

GENETICS AND ETHICS

"What's a GMO?"

By Quentin Bidy



SUMMARY

Students will research the concepts of genetically modified organisms (GMO) such as agricultural crops and animals and discuss the ethics involved. Students will utilize the information to make an informed decision about genetic science and its role in today's society.

ESSENTIAL QUESTION

Overarching : Is everything that is legally acceptable always ethically acceptable? Topical: What is a genetically modified organism (GMO) and how are they produced? What are the ethical dilemmas surrounding GMOs and their use?

DURATION

120 Minutes

TIME FRAME

2 - 3 Class Period(s)

SUBJECT(S)

English/Language Arts, Science

GRADE LEVEL(S)

6th, 7th, 8th, 9th, 10th, 11th, 12th

LESSON SNAPSHOT

1. ENGAGE:

Students will view a video clip in which people on the street are asked what GMO means. Students will engage in discussion about what they know about GMO's and answer the question are GMO's a good or bad thing.

2. EXPLORE:

Students will work in groups and as either a prosecution team or defense team. Students will rotate through stations to gather research about genetically modified organisms.

3. EXPLAIN:

Students will prepare their opening and closing statements, including claims and citing evidence, as well as questions for the opposition.

4. EXTEND:

Students will debate the pros, cons and ethical concerns regarding Genetically Modified Organisms by writing and presenting claims supported by evidence. Students will follow debate/mock court protocol.

5. EVALUATE:

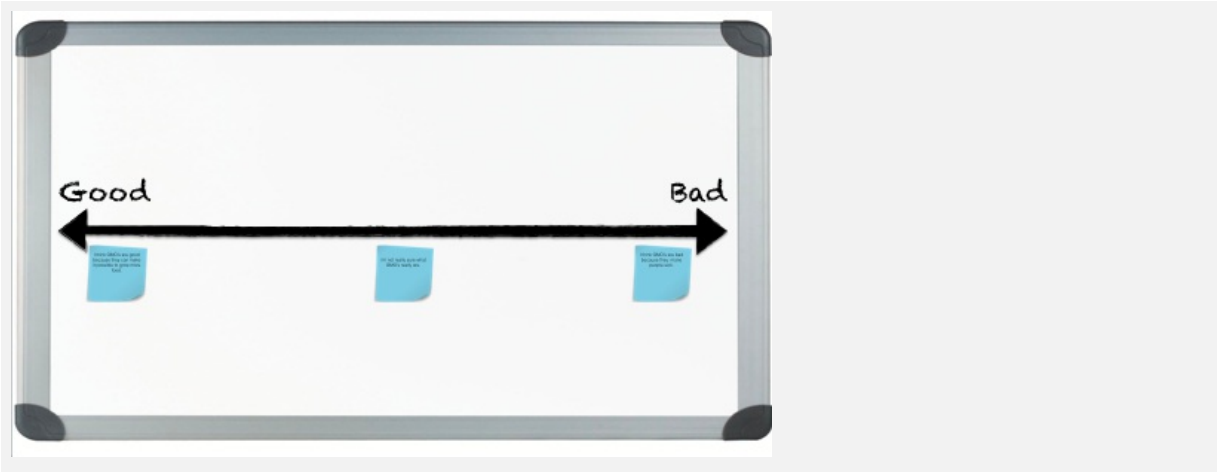
Students not involved in the case will actively listen to each debate/court proceedings as members of the jury. They will use the provided analysis document to "judge" the winner of the case for each group.

LESSON PROCEDURES

1. ENGAGE

Begin by showing the students the video “What is a GMO? - Jimmy Kimmel” (<https://www.youtube.com/watch?v=EzEr23XJwFY>) Ask the students what they know about GMO’s. Leave it wide open for discussion. Have students share their thoughts with the class. Copy them on the board to keep a record of the class list.

Pose the question, “Are GMO’s a good thing or a bad thing?” On the board have a line labeled “Good” on one end and “Bad” on the other end.



Have the students answer the question on a sticky note, making sure students give a reason why they think this, and place it where they think it should be on the line.

TEACHER'S NOTE

There is no right or wrong answer for this activity. This activity is to engage students in seeing the spectrum of viewpoints on an issue. This is a great opportunity to read some of the student responses and engage the students in a discussion around the differing viewpoints.

2. EXPLORE

Inform the students that they will be taking part in a “mock trial” in which they will be debating the issue of genetically modified organisms and the ethics involved. Use the following debate format. Show the students the debate format so they can plan and be familiar with how the debate will proceed:

- Opening Statement (Affirmative: 1 minute)
- Opening Statement (Negative: 1 minute)
- Rebuttal (Negative: 1 minute)
- Rebuttal (Affirmative: 1 minute)
- Cross Examination (Affirmative: 2-3 minutes)
- Cross Examination (Negative: 2-3 minutes)
- Second Rebuttal, or Second Statement (Negative: 1 minute)
- Second Rebuttal, or Second Statement (Affirmative: 1 minute)
- Closing Statement (Negative: 1 minute)
- Closing Statement (Affirmative: 1 minute)
- Second Rebuttal, or Second Statement (Negative: 1 minute)
- Second Rebuttal, or Second Statement (Affirmative: 1 minute)
- Closing Statement (Negative: 1 minute)

- Closing Statement (Affirmative: 1 minute)
- Audience Questions (Optional: 2-5 minutes. Can be moved before Closing Statements.)

