

Assignment Discovery Online Curriculum

Lesson title:

Nature Versus Nurture

Grade level:

9-12, with adaptation for younger students

Subject area:

Human Body
Contemporary Studies
Behavioral Science

Duration:

Two class periods

Objectives:

Students will

1. learn that environment can influence some personality traits, while others are genetic;
2. understand that the most effective way to study the concept of nature versus nurture is by conducting research with identical and fraternal twins reared separately and together; and
3. discover that the issues of nature versus nurture are still debated in the scientific community.

Materials:

- Computer with Internet access
- Copies of Classroom Activity Sheet: Analyzing Twin Studies
- Printouts of three twin studies from these Web sites:
 - <http://www.mugu.com/cgi-bin/Upstream/Issues/psychology/IQ/bouchard-twins.html>
 - <http://www.thetimes.co.uk/article/0,,2-96428,00.html>
 - <http://www.ncbi.nlm.nih.gov/htbin-post/Entrez/query?db=m&form=6&uid=10808236&dopt=r>
- Copies of Take-Home Activity Sheet: What Do You Think?

Procedures:

1. Begin the lesson by asking students what they think determines their likes, dislikes, and personality characteristics. Is it their genetic makeup or their environment? Discuss their ideas.
2. Explain that researchers have been debating this question for centuries. This debate is referred to as “nature versus nurture.” Researchers have studied identical and fraternal twins to try to determine whether genetics (nature) or environment (nurture) has a greater effect on personality development. Identical twins, or monozygotic twins, come from the same fertilized egg. In the earliest stages of development, the egg splits into two zygotes, creating two individuals with the same genetic code. Fraternal twins, or dizygotic twins, develop from two eggs, and each has its own genetic makeup.

3. Explain that some of the most conclusive research has studied identical and fraternal twins who were raised apart. Scientists have been able to determine whether characteristics such as personality traits, talents, and occupational preferences are a result of environment or genes. Similar characteristics among identical twins reared apart might indicate that environment does not play the biggest role. Different characteristics might indicate the opposite. By comparing fraternal and identical twins, scientists can refine their findings. If identical twins raised in different homes have many similarities but fraternal twins raised apart have nothing in common, scientists can conclude that genes are more important than environment in determining personality traits.
4. Tell students that they will read summaries of three twin studies. Give each student a copy of the Classroom Activity Sheet: Analyzing Twin Studies. The studies can be printed out from the following Web sites:
 - <http://www.mugu.com/cgi-bin/Upstream/Issues/psychology/IQ/bouchard-twins.html>
 - <http://www.thetimes.co.uk/article/0,,2-96428,00.html>
 - <http://www.ncbi.nlm.nih.gov/htbin-post/Entrez/query?db=m&form=6&uid=10808236&dopt=r>
5. Working individually or with partners, students should review the studies and record the answers to the following questions for each one:
 - What is the hypothesis?
 - What is the sample size?
 - How are the findings summarized?
 - What do you think the data say about nature versus nurture?
 - Compare the data for identical and fraternal twins. What conclusions does the study draw about nature versus nurture?
6. Give students time in class to complete the Classroom Activity Sheet. If more time is needed, have them complete the sheet as homework. After students have completed the assignment, discuss the following:
 - What conclusions about nature versus nurture emerge from each study?
 - Do you think these studies are conclusive? Why or why not?
 - Do you think sample size has anything to do with the validity of the conclusions? Why or why not?
7. Assign the Take-Home Activity Sheet: What Do You Think? Explain to students that after reviewing studies about nature versus nurture, they will write paragraphs summarizing their own ideas. Students may want to consider these issues: traits inherited from their parents; the effects of their upbringing; the influence of their friends; and the effect of the media on their personality development. If time permits, have students share their paragraphs during the next class period.

