



From “Designer Jeans” to “Designer Genes”

An Analysis of the Use of Biotechnology in Society Today

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** Note: This lesson plan was adapted from a Genetic Engineering lesson plan posted on <http://school.discovery.com>

Annotation:

This lesson will enable students to discover ethical issues surrounding the practice of genetic engineering in reproductive medicine and understand key terms and concepts related to the science of genetic engineering.

Primary Learning Outcome:

Students should understand the role of ethics in science, evaluate the use of technology to create “designer babies,” assess pros and cons of such genetic manipulation, and become aware of what types of stem cell research, cloning, and genetic advancements are currently taking place in the scientific community.

Assessed GPS:

SB2. Students will analyze how biological traits are passed on to successive generations.

- a. Distinguish between DNA and RNA.
- b. Explain the role of DNA in storing and transmitting cellular information.

SCSh6. Students will communicate scientific investigations and information clearly.

- b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.
- d. Participate in group discussions of scientific investigation and current scientific issues.
- f. Examine the use of DNA technology in forensics, medicine, and agriculture.

SCSh9. Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Read technical texts related to various subject areas.

Materials:

- 1) Designer Babies Video (# 764647) (<http://shopping.discovery.com/stores>)
- 2) A class set of the novel *A Brave New World* by Aldous Huxley
- 3) Computer with Internet access (optional)
- 4) Library resources for research
- 5) Paper, pens, pencils

Total Duration:

Day 1- 1.5 hrs

Day 2- 1.5 hrs

** If reading assignment is included, plan for ~ 20 minutes of discussion per day for the two week duration when students are reading Aldous Huxley's *A Brave New World*

Procedures:**Step 1**

Description: Designer Babies Video (52 minutes), remainder of the class period will be used for discussion and assignment "Different Perspectives on Genetic Engineering." Reading schedule for "A Brave New World" by Aldous Huxley will be assigned for ~ two week duration.

Duration in hours/minutes: Day 1- 1.5 hrs.

Discussion: In groups have students analyze the risks and benefits associated with biotechnology. For example, the removal of hemophilia or other serious disorders from the gene pool is a benefit because people would no longer suffer from a chronic condition. An example of a risk is going too far in selecting the genetic makeup of future children.

Possible risks:

- Relying on eugenics, or selecting the genetic makeup of future children. This practice may give people the power to control some personal traits, such as having blond hair or being tall. Taken to an extreme, this could eliminate some traits.
- Using biotechnology before exploring other options, particularly in reproductive medicine. For example, technology enables scientists to implant an egg from one woman into the uterus of another. But it may not be a good idea to use this technique before trying less extreme techniques first.

Possible benefits:

- Eliminating genetic diseases. For example, geneticists think it may be possible to eliminate genetic diseases such as Tay-Sachs through careful and methodical screening programs.
- Screening unborn babies. This refers to screening for genetic disorders either before a pregnancy takes place or in the early months of a pregnancy. More information would give prospective parents more options in dealing with their infants' problems.
- Treating diseases. For example, scientists are working on ways to insert cells from embryos into cancerous cells as a way to stop the growth of cancer.

Step 2

Description: Research and Analysis of Ethics Involved in Genetic Engineering

Duration in hours/minutes: Day 2- 1.5 hrs.

Allow students to conduct research in order to gain background information so that they can answer the following questions: (** Note: It might be beneficial to allow students to work in pairs to answer and discuss these questions).

- 1) Discuss issues involved with biotechnology and reproductive medicine. For example, the technology may allow a 60-year-old woman to have a baby. Is that a positive or negative outcome? Consider its ramifications. How does this example illustrate some of the complex issues that arise from the use of biotechnology?
- 2) Discuss ways in which biotechnology is becoming a powerful presence in our lives. What areas have been affected by biotechnology? Give at least two examples.
- 3) What safeguards must society adopt to handle the rapid advances in biotechnology?
- 4) To what extent should religious ideology influence bioethics? To what extent should a religious perspective affect the use of biotechnology?
- 5) What are some positive long-term effects of biotechnology? What are some negative long-term effects?
- 6) During World War II, Nazis in Germany conducted experiments to selectively breed blond, blue-eyed men and women. This is an example of eugenics that was detrimental to society. Explain why.

Step 3

Description: Reading of Alexis Hudley's *A Brave New World* and Comparison Paper

Duration in hours/minutes: Ongoing Project (~ two week duration with 10-20 minute discussions each day; may vary depending upon class schedule)

Student will read this novel independently and will discuss the novel as a class for approximately 10-20 minutes per day for the duration of two weeks or so. Students will be asked to write a comparison paper on the novel *Brave New World*, by Aldous Huxley (1932) that compares and contrasts the ethical and societal conflicts in Huxley's society with our society's use of biotechnology.

Assessment:

This lesson will be assessed by evaluating the comparison paper students write on the ethical and societal conflicts in Huxley's society as compared to our society's use of biotechnology. Inferences, extensions, and adaptations of these themes as they relate to scientific advances in today's society should be interpreted as a gauge of a student's understanding of this lesson.

Extension:

Students may discuss as a class fictitious biotechnological advances that they believe they will see in their lifetime, how these advances will come about, what ethical issues may arise with the evolution of even more advanced technology.

Remediation:

Students may be allowed to work on their comparison papers in teams or as a group and may set up individual meetings with the teacher to discuss the key points and analyses of the novel as it relates to ethical and societal issues involving the use of biotechnology.