

Students' Ideas About Columbus

On pages 3 and 4 is a student questionnaire we used to study what students already know about Columbus, and what misconceptions they may have. You can use this questionnaire as a pre- and post-test for the planetarium program *Who "Discovered" America?* and the classroom activities. We devised and administered the student questionnaire about what Columbus set out to do, what he accomplished, and the consequences of his voyages. Based on pilot studies, the questionnaire allowed for several kinds of responses, including multiple choice, essay, true-or-false, and drawings. We administered these questionnaires to 279 students in grades four through eight at four San Francisco Bay Area schools. Two of the schools were inner city schools with multi-ethnic school populations. The other two were suburban schools. Here are the results of our study.

Results of Our Pilot Study

Recall of basic information.

We asked the students to name the three ships that Columbus used on his first voyage, so that they would feel a sense of accomplishment and be more willing to answer the essay questions that followed. We were quite surprised to find that, even ignoring spelling errors, only 32% of the students could name all three ships. Fifteen percent of students named the Mayflower as one of his ships!

Stories about Columbus state that he was born in Italy and sailed from Spain. This appears to be a source of confusion. When asked a true-or-false question about whether or not he was born in Seville, Spain, 55% of the students said it was true. When asked if he was born in Genoa, Italy, 53% of the students said it was false. Given that the most likely distribution of responses to any true-or-false question is 50%, it appears that few students know the simple facts of Columbus's life. Our own research uncovered disagreements with the view that Columbus was born in Genoa, but such scholarly arguments have not found their way into the popular literature.

Size and shape of the world.

Perhaps the most influential American biography of Columbus is Washington Irving's *Life and Voyages of Columbus* written in 1830. This volume gives the impression that Columbus was alone in maintaining that the world is round, and that sailors were afraid to sail with

Columbus because they thought they would fall off the edge of the world. Many adults recall vivid illustrations of this idea in books they have read about Columbus. This idea is completely untrue. The idea that the world is shaped like a ball originated in ancient Greece. By 300 B.C., Eratosthenes, the librarian at Alexandria, Egypt, had devised a method of measuring the Earth's circumference. In Columbus's time the argument was about how far the journey was likely to be, not the shape of the Earth.

The results of our pilot study indicated that the old myths still prevail. When asked if it was true or false that "In Columbus's day, most educated people agreed that the world is round like a ball," 66% percent thought it was false. 73% percent thought that "Columbus was the first to believe that the world is round like a ball." When asked if people were afraid to go on Columbus's ships because "they thought they would fall off the edge of the world," 85% agreed. Only 49% agreed that the sailors "thought they would run out of food and water before they reached land."

What did Columbus prove?

Columbus's aim was to find a more practical way of reaching Asia than by sailing around Africa. By doing so, he believed that he and his heirs would become wealthy.

He was open to the possibility of finding new islands on the journey, but he never suspected that he might encounter unknown continents. He was never concerned with proving that the Earth was ball-shaped.

Our research showed that 82% of the students believed the myth that Columbus proved the world is round like a ball. Only among the fifth graders was there 45% that disagreed. When asked the open-ended question, “Why did Columbus want to sail to the Indies? List as many reasons as you can,” 31% answered that he wanted to find spices and gold. 27% said he wanted to prove the world was round. 14% said he wanted to discover new lands.

Did Columbus discover America? Why or why not?

This is a complicated question, and we were pleased to find that many students had interesting ideas about it. Overall, 36% of the students gave reasons why they believed Columbus discovered America, 42% gave reasons why he did not, and 22% did not justify their answers at all. The reasons they gave broke down as follows:

Yes, he did discover America.....	36%
• because teachers or books say so.....	10%
• various other reasons.....	26%
No, he did not discover America	42%
• Indians discovered it first.....	22%
• Vikings came first, or other reasons.....	20%
No justified answer	22%

The effect on Native Americans.

How did Columbus’s arrival affect the people who already lived in America?” We were disappointed to find that students had a very limited perspective on the results of Columbus’s voyages. According to historical records within a few years of Columbus’s first voyage, millions died from fights with European forces and from disease. Columbus sent 500 Native people as slaves to Spain on his second voyage. However, only five percent of the students mentioned these dire consequences. Eight percent of the students noted that the Indians lost their lands. 13% said that the Indians were angry at, scared, or surprised by their encounters with the Europeans. 28% gave a wide variety of other answers. 46% did not answer the question at all. It is not surprising that students are unaware of the tremendously destructive effect that European contact had on the Native Americans. The elementary and middle school text and trade books we inspected tended to gloss over that aspect of the settlement of the Americas or did not mention it at all.

What Does the Study Tell Us?

