Yale 2016 PIER Summer Institute: Ancient Cities, Modern Inquiries

Title of Lesson: Earthquakes and Their Impact in History

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Subject Area(s): Science
Grade Level(s): 6-8
Time Allotment: 4- 45 minute classes

Lesson Description: *Include- why is this important for students to know?*

The lesson is based on the 5 E model of instruction. Students will be able to describe the effects of geological events on ancient civilizations.

Learning Context: *How does this lesson/unit fit within the context of the the larger unit or other units?*

This lesson is part of the unit: Forces that change the Earth. During this unit, students describe the historical development of evidence that supports plate tectonic theory, including contributing scientists. Students use graphic organizers to demonstrate how plate tectonics relate to crustal feature formation. Students investigate and describe how Newton's laws apply to Earth's tectonic activities. Additionally, they interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering. Students use models to depict crustal features shown on topographic maps or satellite views and demonstrate how the features were formed. (TEKS Resource Systems, 2016)

Compelling Question(s): *What question(s) will guide student inquiry during the lesson/unit?*

How have geological events such as earthquakes and volcanoes affected civilizations in the past? In what ways can we analyze and interpret data to communicate valid conclusions and predict trends?

Content Standards: *What standards are addressed through the teaching of this lesson/unit?*

Texas Essential Knowledge and Skills

8.2E Analyze data to formulate reasonable explanations, communicate valid conclusions

supported by the data, and predict trends

8.3A In all fields of science, analyze, evaluate, and critique scientific explanations by using ~~empirical evidence,~~ logical reasoning~~, and experimental and observational testing,~~including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.

8.3D Relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.

8.9A Describe the historical development of evidence that supports plate tectonic theory.

8.9B Relate plate tectonics to the formation of crustal features.

Lesson Objectives/Learning Intentions:

Students will be able to analyze and describe the effects of geological events on ancient civilizations. Students will also evaluate and critique the scientific explanations presented to them on the destruction of ancient cities. Students will additionally relate the location of currently identified plate boundaries to the areas in the the eastern mediterranean that suffered losses due to earthquake activity.

Lesson Vocabulary:

Content Vocabulary	Skill/Process Vocabulary
Plate tectonic theory, continental drift theory, plate boundary, convergent boundary, divergent boundary, transform boundary, crustal features, fault, stress, seafloor spreading, mid-ocean ridge, rift zone, ring of fire, trench, earthquake, volcano, weathering, erosion	Analyze, evaluate, relate, contiguous, correlation, subsidence, theory,

Supporting Questions:

These questions are intended to contribute knowledge and insights to the inquiry behind the compelling question. These questions should provide students with the opportunity to explore content essential to advance the inquiry. Supporting questions should also serve to support development of formative assessment tasks (progress monitoring) and teacher or student selection of resources/teaching materials.

Supporting Question 1	**Supporting Question 2**	**Supporting Question 3**
Why should we analyze, critique, and evaluate scientific explanations?	*How is the history of science connected to our study?*	*How does research impact scientific thought and society?*

Formative Assessment	Formative Assessment	Formative Assessment
Students will view a video on the findings of Archeologists Claude Schaeffer and reflect on the importance of his research.	Students will share their ideas with a partner on the evidence of geological events taking place in pictures of ancient cities.	Students will summarize the impact of geological events in history.
Materials/Resources	**Materials/Resources**	**Materials/Resources**
Video: https://www.youtube.com/results?q=claude+schaeffer	Cooperative learning groups	Student Interactive Notebooks

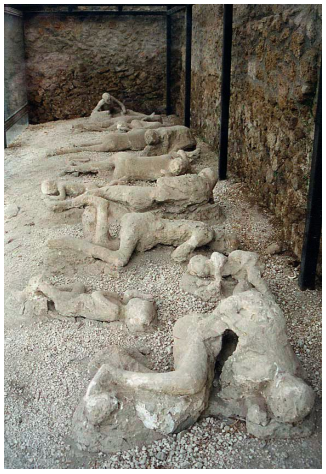
Summative Assessment/Performance Task:

Students will research a historical earthquake and create a report and a poster.

