

Asian Odyssey

A National K-12 Interdisciplinary Curriculum Model

The
Cleveland
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BRONZE SCIENTIFIC INQUIRY THROUGH CHINESE ART

Introduction

This lesson focuses on bronze, a medium of historical importance to China and the rest of the world. Students will gain an appreciation of the advanced technology of the early Chinese civilization. Ancient Chinese artworks in the collection of the Cleveland Museum of Art will be used to introduce the scientific method of inquiry. Students will use prior knowledge to make assumptions about the purpose and function of the objects they study. By observation and inference, they will draw connections between what they do and do not know.

Grade Level

This lesson was created for 4th grade, self-contained, gifted class. The level of class and state benchmarks can be adjusted to meet the needs and abilities of grades 4-8.

Objectives

- To hypothesize the medium used in the creation of an ancient ceramic Chinese artifact.
- Students will learn how the ancient Chinese used bronze, and that the Chinese were the first to develop porcelain. They will then explore and make connections to today's use of the medium, and create a replica of a use of ceramic today.

Concepts

- Scientific method of inquiry is the method employed in exact science consisting of:
 - Careful and abundant observation and experimentation
 - Generalization of the results into laws and statements
- Hypothesis: a tentative explanation for a scientific problem that can be tested by further investigation
- Technological advances, influenced by scientific knowledge, affect the quality of life.
- New technologies are sometimes invented independently by different cultures, and in other cases the information diffuses from one culture to others.
- Cultures use technologies in their own ways, to satisfy their particular needs.
- The availability and development of resources affect the ways that societies develop and interact with each other.

Key Ideas

- Bronze, a valuable material to the ancient Chinese, is an alloy (mixture) of tin and copper, with small amounts of other metals sometimes added.

- The earliest known Chinese bronzes date from 1700 to 1500 BCE. The Chinese may possibly have learned the technique of "cold" working bronze from the Middle East, but they created their own techniques for casting bronze by pouring the heated metal into pottery molds.
- No other culture has been able to equal the ancient Chinese in creating as fine bronze implements. The Chinese cast bronze containers in a number of different shapes, many of which were based on the shape of existing bronzes. Bronze was also used for weapons, such as axes and knives, and for fittings on war chariots.
- An important use of bronze was to make implements used in the ritual worship of the ancestors. Many of these have been found by archaeologists when they excavated tombs.
- Rulers of feudal kingdoms under the Zhou dynasty (1100-256 BCE) had sets of bronze bells made that were suspended on poles and displayed at important ceremonies as a symbol of their authority.
- The first emperor, Shi Huangdi of the Qin dynasty (221-206 BCE), standardized a system of Chinese currency. This system used round copper coins with square holes in the center so they could be put on strings. These strings of coins were called "cash" in Chinese.
- Basic outline of piece-mold casting:
 - A. A simple clay model (without decoration) of the vessel shape is made and left to dry a bit.
 - B. Clay is then shaped over this model and let to dry to a leather-hard stage.
 - C. The outer layer of clay is then sliced off into sections and decorated by incising designs into the clay.
 - D. Then this carved outer mold is pieced together.
 - E. The original model is used as an interior form to make the vessel hollow. The outer mold is attached to the inner form at a few points.
 - F. The bronze is poured in.
 - G. After cooling, the inner and outer molds are broken away from the vessel
 - H. Spurs and imperfections are filed away.
- Barter is the direct exchange of goods or services between people.
- Overtime, money was developed to facilitate the exchange process. Money is a good that can be used to buy all other goods and services and is any generally accepted medium of exchange. Many items have served as money throughout time such as salt, cows, stones, shells, tea and feathers.
- The use of money as a medium of exchange, measure of value, and store of value makes specialized production and trade easier. This specialization by individuals and countries increases productivity; enabling people to consume more of a variety of goods and services.

