

Human Genetic Engineering

Pre-Reading

A. Warm-Up Questions

1. What desirable human traits are in your family?
2. What traits in your family are less desirable?
3. Is it ethical for scientists to explore human genetic engineering?

B. Vocabulary Preview

Match up as many words and meanings as you can. Check this exercise again after seeing the words in context on page 2.

- | | |
|----------------------------------|--|
| ___ 1. genes | a) deoxyribonucleic acid, a substance that carries genetic information |
| ___ 2. human genetic engineering | b) reoccurring |
| ___ 3. chronic | c) the study of what is morally right or wrong |
| ___ 4. DNA | d) parts of cells that are inherited and determine human characteristics such as health and appearance |
| ___ 5. controversial | e) a human at a very early stage of life before birth |
| ___ 6. modification | f) a human at a late stage of life before birth |
| ___ 7. embryo | g) a change |
| ___ 8. fetus | h) resulting in many different opinions |
| ___ 9. the norm | i) something that is now expected or commonplace |
| ___ 10. ethics | j) the alteration of human genes before or after birth |



Reading

HUMAN GENETIC ENGINEERING

Are designer genes the way of the future?

1. Human **genes** help determine a person's physical and mental characteristics at birth. Genes also play a big part in the development of diseases. Scientists are now experimenting with **human genetic engineering** (HGE) to correct errors in the **DNA** of living cells. Several HGE experiments have been performed on children and adults with **chronic** diseases. Though some success stories are emerging, scientists admit they have a long road ahead of them.
2. Altering the DNA of an unborn baby is a more **controversial** form of HGE. Unlike a living child or adult whose genes are fully developed, an unborn child's cells are still developing. Performing HGE on an unborn child results in the genetic **modification** of every cell of the developing body. The **embryo** or **fetus** eventually passes this modification on to further generations.
3. Will genetically modified babies eventually become **the norm**? Some countries are more open to the development of HGE technology than others. There is also a division of opinions among scientists. Some fear that gene therapy will destroy the human race. Others believe genetic engineering is the way of the future. World-famous scientist Stephen Hawking once said that humans must explore genetic engineering if they don't want robots and computers to take over the world.
4. It is safe to assume that genetic technology will continue to develop regardless of **ethics**. It is also likely that gene therapy will be extremely costly if it ever becomes an option for expecting parents. Do you agree with Stephen Hawking's warning that we ought to "follow this road if we want biological systems to remain superior to electronic ones"?

"With genetic engineering, we will be able to increase the complexity of our DNA, and improve the human race."

—Stephen Hawking

Comprehension

Discuss these questions in pairs and write the answers in your notebook.

1. How is the subtitle a play on words?
2. What is HGE?
3. What type of HGE is the most controversial?
4. Paraphrase Stephen Hawking's viewpoint about HGE.
5. What does the reading imply about expecting parents of the future?

Vocabulary Review

A. Chunking

Create six words or expressions by pairing the words that are commonly found together in English. Write a sentence for each example.

Word List

- safe to
- designer
- genetic
- engineering
- assume
- DNA
- chronic
- future
- illness
- jeans
- generations
- sample

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Vocabulary Review cont.

B. Odd One Out

Circle the word or phrase that does NOT belong in the group.

- | | | |
|---|---|--|
| 1. a) modification
b) change
c) opposite
d) alteration | 3. a) ethical
b) controversial
c) moral
d) right | 5. a) generation
b) chronic
c) long-term
d) reoccurring |
| 2. a) fetus
b) baby
c) embryo
d) scientist | 4. a) expected
b) acceptable
c) the norm
d) biological | 6. a) genes
b) DNA
c) characteristics
d) exploration |

Discussion

1. Should animals be used for testing related to human genetic engineering?
2. Could eliminating defective genes from the human population result in more trouble than good?
3. Will genetic engineering allow the rich to get smarter and more attractive as well as wealthier?