Adaptation for younger students:

Divide the class into three groups and have each group summarize and present the findings from one of the three studies. Based on these studies, what conclusions can the class draw about nature

versus nurture? Does one study seem stronger than the others? Why or why not? Do students find any of the results surprising? On what evidence do students base their opinions? For more information, middle school students may go to the following Web site:

Twins

<http://school.discovery.com/lessonplans/programs/themysteryoftwins/index.html>

Discussion Questions:

1. Do you think personality traits are primarily inherited or influenced by environment? What is your evidence?
2. Why do you think nature versus nurture is debated? Do you think it is possible to answer this question definitively? Why or why not?
3. Who might be most interested in resolving the nature versus nurture debate? What effect might a resolution have on our society?
4. If you were raising identical twins, what might you do to make sure that they were unique individuals? Explain your answer.
5. Based on what you have learned, do you think it is possible to change your personality? Why or why not? If so, how would you go about making changes?
6. If you are not a twin, would you rather be an identical or a fraternal twin? Why? What do you think would be some of the challenges of being a twin? If you are a twin, write a couple of sentences about the experience. Is it fun? Difficult? If you have other siblings, is your relationship with your twin different from the relationship with your other siblings? If so, what makes it different?

Evaluation:

You can evaluate your students using the following three-point rubric:

Three points: accurate and thorough answers to all the questions; synthesis of the information and development of thoughtful conclusions; completion of the Take-Home Activity Sheet

Two points: accurate and thorough answers to most of the questions; synthesis of most of the information and development of partially thoughtful conclusions; completion of most of the Take-Home Activity Sheet

One point: answers to few of the questions, with incomplete responses; failure to synthesize information and development of only a few conclusions; failure to complete the Take-Home Activity Sheet

Extensions:

Attachment Theory

In the late 1950s, psychologist Harry Harlow studied the effects of maternal deprivation on the development of baby monkeys. Using a wire artificial mother and a cloth artificial mother, both of which offered nourishment to the monkeys, Harlow found that the monkeys drew more comfort from the cloth model. He hypothesized that the monkeys needed the warmth and comfort that the cloth appeared to offer. This hypothesis was confirmed by putting the monkeys in a new environment with the wire and cloth mothers. The monkeys felt safe and secure enough to explore the strange environment when the cloth mother was present but not in the wire mother's presence. Harlow also deprived monkeys of contact with any kind of mother for the first eight months of their lives. He found that these monkeys could not later form attachments to any mother figure.

What do these findings say about nature versus nurture? How do these studies indicate the close relationship between genetic makeup and upbringing? Write several paragraphs to explain your ideas.

Research on Adolescents

In the past decade, scientists have conducted a great deal of research on adolescent development. One study found that girls who go through early puberty tend to be at greater risk of developing emotional problems and tend to be less confident than peers who develop later, while boys who experience early puberty tend to be more confident and successful than peers who develop later. Have students debate these findings. Divide the class into two teams, each including boys and girls. Have one team argue in favor of these results and one against them. Suggest that students include what they have learned about nature versus nurture. Before beginning the debate, tell students that the conclusions of one study are not necessarily accurate. In social science fields, researchers continue to refine findings with new information and more sophisticated experimental techniques.

Suggested Reading:

Stranger in the Nest: Do Parents Really Shape Their Child's Personality, Intelligence, or Character?

David B. Cohen. John Wiley & Sons, 1999.

Parents have always felt great responsibility for the kind of adults their children become. This book attempts to sort which characteristics in children are the result of parenting and which are influenced by genes, or if a combination of both genes and environment influence development. While some of this material is challenging to the reader, lots of examples, research results, and case studies make the text more accessible. Lots of chapter notes and an extensive bibliography are included.

Twins and What They Tell Us About Who We Are

Lawrence Wright. John Wiley & Sons, 1997.

For many years, twins have been the subjects of research to determine how much of a personality is controlled by genes. Using insights from many research studies, the author explains not only our genetic influences but also how studies have been manipulated by others to promote any number of false results, both in the past and present. A lengthy bibliography provides further reading.

Vocabulary:

dizygotic twins

Definition: Twins derived from two fertilized eggs, each with unique genetic makeup, that develop at the same time.

Context: **Dizygotic twins** are genetically as similar as siblings who are not twins.

gene

Definition: A specific sequence of nucleotides in DNA or RNA, located on a chromosome, the functional unit of inheritance that controls the transmission and expression of one or more traits.