The results of our preliminary study strike a familiar chord, which echoes the headline news reports on the poor science and mathematics test scores of U.S. students in the past few years. We found that students had little understanding of what Columbus attempted to do, what he accomplished, and the consequences of his voyages to the American continents. Myths about Columbus are still widespread. However, there were two bright spots in our study. The first was a sample of 60 fifth graders, who seemed more knowledgeable about Columbus than the other classes. This suggests that specific instruction by a knowledgeable teacher may have made the difference. The second was that many students had interesting thoughts concerning whether or not Columbus should be credited with the discovery of America. Taken together, these findings suggest that:

1. Students in upper elementary and middle schools have a great deal to learn about Columbus’s experiment.
2. Students in this age range are thoughtful and capable of responding to new information that captures their attention and holds their interest.

If you use this student questionnaire, we’d like to know the results. Please send your responses to: Cary Sneider, Lawrence Hall of Science, University of California, Berkeley, CA 94720.

Questionnaire: What Are Your Ideas About Columbus

Please answer these questions in your own words.

1. What were the names of Columbus's ships?

2. People knew that the direction to the Indies by land was east. Columbus said that you could get there by sailing west. How did he explain this?

3. Columbus asked for ships and a crew, and he was turned down many times. Why was he turned down?

4. Why did Columbus want to sail to the Indies? List as many reasons as you can.

5. People say that Columbus discovered America. Do you agree? Why or why not?

6. How did Columbus's arrival affect the people who already lived in America?

Questionnaire: What Are Your Ideas About Columbus (p. 2)

Please circle the word TRUE or FALSE to show your opinion of each statement.

TRUE FALSE

7. Columbus was born in Seville, Spain.

TRUE FALSE

8. Columbus was born in Genoa, Italy.

TRUE FALSE

9. Columbus was the first to believe that the world is round like a ball.

TRUE FALSE

10. In Columbus's day, most educated people agreed that the world is round like a ball.

TRUE FALSE

11. Columbus proved the world is round like a ball.

TRUE FALSE

12. People were afraid to go on Columbus's ships because they thought they'd fall off the edge of the world.

TRUE FALSE

13. People were afraid to go on Columbus's ships because they thought they would run out of food and water before reaching Asia.

TRUE FALSE

14. Columbus made four voyages to the Americas.

TRUE FALSE

15. Columbus died thinking that the Americas were really "The Indies" (China and Japan.)

Questionnaire Answer Key

1. Niña, Pinta, and Santa Maria were the names of Columbus's three ships.
2. Columbus knew that the world is shaped like a ball. So, if you sail west, you will eventually get to the Indies. If you keep going west by land and sea you'll end up where you started.
3. Columbus was turned down because other people believed the distance across the Ocean Sea from Spain to the Indies was much larger than Columbus thought it to be. They feared the ships would run out of food and water long before reaching the Indies.
4. He wanted to bring back gold, spices, silks, and other valuable items for trade throughout Europe. The advantage of a short water route to the Indies was to save on food, supplies, and the taxes at various ports and cities. If Columbus could bring goods to market more cheaply, he could undersell the competition. Also, if he encountered any Native peoples, he wanted to either convert them to Christianity or bring them back as slaves.
5. If students say "Yes," they may explain by saying that he "discovered" America from the viewpoint of Europeans who had not known about these continents before. If students say "No," then they may justify their answer by saying that Columbus did not know he had discovered a new continent; and/or that people already lived in the Americas when he arrived, and/or that other explorers from many continents had visited the Americas long before Columbus.
6. Millions of the people living in the Americas lost their lands, died by disease or suicide, or were killed outright by the Spaniards.
7. False. Columbus sailed from Seville, but was not born there.
8. True. There is considerable evidence that Columbus was born in Genoa, Italy.
9. False. It was widely believed that the Earth is round like a ball for over 1,800 years before Columbus.
10. True. In Columbus's day, most educated people knew that the Earth is a ball. This was especially true of sailors who had visited southern lands and seen the North Star disappear below the horizon when they crossed the equator.
11. False. Over 1,800 years before Columbus, ancient Greeks made various observations that supported the idea that the Earth is round. For example, as ships disappear over the horizon, we see their sails disappear last. The shape of the Earth's shadow on the moon is always round. Sailors who traveled far to the south observed different stars than they did in the northern skies. None of these lines of evidence "proved" that the Earth was round, but rather, led people to believe that the ball-shaped Earth idea was correct. Perhaps the most convincing evidence are photographs of the entire Earth taken by twentieth-century astronauts from space.
12. False. Sailors already knew that the Earth is shaped like a ball, and that there is no "edge" to the world.
13. True. Sailors were correct in believing that the Earth was bigger than Columbus thought and the distances greater. They feared they would run out of food and water before reaching the Indies. Luckily for them, the Americas were on their route between Spain and the Indies, so they were able to replenish their supplies.
14. True. Columbus explored the Americas during four voyages. He and his crews departed from Spain in 1492, 1493, 1498, and 1502.
15. True. All evidence is that Columbus died believing that the lands he explored were just off the coast of Japan, China, or India. His hopes of achieving great wealth and power were never realized. At one point he was imprisoned for mistreating Spanish settlers and sent back to Spain in chains.