

Invitation

How will it get learners interested in learning about the topic and access their prior knowledge?

Example tasks for small groups/partners: (1) Using Google Earth, students observe the area of the 2011 Tohoku Earthquake & Tsunami and watch a video of the event. They discuss & write down what they would need to know to determine if a similar hazard exists at another location. (2) Students discuss what they already know about plate tectonics. (3) They examine plate boundaries and discuss what they think are the impacts that plate movement and interactions can have on human populations and the natural environment. (4) Instructor demos a “pencil quake” as an analogy. After each task, instructor adds info and clarifies as needed as a review to set the stage for the lesson.

Exploration

How will the experiences provide observations & discoveries to help learners ask/answer questions, and make sense of the topic?

Students (individuals or groups of 2-3) use the **exploration widget** to explore earthquake and bathymetry data to make observations about seafloor features and potential tsunami hazards. They work together to answer the embedded questions and describe the possible relationship between the earthquakes and tectonic boundaries. They predict locations for potential tsunami generation based on their prior knowledge and exploration of the widget. Instructor leads a whole class discussion encouraging students to share what they discovered and observed.

Concept Invention

How will learners be encouraged to struggle with their understanding and negotiate their ideas with others?

Small groups/partners discuss their observations and ideas about the connection between seafloor features, plate tectonics, and earthquake location and depth, and the evidence or concepts that support their ideas. Instructor leads a discussion, asks guiding questions, encourages students to make evidence-based explanations, and provides additional information as needed. Information about subduction zones is shared and students share their ideas about how it relates to/makes sense with the earthquake data they explored.

Application

How will learners authentically use what they've learned & apply it to new contexts?

Students compare the location of this exercise with the Tohoku Earthquake & Tsunami, other areas of the world using Google Earth, and to any personal experiences they've had with earthquakes. They discuss the potential for a tsunami occurring in each location based on what they've learned. They're challenged to suggest additional data that might be helpful to be more sure about the potential threats and whether people in these areas should be concerned.

Reflection

How will learners think back on the process of learning to reinforce understandings & make them better learners in the future?

Students respond to prompts encouraging them to reflect on what they've learned about the relationship between seafloor features, plate tectonics, and earthquakes; why should people care about collecting the data used in this exercise; and what additional data would be useful. They also consider how this knowledge applies to them, what they found new or surprising, what specific skills they gained or used, and how those skills might be applied in their lives.