Materials

Sample of bronze

Student Questionnaire Sheet

Student Homework Sheet

Cleveland Museum of Art's web site: www.clevelandart.org

Internet Access for students

Handout: Short Introduction to Chinese Bronzes
Handout: Chinese Bronzes: Discovering Their Uses
Handout: Chinese Bronzes: Discovering Their Uses **ANSWERS**
Handout: Ancient China Barter and Trade Good Cards
Handout: Ancient Chinese Coins

Resources Books including but not limited to:

Blunden, Caroline and Mark Elvin. *Cultural Atlas of China* (revised edition). England: Checkmark Press, 1983.
Cotterel, Arthur. *Eyewitness: Ancient China*. London; DK CHILDREN, 2000.
Cluna, Craig. *Art in China (Oxford History of Art Series)*. Oxford: Oxford University Press, 1997.
Debaine-Francfort, Corinne. *Discoveries: Search for Ancient China*. New York: Harry N. Abrams, 1999.
Jean, Georges. *Discoveries: Writing*. New York: Harry N. Abrams, 1992.
Knowles, Christopher. *Fodor's Exploring China, 4th Edition*. New York; Fodor's, 2001.
Sullivan, Michael. *The Arts of China*. Berkeley: University of California Press, 2000.
Tregear, Mary. *Chinese Art (World of Art)*. London: Thames & Hudson, 1997.
Yang, Xiaoneng (Editor). *The Golden Age of Chinese Archaeology*. Washington: National Gallery of Art, 1999.

Tempera paints in a variety of green shades, a deep blue and a rust-colored brown, paper cups, fine brushes, q-tips, glue sticks, tag board scissors, pencils

Procedure

Activity 1

1. Allow students to observe your object without saying its medium (bronze).
2. Pass out the Student Questionnaire. Have students hypothesize as to what medium was used to create the object. Students then complete the first page of the questionnaire.
3. Inform them that it is bronze. Explain the key concepts related to bronzes.
4. For homework, the students should each pick three Chinese bronze art objects from Cleveland Museum of Art using the museum's web site. They will describe them by giving the title of the piece, its time period, its accession number, and its measurements. In addition, students will then give two examples of how bronzes are used today.

Activity 2

1. Set up a resource library in the classroom.
2. Pass out the Short Introduction to Bronzes Handout. Have the students read the handout and take notes.
3. Have the students work as a group to discuss all the major issues described in the handout.
4. Explain to the students that they will be researching the uses of a variety of bronzes objects.

5. Pass out the Chinese Bronzes: Discovering Their Uses Handout. Split the class up into groups and assign each group a page from the handout.
6. Groups should spend one or two class periods researching their page of objects.
7. The teacher should circulate to insure that the students are taking careful notes.
8. When students are finished, have a representative member of each group form a new group and share their information while continuing to take notes (jigsaw exercise).
9. Pass out the answer sheets. Lead a discussion with the students about the objects and their uses.

Activity 3—Bartering versus Using Money

Day 1

1. Explain to the students that they will be bartering for goods.
2. Ask students if they have ever traded something they owned for something they wanted. Invite several students to share examples.
3. Ask the students, who have some experience trading, if some collectibles are more valuable than others. Explain to students that there are usually a variety of factors that make things valuable, including the rarity of the object and the amount of work it takes to prepare the object to be sold.
4. Write the name of each good on the board with the number of cards available in circulation.
5. Pass out the cards, but do not share the unit value with the students. Unevenly distribute the cards. Each student should receive at least one card, some students should receive more.
6. Tell the students that they should circulate a trade cards. They will have 10 minutes to get the most valuable hand.
7. After the bartering period has passed, write out the values of each good on the board:
 - a. 8 hay—10 units
 - b. 5 wool—10 units
 - c. 2 cotton—20 units
 - d. 2 rhubarb—20 units
 - e. 3 silverwork—20 units
 - f. 1 lapis lazuli—20 units
 - g. 2 carpet—20 units
 - h. 4 camels—20 units
 - i. 1 cheese—20 units
 - j. 2 oil—20 units
 - k. 2 prepared pigments—20 units
 - l. leather boots—20 units
 - m. 2 woven cottons—20 units
 - n. 2 woolen clothes—20 units
 - o. 2 metal weapons—20 units
 - p. 2 medicine—20 units
 - q. 1 milled paper—20 units
 - r. 2 herbal medicine—30 units

- s. 3 horses—30 units
 - t. 1 melons—30 units
 - u. 4 porcelain—30 units
 - v. 2 jade—30 units
 - w. 4 Silk—40 units
 - x. 1 grapes—40 units
 - y. 1 wine—40 units
 - z. 1 peaches—40 units
 - aa. 2 finished silk—50 units
8. Ask the students to tally their hands.
 9. For homework, they should write a journal entry the good and bad aspects of bartering.