Critical Thinking

If you had the ability to choose your unborn child's physical and mental characteristics, would you do it? What are the desirable traits that you would choose when developing your designer genes?

Listening

Fill in the blanks as you listen to the recording.

HUMAN GENETIC ENGINEERING

Are designer genes the way of the future?

1. Human _____ help determine a person's physical and mental characteristics at birth. Genes also play a big part in the development of diseases. Scientists are now experimenting with _____ (HGE) to correct errors in the _____ of living cells. Several HGE experiments have been performed on children and adults with _____ diseases. Though some success stories are emerging, scientists admit they have a long road ahead of them.
2. Altering the DNA of an unborn baby is a more _____ form of HGE. Unlike a living child or adult whose genes are fully developed, an unborn child's cells are still developing. Performing HGE on an unborn child results in the genetic _____ of every cell of the developing body. The _____ or _____ eventually passes this modification on to further generations.
3. Will genetically modified babies eventually become _____? Some countries are more open to the development of HGE technology than others. There is also a division of opinions among scientists. Some fear that gene _____ will destroy the human race. Others believe genetic engineering is the way of the future. World-famous scientist Stephen Hawking once said that humans must explore genetic engineering if they don't want _____ and computers to take over the world.
4. It is safe to assume that genetic technology will continue to develop regardless of _____. It is also likely that gene therapy will be extremely costly if it ever becomes an option for expecting parents. Do you agree with Stephen Hawking's warning that we _____ "follow this road if we want biological systems to remain _____ to electronic ones"?

Answer Key

LESSON DESCRIPTION:

In this lesson, students read about the controversial field of human genetic engineering. The lesson includes vocabulary review exercises, comprehension questions, and discussion questions.

TEACHING TIPS:

See *Discussion Starters Teaching Guide* (<https://esllibrary.com/courses/72/lessons/>) for a variety of ways to use the reading.

LEVEL: High Int – Adv

TIME: 1.5–2 hours

TAGS: discussion, genetic engineering, genes, controversial

Pre-Reading

A. WARM-UP QUESTIONS

Answers will vary.

B. VOCABULARY PREVIEW

- | | | | | |
|------|------|------|------|-------|
| 1. d | 3. b | 5. h | 7. e | 9. i |
| 2. j | 4. a | 6. g | 8. f | 10. c |

Reading (and/or Listening)

Read individually, in small groups, or as a class. Discuss the quote. You can also play the listening as your students read along. A gap-fill version of the reading is available on page 5. Help your students with vocabulary and expressions that they are unfamiliar with.

Comprehension

- “Genes” and “jeans” are homophones. They sound the same, but are spelled differently and have different meanings. Designer jeans are expensive denim pants. Designer genes are human cells that scientists physically modify.
- HGE is human genetic engineering. This refers to the scientific practice of modifying human genes.
- The most controversial type of HGE is modification that is done to unborn babies.
- Stephen Hawking feels that humans need to explore HGE if they want to remain in charge of the planet. He suggests that robots and computers could take over the world if we don’t.
- The reading implies that parents of the future may be able to design their babies to have desirable physical and mental traits, though it will be costly. They may also be able to eliminate undesirable traits from their gene pool.

(continued on the next page...)

Answer Key cont.

Vocabulary Review

A. CHUNKING

Individual answers for sentences.

1. safe to assume
2. designer jeans
3. genetic engineering
4. DNA sample
5. chronic illness
6. future generations

B. ODD ONE OUT

1. c
2. d
3. b
4. d
5. a
6. d

Invite students to explain why one word doesn't fit.

Can they think of a word that does fit?

Discussion

Answers will vary. Place students in pairs or small groups.

Critical Thinking

Answers will vary. Place students in pairs or small groups.

Listening

1. genes, human genetic engineering, DNA, chronic
2. controversial, modification, embryo, fetus
3. the norm, therapy, robots
4. ethics, ought to, superior