Context: Scientists are trying to locate the **gene** that is responsible for Alzheimer's disease so that they can better understand how to treat this condition.

genetics

Definition: A branch of biology that deals with heredity and the variation of organisms.

Context: Gregor Mendel is considered the father of modern **genetics**.

monozygotic twins

Definition: Twins conceived from the same egg and sperm, which split and develop into two persons with the same set of genes.

Context: Most **monozygotic twins** look so much alike that they are difficult to tell apart.

personality

Definition: The distinctive behavioral qualities of a person.

Context: Mary has an outgoing **personality** like her mother's, but her brother Tom is shy like his father.

Academic standards:**Grade level:**

9-12

Subject area:

Life Science

Standard:

Understands the principles of heredity and related concepts.

Benchmark:

Knows that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells; other changes in an organism cannot be passed on.

Grade level:

9-12

Subject area:

Life Science

Standard:

Understands biological evolution and the diversity of life.

Benchmark:

Knows that heritable characteristics, which can be biochemical or anatomical, largely determine what capabilities an organism will have, how it will behave, and how likely it is to survive and reproduce.

Credit:

Jennifer Coggins, freelance writer and education program manager

DiscoverySchool.com

<http://www.discoveryschool.com>

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Analyzing Twin Studies

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Review the twin studies listed below and record the information for each one. Web addresses are provided.

1. Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart
Thomas Bouchard Jr., David Lykken, Matthew McGue, Nancy Segal, Auke Tellegen (Science, October 12, 1990, 223-226 Condensed version: <http://www.mugu.com/cgi-bin/Upstream/Issues/psychology/IQ/bouchard-twins.html>)

Hypothesis:

Sample size:

Summary of findings:

What do you think the data say about nature versus nurture?

Compare the data for identical and fraternal twins.
What conclusions does the study draw about nature versus nurture?

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2. Genetic Correlates of Musical Pitch Recognition in Humans

D. Drayna, A. Manichaikul, M. de Lange, H. Sneider, T.D. Spector (Science, 2001: 1969-1972).
Listed on the Twin Research Center's Web site: <http://www.thetimes.co.uk/article/0,,2-96428,00.html>

Hypothesis:

Sample size:

Summary of findings:

What do you think the data say about nature versus nurture?

Compare the data for identical and fraternal twins.

What conclusions does the study draw about nature versus nurture?

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3. Happy Families: A Twin Study of Humour

L. Cherkas, F. Hochberg, A.J. MacGregor, H. Sneider, and T.D. Spector
(Twin Research, March 3, 2000: 17-22).

Abstract: <http://www.ncbi.nlm.nih.gov/htbin-post/Entrez/query?db=m&form=6&uid=10808236&dopt=r>

Hypothesis:

Sample size:

Summary of findings:

What do you think the data say about nature versus nurture?

Compare the data for identical and fraternal twins.

What conclusions does the study draw about nature versus nurture?

What Do You Think?

After reading the three studies and thinking about nature versus nurture, what do you think determines personality? Do you think your genes are mostly responsible, or has your upbringing played a more significant role? How much do your friends and peer pressure influence your personality?

First, briefly answer the questions below. Then, on the back, write a few paragraphs about your ideas. Try to reach a conclusion as to whether you think nature, nurture, or a combination of both has influenced you the most.

1. Are your personality traits similar to those of your parents? Make a list of the traits you share with your mother and those you share with your father. Refer to this list as you work on your paragraphs.

2. Do you sometimes think that you “can’t help” the way you respond to certain situations? For example, do you find yourself always wanting to be on time for school events? Is this behavior like that of one of your parents? Do you see “nature” winning out in this example? Can you think of similar examples? Can you think of situations in which “nurture” seems to win out?

3. Do your friends influence your behavior? If so, how? Try to be as specific as you can.

4. Are you influenced by what you see and hear in the media? Describe the impact this has on you.

5. Are you influenced by a special adult in your life, such as a relative, a teacher, or a youth group leader? How has this person helped shape your personality?