

Sail Like an Egyptian: Alternative Energy

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Grade Level 6
Duration 4 class periods

National Standards

GEOGRAPHY

Element 4: Human Systems

10. The characteristics, distribution and complexity of Earth's cultural mosaics.

11. The patterns and networks of economic interdependence.

NEXT GENERATION OF SCIENCE STANDARDS

MS Engineering Design

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

AZ Standards

ELA

Reading

Key Ideas and Details

6.RI.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

6.RI.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

Integration of Knowledge and Ideas

6.RI.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

Writing

Production and Distribution of Writing

6.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

SCIENCE

Life Science

6.L2U1.14 Construct a model that shows the cycling of matter and flow of energy in ecosystems.

Arizona Social Science Standards

GEOGRAPHY

Human-environment interactions are essential aspects of human life in all societies.

6.G2.1 Compare diverse ways people or groups of people have impacted, modified, or adapted to the environment of the Eastern Hemisphere.

Examining human population and movement helps individuals understand past, present, and future conditions on Earth's surface.

6.G3.1 Analyze how cultural and environmental characteristics affect the distribution and movement of people, goods, and ideas.

6.G3.2 Analyze the influence of location, use of natural resources, catastrophic environmental events, and technological developments on human settlement and migration.

HISTORY

The development of civilizations, societies, cultures, and innovations have influenced history and continue to impact the modern world.

6.H1.1 Compare the development and characteristics of historical cultures and civilizations from different global regions within designated time periods.

SIOP Elements



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Sail Like an Egyptian: Alternative Energy

Preparation Adapting content Linking to background Linking to past learning Strategies used	Scaffolding Modeling Guided practice Independent practice Comprehensible input	Grouping Option Whole class Small groups Partners Independent
Integrating Processes Reading Writing Speaking Listening	Application Hands on Meaningful Linked to objectives Promotes engagement	Assessment Individual Group Written Oral

Arizona English Language Proficiency Standards

Grade 6

Basic

Listening and Reading

Standard 1 By the end of each language proficiency level, an English learner can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing.

B-1: determine the central idea or theme and explain how they are supported by using some text evidence.

B-2: recount specific details and information in a variety of texts.

Speaking and Writing

Standard 3 By the end of each language proficiency level, an English learner can speak and write about grade appropriate complex literary and informational texts and topics.

B-3 compose informational text that includes details to develop a topic while using appropriate conventions.

B-5: use examples of precise language and domain-specific vocabulary within informative texts.

Listening, Speaking, Reading, and Writing

Standard 6 By the end of each language proficiency level, an English learner can participate in grade-appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.

B-1: participate in discussions about familiar topics and texts.

B-2: participate in written exchanges about familiar topics and texts.

B-5: contribute relevant information and evidence to collaborative oral and written discussions.

Standard 7 By the end of each language proficiency level, an English learner can conduct research and evaluate and communicate findings to answer questions or solve problems.

B-2: paraphrase observations/information notes with labeled illustrations, diagrams, or other graphics, as appropriate.

Overview

Starting with the earliest civilizations, cultures have been using different modes of transportation to move goods and people. With advancements from these early civilizations, transportation has not only changed drastically over the years but has also improved enough to be used in daily life. It is important for students to realize that certain aspects of life which seem “new” and “cool” actually have ties back to ancient civilizations.

In this lesson students will learn the importance of conserving resources, and the different types of resources in the world. They will learn the method and practices that engineers go through when designing objects. Finally, students will be asked to work as a group of engineers by following the engineering design model to design the most stable and fastest invention that does not use gasoline or electricity to navigate the Nile River. This lesson contains adaptations for diverse learners (ELLs).

Purpose



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Sail Like an Egyptian: Alternative Energy

Key Vocabulary

- non-renewable resource:** Natural resources that cannot be replaced or grown at a rate to meet demand (fossil fuels, metals, and minerals)
- renewable resource:** any natural resource that can be replaced naturally with the passage of time (forests, air, animals)
- renewable energy:** energy that can be supplied continually (wind, solar power, geothermal, hydropower)
- sailboat:** boat that uses the wind to make it move
- parts of a boat:** mast, deck, keel, rudder, tiller, boom, sails
- deceased:** no longer alive
- solar:** relating to the sun

Materials

- Computer with internet access and LCD projector
- Color copies of Ancient Egypt map or project a map of Ancient Egypt
- Wind Power as an Energy Source article
- What is a Solar Boat? article
- Article Summary Sheet
- Vocabulary Cards
- How a Sailboat Works
- Using the Engineering Design Process
- Materials for building sailboats: note cards, cardboard, straws, scraps of cloth, paperclips, Styrofoam, card stock/construction paper, glue, rubber bands, etc.
- Tub/bucket of water
- Electric fan to create wind
- Vocabulary Test and Answer Key
- Ruler
- Stopwatch
- Social Studies Assessment on Egypt and Answer Key

Objectives

The student will be able to:

1. Describe ways ancient civilizations traveled over water in the past.
2. Describe how human dependence on natural resources influences economic development, settlement, trade, and migration.
2. Analyze different ways to design a boat that stays afloat and travels the farthest.