Day 2

1. Students will create replicas of ancient Chinese coins to use in a commerce activity.
2. Pass out the Coins of Ancient China handout. Tell the students that they will be minting coins, sort of.
3. Show the students the bronzes from the Cleveland Museum of Art. Ask them to describe the variety of colors seen on the bronzes.
4. Place a variety of green shades, a deep blue and rust-colored brown tempera paints in cups for students to share. Have them use fine brushes or else q-tip to make their coins resemble real bronze.
5. Once the painting were dry, have the students use glue sticks to affix the paintings to tag board.
6. Once dry, have the students carefully cut out their coins. It is important that they write their names on the back of the coins.

Day 3

1. Write the values for each coin on the board.
 - a. round coins—worth 5 units
 - b. spade shaped coins—worth 10 units
 - c. knife shaped coins—worth 20 units
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2. Write the unit values for each type of good on the board. Pass out the good cards. Again, unevenly distribute the cards. Each student should receive at least one card, some students should receive more.
 3. Tell the students that they will have 10 minutes to buy and sell goods. The goal is to end up with the most coins.
 4. After 10 minutes are up, have the students tally the amount of coins that they have. After this is done, have the students circulate and return their coins to the actual owners.
 5. After this activity, lead a discussion about the similarities and differences of bartering and selling. Invite students to share their experiences in both activities—some who were successful in getting what they wanted and some who were not.

Evaluation

- A. Students will complete the student questionnaire. Class will discuss and share their findings with one another, looking for similarities and differences.
- B. Student created “bronze” coins will be bartered for a better understanding of exchanging for goods.

Enrichment

- A. Coins could be used for addition and subtraction problems, counting, and place value lessons.
- B. Conduct an independent study on a specific topic related to bronze.
- C. Create a review game following the format of their favorite TV game show or board game.
- D. Develop an ancient Chinese timeline, marking dates of significant Chinese inventions across a wall in their classroom.
- E. Transform the classroom into a replica of a museum of Chinese art by displaying all student-created works, listing background information and historical significance with each piece. Students could then invite other classes to learn about ancient China from their efforts.

Ohio State Standards (Benchmarks for Grades 4-8)

1. Analyze different perspectives on a topic obtained from a variety of sources. (A)
2. Interpret relationships between events shown on multiple-tier timelines. (A)
3. Describe the political and social characteristics of early civilizations and their enduring impact on later civilizations. (A)
4. Compare cultural practices, products, and perspectives of past civilizations in order to understand commonality and diversity in cultures. (A)
5. Explain how contact between different cultures impacts the diffusion of belief systems, art, science, technology, language and forms of government. (A)
6. Explain the reasons that people, products and ideas move from place to place and the effects of that movement on geographic patterns. (A)
7. Explain how the endowment and development of productive resources affect economic decisions and global interactions. (A)
8. Explain why trade occurs and how historical patterns of trade have contributed to global interdependence. (A)
9. Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life. (B)
10. Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations, and appropriate tools. (B)
11. Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions. (B)
12. Use skills of scientific inquiry processes (e.g., hypothesis, record keeping, description and explanation). (B)
13. Use text features and graphics to organize, analyze and draw inferences from content and to gain additional information. (C)
14. Use observation and inference to hypothesize the function of the artifacts. (C)

- (A) Benchmark objectives in the Ohio Department of Education's Academic Content Standards in Social Studies for grades 6,7, 8.
- (B) Benchmark objectives in the Ohio Department of Education's Academic Content Standards in Science for grades 6,7, 8.
- (C) Benchmark objectives in the Ohio Department of Education's Academic Content Standards in Language Arts for grades 4, 5, 6, 7.

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