

Lesson Plan

Topic: Volcanoes - two sides of the force.

Subject: Geography.

Level: High - school.

Core curriculum: IV stage of education - extended.

Teaching content-specific requirements:

Sources of geographic information. Student:

- interprets the geographic phenomena in the graphs, tables, and diagrams as well as on the models,
- formulates cause-and-effect, functional and timing relationship between selected elements of the natural and the socio-economic environment and verifies them by using thematic maps,
- uses information and communication technologies for acquiring, storing, processing and presentation of geographic information.

Sphere Earth - the lithosphere. Student:

- characterizes the main internal processes leading to diversification of the Earth's surface-volcanism, plutonism, Earth / Crustal movements, shock tectonic movements of the tectonic (Paleozoic, Mesozoic, Cenozoic) and mold caused by them.

Objectives:

Student should:

- explain the causes of volcanic phenomena,
- classify types of volcanoes according to different criteria,
- give examples of volcanic regions in the world,
- describe the negative and positive effects of volcanic phenomena,
- create the ability to participate in the discussion as well as be able to present information,
- create the ability to be a critical user of different sources of information.

Methods and Techniques:

- lecture,
- working with student's book and geographical atlas,

- brainstorm,
- learning game,
- simulation.

Time: a series of two lessons.

Note: students should already be familiar with the theory of plate tectonics.

Technical requirements: PC with an Internet connection and multimedia projector.

List of supportive materials:

- geographical atlas,
- student's book,
- copied version of a learning game,
- supportive material no 1.

Literature / The list of useful websites: Internet websites' links included in "Lesson Plan" and supportive material.

The lesson activities:

1. At the beginning of the lesson, the teacher introduces the concept of *volcanism*, explaining that the volcanic phenomena include the processes associated with the escape of magma to the surface of the Earth. Magma which is a molten mass of rock with plenty of water and gas flows to the surface in the form of lava.
2. Then the teacher presents students with the construction of a volcano (you can use an illustration from the portal Scholaris [Katalog zasobów-Szkoły ponadgimnazjalne-Geografia-Wulkanizm]) indicating: *magma chamber (magmatic fireplace)*, *chimney volcanic crater*, *a parasitic cone*. The teacher explains the concept of the *caldera*, as a specific form of volcanic sculptures. It notes that the appearance of a volcano depends on the type of eruption, this is determined by the chemical composition of the magma and lava, as well as the pressure and the amount of gases.
3. Depending on the number of students in class, teacher divides them into three or six groups (in the case of division into six groups of tasks are repeated). The students using the textbook, classification of volcanoes considering: *activity* (group 1), *products of the eruption* (group 2), and *morphology-shaped volcano* (group 3). Then the leaders of the various groups present the results of their work. After the presentation of each group teacher explains additional information (Handout No. 1).

4. To determine the location of volcanoes teacher recommends the students based on geographical atlas to compare the map "Distribution of volcanoes and earthquake areas" with a map of "Geology-tectonics" and indicate the relationship between the phenomena shown on both maps. The common conclusion should be that the areas of occurrence of volcanoes and earthquakes coincide with the boundaries of lithospheric plates. These are the subduction and spreading zones. Most active volcanoes located in a huge ring of almost the entire Pacific Ocean.
5. As a homework assignment the teacher proposes to the students an educational game "Trip around the Pacific Ring of Fire." During the game, students learn about the famous volcanoes and examples of the effects of the eruption. The teacher asks volunteers to do additional work to sought out on the Internet or in magazines popular scientific information on recent volcanic eruptions. Selected students are preparing for the simulation of a meeting of scientists from different countries. Volcanologists' talks are designed to fix terminology for volcanic phenomena and learners should be aware of the consequences of the eruption. Other people in the class will be a team of journalists that keep asking questions to scientists during the meeting.
6. Another lesson the teacher starts by checking the answers to the game. Then invites pre-selected students to simulate the meeting volcanologists (the teacher prepares the classroom beforehand) and starts the conference, but is not involved in the discussion, and after its completion allows some time for questions from the students-journalists.
7. The discussion is a pretext to draw students' attention to the multiplicity of the effects of volcanic phenomena (*eg. climate change, destruction, people's death, pollution, volcanic ash, the use of raw materials in industry, eg. pumice, the development of geothermal energy*).
8. The teacher asks students to think about the topic and explains the meaning of it with them. The common conclusion should be that the volcanoes build as well as destroy. Perhaps students remark that modern civilization seems to be more dependent on the negative effects of volcanic eruptions, which was shown six years ago while European airports' paralysis.
9. With reference to the above discussion, the teacher presents students with a part of the film series "Weather's Encyclopedia" (<http://tvnmeteo.tvn24.pl/magazyny/encyklopedia-pogody,3/odcinki-online,1,7,1,0/pyl-wulkaniczny,516.html>); the film is dedicated to the impact of the eruption on air communication. It is in the interval 06.01 min -11.21 min, [access: 01.25.2016].
10. The teacher asks a question about the phenomena associated with volcanic eruptions (*eg. earthquakes, the formation of mountains' formation, volcanic gases exhalation, tsunami*). The teacher draws attention to the efficiency of geysers, which are the source type. Their functioning is related to the presence of slots in the ground filled with water, which is heated by the heat inside the Earth which turns partly in

steam. High blood pressure causes water and steam escape to the surface at regular intervals. The largest and most active geysers in the world is in the world's oldest national park - Yellowstone.

11. Students watch the video of the geyser' explosion

(http://www.epodreczniki.pl/reader/c/148602/v/latest/t/student-canon/m/ipx7hOVfDa#ipx7hOVfDa_d5e267), [access: 25.01.2016].

12. At the end of the lesson, the teacher shows students the non – stop ability to track up volcanic phenomena throughout the world using webcams (<http://webcams.volcanodiscovery.com>), [access: 25.01.2016].