You will act as moderator during the debates to keep the students confined to the time limits set. Explain to the students the format and the time allotted for each portion of the debate. You may want to show them sample debates via video clips to prepare them to review this. 2 part tutorial for public debate:

- Part 1 <https://www.youtube.com/watch?v=oN6Z1WKVh8g>
- Part 2 <https://www.youtube.com/watch?v=zeposE11Irg>

During the debate the rest of the class will serve as the jury and will evaluate the arguments based on the rubric you will hand out. Place students into groups of 4-5. Assign half of the groups to serve as prosecution teams and the other half to serve as defense teams on the issue. Tell the students they will be conducting research to use in their debate. They need to locate and cite evidence from a range of sources to support their conclusions. (This will give them a perspective lens with which to analyze the information they will be reviewing.) Assign one prosecution and defense team to each of the following topics or similar topics related to ethics in genetics:

- Genetically Modified Animals
- Genetically Modified Crops in Agriculture

TEACHER'S NOTE

Evidence collection can be done as a gallery walk where the students rotate to each station or all the resources could be provided directly to each group for independent research. However, students should view resources for both sides of the debate in order to multiple sources such as a: news article, research paper, podcast, or some other piece of information regarding genetically modified organisms. At each station there should be information presented for both sides of the debate, that is, either supports or opposes GMO's. Resources should include multiple sources such as a: news article, research paper, podcast, or some other piece of information regarding genetically modified organisms. Information presented for both sides of the debate, that is, either supports or opposes GMO's. If you would like to provide additional guidance for students as they collect their research, you can give them the Cornell Notes handout, which poses specific questions for their search.

TEACHER'S NOTE

The attachment "Resource Page" has linked resources for students to use as they do their research. Other relevant information may be included or students may independently research topics using available resources (i.e. library or internet).

3. EXPLAIN

Have students work with their team to prepare for the presentation of the case. Hand out the Case Preparation Notes Student Handout (see Teacher Instructions and Guidelines are included on the Case Preparation Notes Teacher Handout). Have the students prepare their opening and closing statements as well as constructing an opening and closing statement for the opposition. They will use the statement they prepared for the opposition to help prepare and anticipate the argument that will be constructed against them.

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4. EXTEND

Have the students present their arguments for their case. Use the debate format outlined in the Explore section.

You will need to act as moderator during the debates keeping the students confined to the time limits set. Explain to the students the format and the time allotted for each portion of the debate. During the debate the rest of the class will serve as the jury and will evaluate the arguments based on the rubric you will hand out.

5. EVALUATE

Inform the class that as the debates are occurring, groups not actively debating will serve as jury members who will be evaluating the arguments presented and deciding which is the winning team. Hand out the Case Evaluation Rubric and Form. Instruct the students as to how they should evaluate the arguments based on the information presented in the rubric. Before each debate, name the debate as Case #1 or Case #2, etc.... Have the students fill out the evaluation form appropriately.

At the end of each debate you may take a poll of the class to get the total number of points awarded to each team and to determine the winner of each debate. Tell students to take notes as they listen to the debates to support the score they give each debate team and to form questions they will ask at the end of the debate.

Have the students respond to the essential questions:

- Overarching : Is everything that is legally acceptable always ethically acceptable?
- Topical: What is a genetically modified organism (GMO) and how are they produced? What are the ethical dilemmas surrounding GMOs and their use?

At the end of the lesson the students will be turning in their evaluation forms as well as the evidence collection handout and the Case Preparation Notes.

POSSIBLE LESSON DIFFERENTIATIONS

The research the students will be looking at may be scaled back or highlighted in order to help students find relevant information. The teacher may choose groups that will compliment each other in the various roles needed to complete the research and the debate.

STANDARDS

- Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

MATERIALS LIST

- Evidence Collection Form (Included)
- Preparation Notes Document (Included)
- Jury Case Analysis Document (Included)
- Public Debate Refresher Notes (see Extend for more information and possible links)
- Resource Page Handout

ATTACHMENTS

- [Debate Format.docx](#)
- [Case Evaluation Form.docx](#)
- [Case Evaluation Rubric.docx](#)
- [Case Preparation Notes - Student Handout.docx](#)
- [Case Preparation Notes - Teacher Handout.docx](#)
- [EvidenceData Research Collection Sheet.Final.docx](#)
- [Resource Page.docx](#)
- [Cornell Notes.docx](#)

RESOURCES