Procedures



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Prior Knowledge: Students have been studying ancient Egypt. This lesson would come toward the end of the study.

SESSION ONE

Engage:

1. Show the National Geographic video (2.48 min) called "Energy: Alternative Energy" <http://video.nationalgeographic.com/video/environment/energy-environment/alternative-energy/> Discuss the key concepts and vocabulary used. (**Integrating Processes: Listening**)

Explore:

2. Project or distribute the map of Ancient Egypt. Ask students to name several ways that people traveled many years ago in Egypt. (riding animals, boats, chariots pulled by animals, carried by people, etc.) Which of these ways seems the easiest in terms of energy? Which requires the most amount of work? What routes seem obvious for traveling? (Nile River, Mediterranean Sea, and Red Sea) Why would people live along the Nile? Why would people live along the seas? (**Preparation: Linking to past learning**)

Explain:

3. Pair students. Have one student in the pair read Wind Power as an Energy Source while the other student reads What is a Solar Boat? (**Integrating Processes: Reading; Grouping Option: Partners**)
4. Once both partners are done reading his/her article have them share orally with their partner what they learned from their article.
5. Once this is done, have them fill out the Article Summary Sheet for both articles. (**Application: Promotes Engagement; Integrating Processes: Speaking and Writing; Assessment: Individual**)
6. Create a word wall with the words that were not understood in the two articles as well as the words from the video shown earlier. (**Scaffolding: Comprehensible input**)
7. In any time left, have the students play a game to begin learning the vocabulary words. (**Application: Promotes Engagement**)

SESSION TWO

Diagram/Elaborate:

1. Pose the question: What is the best way to travel on the Nile River in Egypt and not use gasoline or electricity?



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2. Pass out the diagram How Sailboats Work. Have each group complete the questions on the paper. Encourage groups to incorporate some of the ideas from How Sailboats work into their designs. **(Scaffolding: Comprehensible input)**
3. Place students in groups of 4. Pass out the Using the Engineering Design Process worksheet. Explain that they will work as a group to design an invention that would travel the farthest, the fastest, and still hold together. Have the students complete the design worksheet and make their model using the materials provided. **(Grouping Option: Small groups; Application: Hands on)**

SESSION THREE

Evaluate:

1. Each group will test their boat in water provided with the fan providing wind. Allow students to measure the distance traveled using the ruler and how fast the boat crossed the tub. Then have the groups compare the inventions for stability (staying upright) and not falling apart. **(Grouping Option: Small groups; Application: Hands on; Assessment: Group)**
2. Have groups return to evaluate their success by completing the chart on the worksheet.
3. Allow time for students to re-engineer their inventions. **(Grouping Option: Small groups) (Application: Hands on)**
4. End the day by adding to the word wall especially the terms for parts of a boat. **(Scaffolding: Comprehensible input)**

SESSION FOUR

1. Review the question: **What is the best way to travel on the Nile River in Egypt and not use gasoline or electricity?**
2. Test the re-designed inventions with the same criteria from #1 above. Students will then complete the final question on the Using the Engineering Design Process worksheet.
3. Students will complete the Social Studies Assessment on Egypt.

Assessment

ELA, Social Sciences, and Science

The Article Summary Sheet can be graded for accuracy and completeness. Mastery will be considered a score of 90% or higher. **(Assessment: Written, Individual)**

Language acquisition can be measured with the Vocabulary Test. Students will score 80% or higher on the Vocabulary Test. **(Assessment: Written, Individual)**

Science

The Using the Engineering Design Process group work can be graded for completeness. Mastery will be considered a score of 90% or higher. **(Assessment: Written, Group)**

Social Sciences

The Social Studies Assessment on Egypt can be graded for accuracy. Mastery will be considered a score of 80% or higher. **(Assessment: Written, Individual)**

Extensions

Have students power their inventions by solar cells.

Have students design non-water modes of transportation.

Compare Egyptian boats to boats in other ancient civilizations.

Sources

Resources Vocabulary definitions:

www.epa.gov/greenhomes/TopGreenHomeTerms.htm

Parts of a Sailboat:

<http://adventure.howstuffworks.com/outdoor-activities/water-sports/sailboat1.htm>

National Geographic Society

<http://environment.nationalgeographic.com/environment/global-warming/wind-power-profile/>

The Solar Boat Museum

<http://egyptsites.wordpress.com/2009/02/25/the-solar-boat-museum/>

Nile Map

http://www.lib.utexas.edu/maps/historical/shepherd/mycenaean_greece_orient.jpg



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