WeTeach_AI

Voices in the Stone – Science Meets Culture

Grade Level: **9-12** | Duration: **75 minutes** | Subject Area: **Science**

LESSON TABLE OF CONTENTS

This lesson was designed for the WeTeach_AI **Advancing AI Literacy Project**. The project supports the development of standards-aligned AI literacy lessons written by teachers for teachers. Additional lesson plan material, such as rubrics, answer keys, activity guides, and instructional considerations can be found here on our website.

The contents of this digital lesson were developed by the Texas Advanced Computing Center (TACC) with the support of Google.org. However, the contents do not necessarily represent the policies of Google.

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"Based in East Texas, I am a STEM educator with a background in geology and astronomy who has a passion for integrating computer science and technology in the classroom. This AI literacy lesson was designed to inspire both students and educators to embrace emerging technologies with confidence and purpose."

Lesson Description

In this lesson, students deepen their investigation into geology and cultural narratives by completing the Voices in the Stone exploration. Working in teams, they analyze rock samples, record observations, and uncover how human decisions shape scientific classification. Through discussion, students compare cultural uses of rocks with their geologic origins, highlighting the interplay between science and society. This lesson sets the stage for understanding why AI systems struggle with nuance, preparing students to critically examine how data choices influence machine learning.

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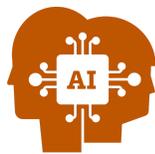
Lesson Objectives
(formatted as "Students will be able to…" statements)

- Analyze rock samples through both scientific and cultural lenses.

- Compare and contrast how human decisions and cultural perspectives shape classification.

- Discuss how data adds to what we know and what might be missing.

Essential Questions

1. How can rocks tell both scientific and cultural stories about the Earth and its people?

2. What influences how we classify and value natural resources?

3. Where do human judgment and cultural context matter in science?

TEKS Alignment (Texas Standards Alignment)

§112.51 Specialized Topics in Science	§130.431 AP Computer Science Principles
- **(c)(2)** Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs.	- **5.B:** Explain how knowledge can be generated from data.

CSTA/ISTE Alignment (National Standards Alignment)

CSTA	ISTE
3A-DA-12: Create computational models that represent the relationships among different elements of data collected from a phenomenon or process.	**1.4.d:** Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
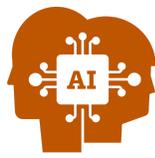
Effective Pedagogical Strategies

|		
Curriculum provides guidance for instructors to create a classroom environment that nurtures emotional safety, encourages resiliency in the face of mistakes, and fosters a sense of belonging for all students.	Curriculum reflects and highlights the perspectives, languages, and community values of students and/or contemporary youth culture (e.g., popular video games or common student interests/activities).	The instructor provides opportunities for students to explore and give solutions to open-ended prompts.

AI Literacy Competencies

[(based on TeachAI Framework)](#)

Designing AI 2: Compare the capabilities and limitations of AI systems that follow algorithms created by humans with those that make predictions based on data.	**Designing AI 4:** Evaluate AI systems using defined criteria, expected outcomes, and user feedback.

| Key Terms	
Term	**Definition**
Classifier	A system that assigns items to categories based on their characteristics.
Crystalline	Describes a material composed of crystals rather than glassy matter or sediments; influenced by cooling time.
Fossil	Preserved remains or traces of ancient organisms, often replaced by another mineral.
Origin	The point at which something comes into existence or from which it derives or is derived.
Texture	Preserved remains or traces of ancient organisms, often replaced by another mineral.
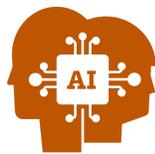
Launch

Engaging activity or prompt to introduce the lesson. **Estimated time: 15 minutes**

Objective: Students will connect cultural and scientific perspectives on rocks by considering how meaning changes across contexts.

Materials:
- Image or physical example of a rock with dual uses (e.g., granite countertop vs. ancient monument)
- Projector or printed visuals
- Voices in Stone presentation (provided in this lesson's resources)

| Teacher Instructions	Sample Teacher Remarks
<u>Lesson Opener (5 minutes)</u> Begin by reminding students of Lesson 1. Next, display an image of a rock or fossil used in two different ways (construction vs. art). Pose the guiding question: *"What information can we learn from this rock sample? What do rocks mean to different cultures? Can you think of any examples?"* <u>Think, Pair, Share (10 minutes)</u> Facilitate a Think-Pair-Share: - Think (2 min): Students jot down ideas individually. - Pair (3 min): Share with a partner. - Share (5 min): Invite 2–3 pairs to share with the class. **Anticipated Student Outcomes** - Students identify cultural and scientific interpretations of rocks. - Students recognize that classification is influenced by human values and context. - Students prepare to explore physical properties and cultural uses in the next activity.	*"Last time, we explored bias in technology and how context matters. Today, we'll see how context shapes how we classify and value rocks."* **(Display rock image.)** *"Look closely at this image. I want you to think about what this rock tells us scientifically and culturally... What story does this rock tell? How might its meaning change in different cultures? I'll give you a couple of minutes to think and jot down ideas."* **(Pause for students to think individually)** *Now, let's turn and talk with a partner. As you share, notice how the same object can have different meanings depending on context. This idea of perspective will guide our work today."* **(Invite 2–3 pairs to share with the class.)**
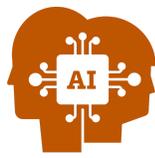
Exploration

Step-by-step student tasks, experiments, or investigations. **Estimated time: 20 minutes**

Objective: Students will analyze rock samples through scientific and cultural lenses to understand classification and perspective.

