

LESSON PLAN: Biological Sciences

Genetics and the Ethics of Gene Technology

Grade Level: High School (ages 14-17)

Objectives

Students will be able to:

- describe the history of genetics
- articulate the ethical issues arising from use of gene technology

Materials

- whiteboard and markers
- handouts on the history of genetics and ethical debates associated with gene technology
- excerpt from MAGE (optional)

Introduction (10 minutes):

- begin by asking students what they know about genetics and gene technology
- provide a brief overview of the history and context of genetics, including the discovery of DNA, the significance of the Human Genome Project and how it has led to advancements in gene technology
- explain that while gene technology has the potential to cure diseases and improve lives, it also raises ethical questions about privacy, discrimination, and the limits of scientific knowledge
- distribute the excerpt from MAGE and ask students to read it (optional)

Activity (40 minutes):

- provide students with handouts on the ethical implications of gene technology, including articles and case studies
- discuss the potential benefits of gene technology, such as personalised medicine and the prevention of genetic diseases
- discuss the ethical concerns surrounding gene technology, such as genetic discrimination, the privacy of genetic information, and the potential for eugenics
- ask students to share their thoughts on the benefits and drawbacks of gene technology, as well as the ethical considerations
- ask students to consider how they would balance the potential benefits of gene technology with the ethical concerns
- encourage students to consider real-world examples or proposed uses of gene technology, and how they have been used ethically or unethically

Conclusion (10 minutes):

- summarise the key points of the lesson, including the history and context of genetics and the ethical implications of gene technology
- ask students to reflect on what they have learned about genetics and gene technology

Assessment

- students' understanding of gene technology through their participation in group discussions
- their answers to questions about genetics and gene technology and/or their questions and comments on the excerpt from MAGE



MAGE Excerpt

www.magethenovel.com

www.youtube.com/@magethenovel - free audio version

Throughout much of human history, people have struggled to survive. But now there are eight billion of us, with a quarter of that population enjoying a material standard of living most people who have ever lived could not have dreamed of, and many more aspiring to the same life. Yet our indicators for human consumption and ongoing ability of Earth to support this tell us it's not possible even now, let alone into the future.

The same genetic traits that have been assets in our evolutionary success—including expanding into every available biological niche and becoming the biggest consumers of resources in Earth's history—have become a dangerous liability, and now threaten our survival. Yet, though the evidence of our detrimental activity is all around us, we cannot seem to find the “off” switch for this evolutionary momentum.

Genes, however, are only one factor, a tendency that will play out in the absence of cultural inhibitors to behaviours. Since we can't seem to develop such inhibitors, and don't have an inbuilt switch that trips when we reach sufficiency, we need to edit our genes. The complementary part of the research is that we have developed a way to “switch off” the gene in human DNA. It is also germline gene therapy, which means this change will be passed on to subsequent generations.

ACTIVITY

Divide up into groups of at least two, and write down your group's thoughts on these questions:

What examples can you think of where human behaviour has caused collapse of societies, or parts of ecosystems?

Do you think it would be ethical to edit human DNA to stop this, even if it is an individual choice? Why, or why not?

What about if these 'edits' are passed onto subsequent generations?