

Using Geography to Integrate Science and Social Studies by Henry Dircks

The focus of geography in secondary education is generally on the location of cities, states, countries, continents, natural resources, major land formations and bodies of water, international boundaries and interconnecting routes. One of its more important functions in the social studies curriculum is academic skill development through map-reading and design, and the creation and analysis of information on charts and graphs. Geography is also used to help students develop their ability to observe, organize, and analyze information presented in pictures, slides and on video. The importance placed on geography in secondary education has had its peaks and valleys, and now seems to be rising. In the early national era, geography, not history, tended to be the main focus of what we would now call the social studies. In a physically-expanding, largely agrarian nation that was also dependent upon international trade, a subject that focused on map skills, international and domestic trade routes and land formations, had more concrete value than stories of great deeds by heroic figures from the past. However, as the study of history became associated with explanation and nation building during the 19th and 20th centuries, geography was eclipsed. In social studies classes, geography continued to provide students with information that teachers believed they needed to memorize, but curricula were organized around history. In recent decades, two factors have contributed to a resurgence of geography within the social studies - a focus on global interdependence, including increased attention on the non-Western world, its contributions to world history and culture and its role in contemporary world affairs, and concern for the impacts of environmental issues like pollution, resource depletion, and global warming, on the quality of human life. Geography, while still generally taught within the context of history or current events, has become crucial for defining and comparing regions of the world, and for understanding the relationship between people and place, the migration of people plants and animals, the ways that the physical world influences human development, and the ways human development has changed the physical world. An example of an area where geography enriches our understanding of history is the study of the impact of post-Colombian exchange that, among other things, brought crops like sugar cane to the Americas and potatoes to Eurasia and Africa. Results of the introduction of potatoes into Ireland included concentration on one crop agriculture, a rapid increase in population from approximately 1.5 million people in 1760 to 9 million people in 1840, a devastating potato famine between 1845 and 1852, and the death or emigration of millions of people. Geography also contributes to the interdisciplinary nature of the social studies by introducing understanding drawn from the natural and physical sciences about climate, agriculture, and the use of resources like air, water and land. These topics are particularly important when preparing students to participate in decision-making as active citizens.

Ecological Disasters - Acts of Nature or People?

Materials: Water, Plastic Container, Sponge, Plastic Wrap, Tape, Pitcher, 1 lb. Weight

Motivation: The world is a changing place. The Sahara Desert is expanding into the Sahel region of Africa. Forests have disappeared in Northern India and Haiti. Flooding threatens human life and property along the Mississippi River. Are these changes caused by acts of nature or the actions of people? The activity that follows illustrates the importance of preserving marshlands to minimize the devastation caused by flooding.

Directions:

1. Place a dry sponge in the open plastic containers. This represents marshland.
2. Slowly pour in a measured amount of water. This represents spring floods caused by snow melting in the Mississippi River's watershed area. The sponge absorbs the water.
3. Wring out the sponge and pour water back into the measuring pitcher.
4. Wrap the sponge with plastic wrap and secure the wrap with tape. Place the sponge in its position in the container, and place the 1 lb. weight on top of it. This represents man's paving and development of the marshlands.
5. Slowly pour the same measured amount of water into the plastic container. The water should be displaced by the covered sponge and overflows the container. This represents flooding of the river system.

Questions:

1. Why did the water overflow the "banks" of the container?
2. How did the marshlands alleviate the effects of the melting snow and rain?
3. How do the actions of man contribute to flooding along rivers?

Learning Activity: How do monsoons work?

Materials: Large map of India, Cloth sheet (with words "Hot Air Over Subcontinent"); Blue Latex Balloons (with words "Cool, Moist Air Over Ocean")

Motivation: Unlike rains which periodically move across our region, monsoons pour rains down upon the Indian subcontinent for months at a time. Why might the rains last for such a long period of time? Let students brainstorm possible scientific causes. This activity demonstrates the basic cause of the monsoon rains.

Directions:

1. Place large map of India on the floor. Place the cloth sheet over the subcontinent on the large map. Explain that during dry season in Indian year, the air over the subcontinent is heated. Ask: what happens to air that is heated? It rises.
2. Blow up the balloons and place them on either side of the sheet, roughly over the Bay of Bengal and Arabian Sea. Explain that this is moist air over the Indian Ocean region.
3. 4 volunteers should grasp corners of the sheet. On the count of 3, they should pull the sheet up quickly. Observe what happens to the balloons when the sheet is raised.

Questions:

1. What happens to the balloons? Why? (Rising air causes vacuum beneath it; moist air rushes in to fill vacuum)
2. How does this help explain how monsoons work?

Learning Activity: Why is there a hole in the Ozone Layer?

Materials: Graduated Cylinder, Food coloring, Water, Vegetable Oil, Liquid Detergent, Eyedroppers

Motivation: The ozone layer protects the world from the sun's harmful ultraviolet radiation. Through the use of chlorofluorocarbons (CFC's), people have depleted the fragile ozone layer and left a hole in the layer over the Antarctic. This activity demonstrates how the ozone layer protects our atmosphere and how it is endangered.

Directions:

1. Fill the graduated cylinder halfway with water. Explain that this represents the Earth's atmosphere.
2. Pour a small amount of vegetable oil into the cylinder and allow it to collect and form a thin layer over the water. Explain that this represents the Ozone Layer.
3. Using the eyedropper, pour drops of food coloring onto oil layer. The layer should keep food coloring from entering the water. These drops represent the ultraviolet radiation that is reflected by the Ozone Layer.
4. Explain that liquid detergent represents CFC's which man has released into atmosphere. With drops of food coloring suspended on layer of oil, pour a drop of detergent in cylinder. Detergent should break up oil and allow food coloring to seep into water, coloring it.

Questions:

1. What happened when the detergent was dropped onto the layer of oil?
2. How does the activity demonstrate the actions of the Ozone Layer and CFC's?
3. Can this effect be reversed?

Learning Activity: Global Warming - Does it really work?

Materials: 2 Plastic Containers with Lids, Vinegar, 2 Scientific Thermometers, Baking Soda, 2 250-Watt Spotlights

Motivation: Scientists warn against rising levels of carbon dioxide and other gases in our atmosphere. The presence of these gases causes the average temperature worldwide to increase. These small increases may seem harmless, but their effects could be monumental. Have students brainstorm effects of increased temperature regarding the following topics: desertification, sea level, migration of people, wildlife and plant life, daily living by humans.

Directions:

1. Place two plastic containers side by side. In the bottom of both, place a half-inch of vinegar. On the sides of both, affix a thermometer. Put the lid on one container.
2. Into the other container, pour baking soda. Allow approximately 30 seconds for the baking soda and vinegar to react, and fill the container with CO₂. Then cover the container.
3. Place the two containers under the spotlights.
4. Allow approximately five minutes to pass. Have student observer record the temperatures in each container.

Questions:

1. How do the closed containers represent?
2. How did the two containers differ? How did this affect the demonstration? Why?
3. Does Global Warming really work? How does the demonstration prove it?