better!

Start at www.nps.gov/sucr/forteachers/classrooms/sunset-crater-volcano-web-quest-groups.htm

Find the "Sunset Crater Volcano Web Quest" and click on the link titled "Understanding Plate Motions" listed under Group 1.

1. How are volcanoes and the process of Plate Tectonics related? _____

2. Pick one of the boundaries described here and explain what happens at this boundary. _____

Go back to the NPS website with your group's links.

Click on the link titled "Frequently Asked Questions". Make sure you are still trying to answer the question "What causes volcanoes?"

3. Select a question from the "About Volcanic Eruptions" section of this page. Write down that question and SUMMARIZE the answer.

4. Select a question from the "About Studying and Working on Volcanoes" section of this page. Write down that question and SUMMARIZE the answer.

5. Select a question from the "Movies - Fact or Fiction" section of this page. Write down that question and SUMMARIZE the answer.

Go back to the NPS website with your group's links.

Click on the link titled "Sunset Crater's Eruption".

6. Based on what it says on this page, what do you think the eruption of Sunset Crater Volcano would have been like for the people who lived nearby?

7. In the column to the left, click on "Natural Features and Ecosystems", then "Volcanoes/Lava". Describe what Sunset Crater Volcano's eruption may have looked like. What happened during the eruption?

Go back to the NPS website with your group's links.

Click on the link titled "Virtual Field Trip".

Click on the links to travel through the virtual field trip. These are pictures from the park itself! Use these links to answer the question below.

8. Think about the previous webpages you looked at. What evidence do you think scientists study and use from Sunset Crater Volcano to support their theories of what causes volcanoes?

If you finish early, explore the rest of Sunset Crater Volcano's website.

Name: _____

Date: _____ Class: _____

Sunset Crater Volcano Web Quest!

Group 2: What are some examples of global volcanoes?

Make sure to read and follow the directions for each section of this web quest carefully and answer the questions for each page that you navigate to. The more detailed your answers the better!

Start at www.nps.gov/sucr/forteachers/classrooms/sunset-crater-volcano-web-quest-groups.htm

Find the "Sunset Crater Volcano Web Quest" and click on the link titled "Weekly Volcanic Activity Report".

This webpage lists the volcanic activity that was reported last week. Click on one of the recent active volcanoes listed here.

1. What is the name of the volcano? _____

2. On what dates was activity recorded for it? _____

3. What type of volcanic activity was recorded for this volcano? _____

4. Look at the map at the top of the page. Is there a higher concentration of activity located in any particular area in the world?

At the top of the page, under the heading of "Learn" click on the "Types and Processes Gallery".

5. Pick a type of volcano listed in red/orange to the left of the screen. What is the definition of that type of volcano?

6. A list of volcanoes of that type should be listed below. Select one. What is its name, and where is it located?

Before you leave this page, make sure and watch one of the pyroclastic videos linked here!

Go back to the NPS website with your group's links.

Click on the link titled "Volcano Cameras".

This webpage has a list of volcanoes that have webcams on them. Click through a few of them, then select a volcano that you can answer the questions below on.

7. What is the name and location of the volcano? _____

8. Is there a 12 hour video available to watch? (Look for the blue link near the photo) _____

9. What was the weather like today? Describe what the photo or video shows. _____

10. Does the volcanoes page tell you what the activity level for this volcano is? For example can you tell if it is erupting or dormant? What is happening at this volcano? (You may have to look around for this, and it may be a link to the side of the page under "activity" or it may be something you can tell from the photos.)

Go back to the NPS website with your group's links.

Click on the link titled "Virtual Field Trip".

Click on the links to travel through the virtual field trip. These are pictures from the park itself! Use these links to answer the questions below.

11. Will Sunset Crater Volcano or something nearby erupt in the future? Why or why not? _____

12. Think about the previous webpages you looked at. What type of volcano is Sunset Crater Volcano? Did you see any other examples of the same type of volcano during this web quest?

If you finish early, explore the rest of Sunset Crater Volcano's website.

Name: _____

Date: _____ Class: _____

Sunset Crater Volcano Web Quest!

Group 3: What are volcano hazards?

Make sure to read and follow the directions for each section of this web quest carefully and answer the questions for each page that you navigate to. The more detailed your answers the better!

Start at www.nps.gov/sucr/forteachers/classrooms/sunset-crater-volcano-web-quest-groups.htm

Find the "Sunset Crater Volcano Web Quest" and click on the link titled "Types of Volcano Hazards".

This webpage has 6 hazards listed under the volcano diagram. Select 2 of them to read through.

1. What is one of the hazards you selected? _____

2. Describe the hazard you named above and its effects. What is it? How is it a hazard? _____

3. Select a second hazard. What is it? _____

4. Describe the hazard you named above and its effects. What is it? How is it a hazard? _____

Go back to the NPS website with your group's links.

Click on the link titled "Mt. Saint Helens Eruption".

5. Watch one or more of the videos on this page. _____

6. D**escribe** one of the volcanic hazards that you see occurring prior to or during the eruption in the video you selected above.

Go back to the NPS website with your group's links.

Click on the link titled "Volcano Hazards Program".

7. What purpose does monitoring volcanoes serve? _____

8. How can past eruptions help to influence future response to volcanic eruptions? _____

Go back to the NPS website with your group's links.

Click on the link titled "Virtual Field Trip".

Click on the links to travel through the virtual field trip. These are pictures from the park itself! Use these links to answer the questions below.

9. Describe the difference between 'A'a and Pahoehoe lava flows. _____

10. What types of volcanic hazards do you see evidence of during your virtual field trip? _____

11. Imagine you were living near Sunset Crater Volcano when it erupted, what types of things do you think you would have seen during the eruption?

If you finish early, explore the rest of Sunset Crater Volcano's website.