

**Lesson title: How Did Scientists Know That There Were Mountains Under the Ocean?
Volcano Mapping
AI Introductions & Implementations Lesson Plan**

Grade(s): 5th

Subject Area(s): Science

Utah ELA standards:

5.R.5 Identify and refer to evidence from a text when explaining what the text says explicitly and when drawing inferences from the texts.

5.R.8 Determine the meaning of words, phrases, figurative language, academic and content-specific words, and analyze their effect on meaning within a text.

5.R.9 Determine or clarify the meaning of unknown and multiple-meaning words and phrases, choosing flexibly from a range of strategies.

5.R.12 Analyze how the visual and multimedia elements contribute to the meaning, tone, or beauty of a text. Draw on information from multiple sources including media to locate an answer to a question or to solve a problem.

5.R.14 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

5.W.2 Write informative/explanatory pieces to examine a topic that links and conveys ideas and information clearly, using words, phrases, and clauses to show the relationship between ideas, paragraphs, and/or sections, and provide a concluding section related to the information or explanation presented.

5.W.4 Conduct short research projects to craft an argument or answer a question.

5.SL.1 Participate effectively in a range of conversations and collaborations using age-appropriate vocabulary, on topics, texts, and issues.

Utah Social Studies Standards:

5.6.3 Connect the causes and lasting effects of at least two social movements and their leaders in the 20th Century (for example, the Women's Suffrage Movement, labor unions, the Civil Rights Movement, child labor reforms).

Utah Math Standards:

5.G.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Science & Engineering Practices:

Analyze and Interpret Data:

Students analyze and interpret data to make sense of the locations of Earth's features

Crosscutting Concepts:

Patterns: Use patterns to organize information and support an explanation for phenomena related to Earth's features.

Phenomenon: Could a volcano pop up in your backyard? [Mystery Science \(4th Grade-Birth of Rocks\)](#)

Disciplinary Core Idea:

(ESS2.B): “The location of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features where people live and in other areas of Earth.

Student Proficiency Standard:

5.1.1

Organizing Data

Students organize data using graphical displays (e.g., table, chart, graph) from maps of Earth’s features (eg., locations of mountains, continental boundaries, volcanoes, earthquakes, deep ocean trenches, ocean floor structures).

Identifying Relationships

Students identify patterns in the location of Earth’s features, including the locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes. These relationships include:

- Volcanoes and earthquakes occur in bands that are often along the boundaries between continents and oceans.
- Major mountain chains form inside continents or near their edges.

Interpreting Data:

Students **analyze and interpret** the organized **data** to make sense of and describe a phenomenon. In their description students include that Earth’s features occur in patterns that reflect information about how they are formed or occur. (e.g. mountain ranges tend to occur on the edges of continents or inside them, the Pacific Ocean is surrounded by a ring of volcanoes, all continents are surrounded by water [assume that Europe and Asia are identified as Eurasia])

Learning objectives:

1. Students can use an ocean floor topography box (already created) to measure where the ocean floor either lifts or sinks (displaying the shape of the terrain).
2. Students can log data and create a graph on graph paper.
3. Students can compare and contrast their images and discuss any errors.
4. Students can join an AI Podcast to discuss how these topography maps help with understanding earthquake patterns.

Safety concerns to be aware of for this lesson:

The only safety concern would be during the AI Image Maker component. Make sure your kids are asking the bot to create pictures that are appropriate.

Key words and vocabulary: phenomenon, earthquakes, mountains, volcanoes, patterns, Artificial Intelligence

Digital or physical materials that are needed for this project:

Soundwave boxes numbered 1-6
Rulers
Black Thin-point marker
Measuring Sticks

Centimeter Graph Paper
 Chosen AI tool, i.e. Adobe Express
 Google Slides for links and Instructions

Lesson budget and materials list:

Item	Cost	Website	Quantity	Total Cost
12x8x4 White Cardboard Shipping Boxes (Soundbox)	\$83.69 (50 Pack)	Amazon	1	\$83.69
Comfy Pack (500) Wooden Stir Sticks	\$5.92 (500 Pack)	Amazon	1	\$5.92
Wooden Rulers 12"	\$13.99 (60 Pack)	Amazon	1	\$13.99
AmazonBasics Black Thin-point Permanent markers	\$8.23 (24 Pack)	Amazon	1	\$8.23
AmazonBasics Quad Ruled Graph Paper	\$7.99 (2 Pack)	Amazon	1	\$7.99
Art Direct Relief Map of Tharpe Ocean Floor	\$14.99	Amazon	Depends: Class set? Group Set? One for board	\$14.99
Optional: <i>Solving the Puzzle Under the Sea</i> Book	\$15.14	Amazon	1	\$15.14
Optional: <i>How Mountains are Made</i> Book	\$6.39	Amazon	1	\$6.39
Google Slides		<u>Mapping Volcanoes Lesson Slides</u>		