Materials:
- [Data table handout](#) (provided in this lesson's resources)
- Physical or digital classification guide (provided in this lesson's resources)
- Rock samples or Voices in Stone digital presentation (provided in this lesson's resources)
- Optional: Safety goggles and lab tools for physical samples

| Teacher Instructions	Sample Teacher Remarks
Introduce activity by explaining that students will act as geologists exploring both scientific and cultural stories of rocks. Assign students to roles, such as: - Lead Geologist - Associate Geologist - Photographer - QA Lead Students begin examining samples or slides. Students rotate roles and through rock samples, recording observations (e.g. texture, origin, cultural uses, whether it's crystalline). Encourage students to think about how classification choices reflect human decisions. **Anticipated Student Outcomes** - Students identify physical properties and cultural uses of rocks. - Students recognize how classification is shaped by human decisions. - Students prepare for discussion on data and perspective.	*"Every rock tells a story—not just about Earth's processes, but about human history and culture. Today you'll step into the role of a geologist. Around the room are rock samples—or digital slides—each with a scientific story and a cultural story.* *In your group, assign these roles: Lead Geologist, Associate Geologist, Photographer, QA Lead. Rotate roles every few stations.* *Move through the stations. At each one, record observations in your data table. Think about two things: What does this rock tell us scientifically? How might people have used or valued it?* *As you work, ask yourselves: What might be missing if we only look at rocks through a scientific lens? Additionally, why do you think some rocks are more valuable in certain cultures?"*
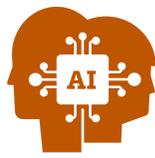
Whole Class Discussion

Discussion questions, teacher prompts, and expected student responses. **Estimated time: 25 minutes**

Objective: Students synthesize observations from scientific and cultural analysis of rocks, identify patterns in classification, and connect these insights to human judgment and cultural context.

Materials:
- Student data tables from "Exploration" section of this lesson
- Whiteboard or chart paper for recording patterns
- Optional: Projected images of rocks for reference

Teacher Instructions	Sample Teacher Remarks
Quick Report (5 min) Each group shares: - One scientific insight (e.g., texture, origin, composition) - One cultural insight (e.g., historical use, symbolic meaning) Record student responses under two columns: Scientific vs Cultural. Deep Dive Discussion (15 minutes) Move from descriptive → analytical → evaluative questions, by guiding students through discussion using the below discussion questions. Consensus & Bridge (5 minutes) Summarize key takeaways: - Classification is shaped by context and human decisions. - Data gaps lead to misclassification. Bridge to the next lesson by sharing what's to come.	*"Let's start by hearing from each group. Share one scientific observation and one cultural insight about your rocks. What stood out to you?"* ***(Facilitate whole class discussion.)*** *"Next time, we'll teach the machine. You'll see how your choices in data collection and labeling affect AI performance."* --- ***Student Supports*** *Sentence stems:* - *"One pattern I noticed was ___."* - *"A cultural factor that influenced classification was ___."* - *"If AI only sees ___, it might miss ___."* *Allow students to jot notes before sharing. Use visual anchors (chart with Scientific vs Cultural columns).*
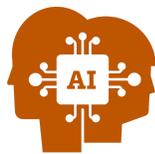
| Sample Discussion Questions	Sample Student Responses
1. What patterns did you notice in scientific vs cultural classification?	*"Scientific focused on physical properties; cultural focused on use and meaning."*
2. Where did human judgment matter most?	*"Deciding which features were important—color for cultural value vs hardness for scientific use."*
3. What might be missing if we only use photos for classification?	*"Physical tests like streak or fizz aren't captured in images."*
4. How could these gaps affect an AI system?	*"It might misclassify rocks because it only sees surface features."*
5. What responsibilities do humans have when using AI for science?	*"We need to check for bias and make sure data is complete."*

Assessment

Formative or summative assessment tasks and criteria. **Estimated time: 15 minutes**

Objective: Students demonstrate understanding of scientific and cultural classification by accurately labeling rock samples and explaining their reasoning.

Materials:
- Student data tables from "Exploration" section of this lesson
- Whiteboard or chart paper for recording patterns
- Optional: Projected images of rocks for reference

Assessment Opportunities	Facilitation Tips

Rock Classifying
There are two options for this assessment:
 	
• Physical Samples: Each group labels 2–3 rocks with:
    ○ Scientific name (based on properties)
    ○ Cultural/historical use (from research or observation)
	Before starting, explain that students should provide both the scientific name and one cultural use for each rock, along with reasoning or evidence.
	
	Show a quick example on the board (e.g., Granite – Scientific: Igneous rock; Cultural: Used in monuments).
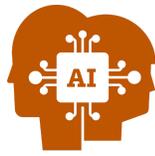
- Digital Version: Students complete a quick Google Form or handout with:
    - Rock name
    - One cultural use or significance
    - Confidence level (e.g., "Very sure," "Somewhat sure")

For each rock, students will write its scientific name and one cultural use. If they are unsure, they will note what evidence they used. This encourages students to think about what influenced their classification — was it physical properties, cultural context, or both?

✅Use the rubric provided in this lesson's resources to assess student submissions.

Circulate among groups to check that students are using observation data and classification guides. Prompt deeper thinking with questions like:

- *"What evidence supports your classification?"*
- *"How did cultural context influence your choice?"*

Ask students to note if they are "very sure" or "somewhat sure" and why — this helps identify gaps for discussion.

Give a clear 10-minute countdown and remind students to focus on 2–3 samples rather than all.