Subject Areas: Science

Grade Level: 7 – 12 (ages 12-18)

Time: At least two 45-minute class periods; time outside of class as necessary

Lesson Objective:
Students will create concept maps that help them to better understand the theory of plate tectonics and the evidence that supports it.

Common Core State Standards¹:
College and Career Readiness Anchor Standards for Reading:
Standard 7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

College and Career Readiness Anchor Standards for Writing:
Standard 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

Overview:
The study of plate tectonics answers questions such as why volcanoes ring the Pacific Ocean, what causes earthquakes and how and why mountain ranges are formed. In this lesson, students research plate tectonics and present the information with a Webspiration™ concept map. Students can create their concept maps from scratch, or use the Concept Map template to help them get started (Webspiration Classroom™ Starter>Starter Docs>Science>Concept Map).

¹Available at: http://www.corestandards.org
Preparation:
- This lesson requires Internet access and the Webspiration Classroom software application published by Inspiration® Software, Inc. It can be accessed by visiting <http://www.webspirationclassroom.com>.
- Review the principles of concept mapping with students.
- Information on plate tectonics and access to library resources would also be helpful for student research.

Lesson:
1. Invite students to brainstorm possible explanations for these facts:
   - The Pacific Ocean is ringed with active volcanoes.
   - The floor of the Pacific Ocean has deep trenches close to active volcanoes.
   - The ocean floor has an extensive ridge system with hydrothermal vents.
   - Ocean floor sediments are much thinner than they should be if the oceans are billions of years old.

2. Explain that these and other characteristics of the Earth’s surface were difficult to explain prior to the development of plate tectonic theory. Explain that today students will be researching plate tectonics and documenting the evidence for it in the form of a Webspiration™ concept map. Explain that students can create their concept maps from scratch or use the Concept Map template to help them get started.

3. Optional: Show students the example file (Webspiration Classroom™ Starter>Examples>Science>Plate Tectonics Example) so they better understand what a well-completed concept map might look like.
4. Ask students to form teams of three and have each team member choose one of the following aspects of plate tectonics to investigate: early theory, supporting evidence and effects.

5. Instruct each team’s members to research their chosen topic using the provided informational material (if available) and/or the library and Internet resources. One excellent resource is This Dynamic Earth: The Story of Plate Tectonics from the U.S. Geological Survey: <http://pubs.usgs.gov/gip/dynamic/dynamic.html>.

6. Students can collaborate on their diagrams and obtain feedback from the teacher and their peers using the collaboration tools. Documents can be shared with others using the Collaborate Tab. The Comment Tab can be used to comment on the document, or the Chat Tab can be used, if it is turned on at your school, to discuss ideas in real time.

7. Have teams present their completed concept maps to the class. Encourage students to ask clarifying questions and offer suggestions for improvement.

8. Lead a class discussion about plate tectonics. Will the Earth appear the same millions or billions of years in the future as it does today? What other natural or man-made phenomena might transform the Earth's surface in much shorter periods of time?

Adaptations / Extensions:
• Allow time for teams to revise their concept maps based on feedback.

• Each student could write a paper focused on one aspect of plate tectonic theory. Students can download their projects to Inspiration® or a word processor, or transfer it to a Google Doc.