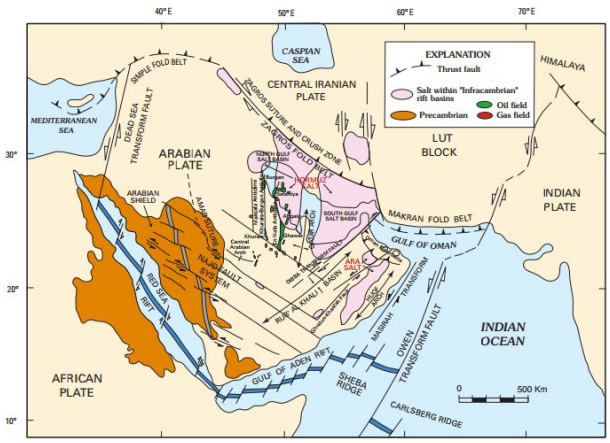
Lesson Activities:

Day 1 (45 minutes):
Set-up: Students will work in heterogeneous groups of four.

Engage: Each group of students will receive a picture depicting an ancient city that has notably been destroyed by an earthquake. Students will individually fill out the "See, think, wonder" sheet. After filling out all three columns they will then compare their list with their shoulder partners. Allow students a few minutes to discuss among themselves. The focus of the conversation should be: What do you think happened? What caused the destruction? (Below are some sample pictures that could be used)



Explore: Each group will receive a set of maps. The first map will be a map of the ancient world and the second will be a map of the world today with the tectonic plate boundaries. Their task is to compare the two maps. The objective is to find a correlation between the eastern mediterranean cities and the tectonic plate boundaries.



Day 2 (45 minutes):
Explain: Students will watch the following video:
https://www.youtube.com/results?q=claude+schaeffer
After watching the video allow for class discussion of the following questions:

1. *How have geological event such as earthquakes and volcanoes affected civilizations in the past?*
2. *Why is should we analyze, critique, and evaluate the scientific explanation that was presented to us by Archaeologist Claude Schaeffer?*
3. *How does research impact scientific thought and society?*

After the discussion, students will research the three types of plate boundaries: convergent, divergent, and transform. Students will create a cause and effect concept map. They will state what geological events occur at each of the three types of plate boundaries (i.e. rift zones, seafloor spreading, volcanic mountains, folded mountains, earthquakes, etc.) The following links could help with the research:
https://www.learner.org/interactives/dynamicearth/plate.html
http://www.amnh.org/ology/features/plates/loader.swf
http://www.cotf.edu/ete/modules/msese/earthsysflr/plates1.html

Day 3 (45 minutes)
Elaborate: Students will use the internet to research a historical earthquake. They will then create a report that offers the following information about the geological event they selected:

1. *City*
2. *Date*
3. *Magnitude of earthquake*
4. *Number of fatalities*
5. *Monetary value of damages*
6. *Distance the earthquake was felt*
7. *What tectonic plate is the plate located on?*
8. *What type of plate boundary is the plate on?*

The following links could help with the research:
http://list25.com/25-worst-earthquakes-in-history/2/
http://www.nbcnews.com/id/42029974/ns/world_news-asia_pacific/t/top-deadliest-earthquakes-history/#.V5uyj9UrLnA
http://geology.com/plate-tectonics.shtml
https://ees.as.uky.edu/sites/default/files/elearning/module04swf.swf

Day 4 (45 minutes)

Evaluate: Gallery walk
With their groups, students will create a poster based on the earthquake information they collected yesterday. After all students are done they will hang their poster on a wall. Each student will then receive a post-it ® that will be used to mark the poster that they feel is the most informative and complete. The criteria for the poster will be posted for students to

see. Students may not select their own groups poster.
Wrap-up: Journal writing/ class discussion
Students will answer the following questions as a reflection statement in the Interactive Student Notebooks: How have geological events such as earthquakes and volcanoes affected civilizations in the past? In what ways can we analyze and interpret data to communicate valid conclusions and predict trends?
After reflecting on their own, allow time for a class discussion.