AI tools are needed for this lesson (ex. chatbot, constitutional AIs, image generation, etc.) and share any prompts/constitutions you used to build these tools:

Access to an AI Image generator (student generated prompting based on their measurements)

Access to an AI Podcast (teacher article uploads about Patterns of the Earth)

Pre-lesson activities that learners may need:

- Initiating student pre-knowledge with an AI Video (see link in the included lesson slides below)
- Students will use the Image Creator to create an image of themselves and a few other things that would let us know what they like or like to do.
- Topography maps for inquiry discussion (either just shown on board or handed out)
- Read Aloud: Solving the Puzzle Under the Sea (Marie Tharp Maps the Ocean Floor) by: Robert Burleigh

Lesson Instructions:

- Students will be separated into groups (enough for 6 boxes) i.e. 30 students, 5 per group.
- Students will receive their box, pieces of centimeter graph paper for creating their data graph, a measuring stick, and a ruler for measuring and marking their measuring stick.
- Expectations for lab work will be explained.
- Directions will be shown and read to students (See Slide link Below)
- Go through the Graphing 101 to guide them with their data graph. (this lesson is in the slides)
- Students will take their rulers and measure in centimeters and mark their measuring sticks.
- They will take their stick and insert it into each hole in their box.
- After each hole, they will need to log the centimeter measurement on their graph paper.
- After they are done logging their data, they will connect the dots to display the visual of the ocean floor.
- For the AI portion of this lesson, each student will need their computer to log into the chosen AI tool, which in this case is Adobe Express.
- Students will go to Image Creator and type in exact instructions of creating an ocean floor that mimics the measurements from their Soundwave Box.
- The groups will then compare and contrast their graph to the AI Generated image, through discussion. They will specifically look at which picture best displayed what the actual floor of their Soundwave Box displayed.
- After their discussion, they will carefully open their Soundwave Box and look at the actual ocean floor and compare it to their graph and AI Image.
- At this point, if there are big differences between the actual floor and their AI image they will need to discuss how to edit what they asked the image maker to do and make adjustments by doing it again.
- To end, the students will write about their own experience with the AI tool and what they learned about using AI for a learning tool, specifically what they need

to do to get a better outcome. This writing assignment will be used as the assessment for the lab.

- Extension Activity (Next day):
- Students will then join an AI Podcast to discuss how these topography maps help with understanding earthquake patterns.
- They will use the AI generated questions to ask during the podcast.

Extension Activity (includes what can be used for assessment):

An AI podcast is created with uploaded articles about Patterns on the Earth, to include: Volcanoes, Earthquakes, Mountains and the Ocean Floor.

Students will use a worksheet with specific questions to ask the AI podcast so they can fill out the worksheet.

Assessment:

The teacher will look at the outcomes of all the required activities for learning data.

The students will complete the extension activity questions and then complete the Exit Ticket and activity (for grading). The Exit Ticket includes: Students writing about their own experience with the AI tool and what they learned about using AI for a learning tool, specifically what they need to do to get a better outcome.

Resource Links:

Lesson Slides:

https://docs.google.com/presentation/d/1mtW4ltOydpmV_ffOIFHDyJewxSm3LTJ-mjtGXJBEJzg/edit?usp=sharing

Podcast Literature:

<https://docs.google.com/document/d/1Hw6-iF0ufsCbstOiSGqbXudyHNOXmcbBws7dvSoavDE/edit?usp=sharing>

https://docs.google.com/document/d/1WmjFLWTxi9czP9Ap_ltdiUS6Enkk6B2fRaVKwJesBwQ/edit?usp=sharing

https://docs.google.com/document/d/1tdFrcRR7mecv2c89c7iaus3Cgzgl_nnDvVZg7zlvXmw/edit?usp=sharing

Worksheet/Exit Ticket Link:

<https://docs.google.com/document/d/1js6XaaS5wQZLiLsQW1eTJHwShi6pPrN8/edit?usp=sharing&oid=113132278098128285711&rtpof=true&sd=true>

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