

## *Designer Babies: Teacher's Guide*

**Grade Level:** 9-12

**Curriculum Focus:** Life Science

**Lesson Duration:** Two class periods

### **Program Description**

It's possible to choose your unborn child's gender. As research advances, parents may soon have more choices available to them: their child's size, hair color, and intelligence. And thanks to gene technology, inherited diseases may become a thing of the past. But how can science answer new ethical questions?

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### **Onscreen Questions**

Part I – Before watching the video

- Think about why some parents might want to choose the gender of their baby. As you watch the program, note the scientific methods physicians use to influence, and in some cases determine, a baby's gender. Consider the pros and cons of such genetic engineering.

Part I – After watching the video

- Genetic treatments that ensure good health, high intelligence, or beauty are scientifically possible to achieve today. Discuss whether these types of genetic manipulation are ethical.
- Where do you think doctors should draw the line?

Part II – Before watching the video

- As researchers decode the human genome, the power to manipulate our genetic makeup grows stronger.
- As you watch the program, pay attention to the debate surrounding genetic manipulation. Consider the ethical dilemmas that scientists and society must face.

Part II – After watching the video

- Genetic manipulation will be a very expensive procedure. How will the cost of genetic treatments determine the types of procedures doctors will perform?
  - What would it mean to have a genetic underclass or upper class in our society?
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## Lesson Plan

### *Student Objectives*

- Discover ethical issues surrounding the practice of genetic engineering in reproductive medicine.
- Understand key terms and concepts related to the science of genetic engineering.

### *Materials*

- Computer with Internet access (optional but very helpful)
- Library resources for research

### *Procedures*

1. Group students into pairs. Ask partners to discuss genes and why they are important. Give students five minutes to discuss and write their ideas.
2. Hold a class discussion about genes. Explain that genes, inherited from parents, are important because they determine much about behavioral, mental, and physical traits. Every gene contains a DNA (deoxyribonucleic acid) code that gives the cell instructions about how to make specific proteins. These proteins form the basis for the structural framework of life.
3. Explain that biotechnology can alter DNA. Scientists insert the genetic instructions to make a specific protein in a cell's DNA. The cell will manufacture the protein, which affects a particular characteristic, and the cell will pass these instructions to its offspring. This gives scientists the ability to improve and alter the basic composition of a living cell.
4. Have students brainstorm risks and benefits associated with biotechnology.

#### **Examples of risks**

- Relying on eugenics, or selecting the genetic makeup of future children. This may give people power to control traits such as hair color or height. It could also eliminate some traits.
- Using biotechnology before exploring other options. For example, implanting an egg from one woman into the uterus of another may not be the best technique without trying other techniques first.

#### **Examples of benefits**

- Eliminating genetic diseases such as Tay-Sachs. Geneticists think it may be possible to eliminate some diseases through methodical screening programs.
- Screening unborn babies for genetic disorders. Prospective parents would have more information and options available.
- Treating diseases. Scientists are working on techniques to insert cells from embryos into cancerous cells to stop the latter from growing.



5. Point out that biotechnology is a powerful tool with many related ethical issues. As a result, the field of bioethics has emerged. This is the study of the ethical implications of biological research and its applications.
6. Tell students they will think about such ethical issues. They will read a scenario about cystic fibrosis and genetic engineering (right) and write a statement from one of five perspectives. Statements should address these questions:
  - Tell students they will think about such ethical issues. They will read a scenario about cystic fibrosis and genetic engineering (right) and write a statement from one of five perspectives. Statements should address these questions:
  - Who is responsible for answering ethical questions – political or religious leaders, lawyers, or others?
  - Should genetic engineering be regulated by federal or state laws? Should a federal agency enforce regulations? Who should be responsible for monitoring the biotechnology industry?
  - What benefits does biotechnology offer? What risks?
7. During the next class period, groups should meet for 15 minutes to develop a consensus. One person will present the consensus to the class.
8. After the groups have presented their positions, have a class discussion. Can the class develop a statement about the government's role in biotechnology? Should biotechnology in reproductive medicine be prohibited? Would government regulations solve any ethical dilemmas?.

## Assessment

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

- **3 points:** Students wrote a clear, succinct, well-researched statement paper; worked cooperatively in a group to develop a consensus of opinion; actively participated in the final class discussion.
- **2 points:** Students wrote a concise statement paper; worked somewhat cooperatively in a group to develop a consensus of opinion; had some involvement in the final class discussion.
- **1 point:** Students did not write a clear, well-researched statement paper; did not work cooperatively in a group to develop a consensus of opinion; had little involvement in the final class discussion.

## Vocabulary

### bioethics

*Definition:* The study of the ethical issues of biological research and applications, especially in medicine

*Context:* Scientists must consider bioethics to make appropriate decisions about some medical procedures.



**biotechnology**

*Definition:* The techniques of managing biological systems for human benefit

*Context:* Advances in biotechnology allow scientists to separate sperm by gender.

**ethics**

*Definition:* A system of moral principles

*Context:* Manipulating genes violates the ethics of some people.

**eugenics**

*Definition:* The science of improving the qualities of a breed or species by different strategies, such as the careful selection of parents or the use of genetic testing

*Context:* Some people argue that designing traits for offspring is reminiscent of eugenics.

**gene**

*Definition:* The functional and physical unit of heredity passed from parent to offspring

*Context:* Introducing healthy genes into diseased cells is becoming an established medical practice.

## *Academic Standards*

### **National Academy of Sciences**

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following science standards:

- Science and Technology: Understandings about science and technology

### **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 link:

<http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Science – Life Sciences: Understands the principles of heredity and related concepts
  - Technology – Understands the relationships among science, technology, society, and the individual
  - Language Arts – Writing: Uses the general skills and strategies of the writing process, Gathers and uses information for research purposes
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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 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>