

Twin Studies and the Nature/Nurture Debate

Lesson Plan

Grade Level: 6-8

Curriculum Focus: Human Body

Lesson Duration: One class period

Student Objectives

- Learn the genetic nature of identical twins.
- Explore studies on identical twins that bring data to the heredity/environment controversy regarding personality development.
- Make a list of questions they would ask if they were performing such a study

Materials

- Discovery School video on *unitedstreaming: The Mystery of Twins*
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- Identical Genes: The Science of Identical Twins
- Separated at Birth: Environment vs. Heredity in Identical Twins
- Research materials on genetics, particularly on twins
- Computer with Internet access

Procedures

1. Initiate a class discussion about the heredity-versus-environment issue. Do your students think that heredity is the primary influence over human personality development, or do they think that a child's experiences and associations are more influential?
2. Continue the discussion by asking students to come up with ways the question could be scientifically investigated.
3. If your students have not brought up twin studies, ask them why a pair of identical twins who had been separated at birth, raised in different environments, and reunited as adults could be excellent subjects for a study of the effects of heredity versus environment on personality development. (Make sure students understand that identical twins are genetically identical.)
4. Ask the class how they would interpret the following sets of data: (a) each identical twin in the pair has a very different personality and lifestyle; (b) the twins are unbelievably similar, not only in physical appearance, but also in personality and lifestyle.

5. Divide your class into groups. Challenge each group to devise a questionnaire with at least 10 questions they would ask each of the twins in a study designed to weigh the effects of heredity and those of environment on personality development.
6. Have students do research on the Internet to find the results of actual studies that have been done using separated identical twins as subjects.
7. Have students play the roles of the separated identical twins and fill in their own questionnaires based on findings from their research.

Discussion Questions

1. Explain what steps should be taken by scientists studying twins to avoid possible invasion of privacy.
2. What might explain the extraordinary similarities between identical twins separated soon after birth, reared in different environments, and reunited for the first time as adults?
3. What do twin studies indicate about the influence of the environment and the complex interaction of genes on our personality, intellectual ability and emotions such as happiness?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Student's questions are all thoughtfully designed; questions well phrased and unambiguous; at least 10 questions.
- 2 points: Student's questions are mostly thoughtfully designed; phrasing of some questions awkward or unclear; at least 10 questions.
- 1 point: Student's questions reflect little thought; phrasing of many questions awkward or unclear; fewer than 10 questions.

Vocabulary

behaviorism

Definition: A school of psychology that takes the objective evidence of behavior (as measured responses to stimuli) as the only concern of its research and the only basis of its theory, without reference to conscious experience.

Context: American psychology went through a reign of behaviorism.

genes

Definition: A specific sequence of nucleotides in DNA or RNA that is the functional unit of inheritance controlling the transmission and expression of one or more traits.

Context: Identical twins are a miracle of nature: two people with the same set of genes.

identical twins

Definition: Two persons closely resembling each other who share the same set of genes.

Context: Most identical twins have identical backgrounds.

telepathically

Definition: Communication from one mind to another by extrasensory means.

Context: It has been suggested that twins have the ability to communicate telepathically.

ultrasound

Definition: A technique involving the formation of a two-dimensional image used for the examination and measurement of internal body structures and the detection of bodily abnormalities; also known as sonography.

Context: These pictures are captured with ultrasound.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Diversity and adaptations of organisms; reproduction and heredity

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science – Life Science: Understands the genetic basis for the transfer of biological characteristics from one generation to the next.
 - Science – Life Science: Understands the basic concept of evolution of a species.
 - Science – Nature of Science: Understands the nature of scientific knowledge.
 - Science – Nature of Science: Understands the nature of scientific inquiry.
 - Science – Nature of Science: Understands the scientific enterprise.
 - Technology: Understands the interactions of science, technology and society.
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the [Discoveryschool.com](http://www.discoveryschool.com) Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>

