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2008 Derricks to Desks Seminar

Educ 992

Lesson Plan (with ideas taken from internet)

Plate Tectonics and the Interior of the Earth

Lesson Objectives:

- Students will learn that the Earth's interior is layered, consisting of a crust, mantle and core which will transition to lesson about locations of oil reserves and movement of such reserves when plates shift and move.
- Students will create a working model about the layers of the Earth, working as a group to collaborate and present one coherent model.
- Students will make observations and create a plan to investigate a question using critical thinking and analysis skills.
- Students will be able to effectively communicate ideas and findings to other individuals and the entire class.
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Materials: Student journals, whiteboard markers

Instructional Strategies:

Individual journal writing activities, writing to learn, cooperative group learning and questioning.

Assessment:

- Homework assignment—Short Essay Paper: Write at least two paragraphs discussing how heat transfer applies to the mechanism of plate tectonics.
- Group assessment of cooperation and participation

Instructional Content: (60 minute class period)

***Do you think that there is enough evidence to support the Theory of Plate Tectonics? Provide at least 2 concrete examples of evidence supporting this theory. Please provide a clear explanation for the evidence you selected.**

- Place question on overhead projector
- Provide at least 5 minutes for student response
- Discuss journal write as a class; discussing some of the clear evidence that supports plate tectonics.
- Use student questions as points for discussion. Ask for student volunteers to discuss their findings; if no volunteers, select one or two students.

5min Teacher: On the whiteboard, write this question for students to answer:

“What does the interior of the earth look like? What are the main regions of the earth’s interior called? For each layer, please explain if it is solid, liquid or gas, providing a clear explanation for your answer. Please draw a large circle in your journal to visually represent the regions of the earth’s interior. ”

Teacher: Draw a circle on the transparency or whiteboard (ask students to do the same). Students should complete this activity in their journals. Based on student answers, the teacher will be able to determine where students stand in terms of understanding and preconceptions of this topic.

5 min **Hook:**

Teacher reads:

The earth is divided into three distinct layers, each different from the layer before and after. To begin with, we know that the layers of the earth are different because of the way seismic (earthquake) waves travel through the interior. The core is the innermost layer, consisting of two different regions—inner core and outer core. The inner core is solid and is made mostly of iron. The outer core is liquid iron, forming a shell around the solid interior. The mantle is the middle layer of the earth, which is also the largest layer. The rock in this layer (ask students: solid or liquid?) is both liquid and solid. There are regions of molten rock that we consider to be liquid, but the mantle is mostly solid. The mantle is also considered a liquid because solid rock can flow if heated due to increased pressure and temperature. Instead of calling this part of the mantle a liquid, it is called **ductile flow** (write word on whiteboard; have students copy into journals). The outermost layer of the earth is the lithosphere, which is a thin layer of solid rock that “floats” on top of the mantle. It is because of this floating that lithospheric plates can move freely and allow plate tectonics to occur.

15 min Divide students into groups of 3-4. In groups, students will look at each other’s drawings of the earth’s layers to see any similarities or differences. Have each group design one drawing for the group, representing the different layers, relative thickness of each layer, relative temperatures and the condition of each layer (solid, liquid, ductile).

15 min Each group needs to select one representative to share the group’s drawing to the rest of the class. Other group members will be allowed to share their ideas as well, but there should only be one presenter. After each group has presented, come back together as a class to discuss the concept being presented. Ask students:

- What features of the earth did you not know before this activity?
- Did your group have a disagreement about a particular feature? Why or why not?
- Do all of the drawings represent an accurate model of the earth’s interior?
- How do you think heat is generated within the earth’s interior?
- If the interior is extremely hot, why is rock within the mantle solid and not molten?

- In journals, have students answer the following questions—

What do you think is the cause for heat within the interior of the earth? How is this heat created? How does heat move from the core to the lithosphere? Does heat remain in one layer or can it move between the core, mantle, and lithosphere?

!"Draw a picture to represent how you think heat travels within the earth's interior.

10 min Wrap up journal activity with a class discussion about "The Heat Engine" (next day's lesson). Ask students to provide examples from the journal activity to which they believe is the reason for heat transfer within the earth's interior. Use student questions and responses to incite further discussion about this topic.

Teacher reads:

Tomorrow, we will be learning about how heat moves through the interior layers of the earth and how this movement is the reason for plate tectonics. It is important to remember that continents and islands are on large, moveable plates, floating on top of a hot and fluid upper mantle. For the plates to move, there must be something happening beneath the surface.

Assessment:

For homework, I want you to write at least 2 paragraphs (6-8 sentences each) about how you think heat movement is related to plate tectonics. Please refer to your journal and the textbook to help guide your answer. I want your answer to be thoughtful. Be prepared to defend your answer at the beginning of class tomorrow.