Next Generation Science Standards: (NGSS) + CCSS-ELA: Augmentation from Evidence & the Hunger Games

(BIOETHICS IN THE HUNGER GAMES)

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Scaffolded Assessment Prompts according to Bloom's Taxonomy
Bioethics of *The Hunger Games*

Remembering:
*Define genetic engineering, natural and artificial selection and transgenic species.
*List current ways we use genetically engineered organisms in society.

Understanding:
*Describe the pros and cons of genetic engineering.
*Describe why bioethical issues need to be considered when engaging in genetic engineering.

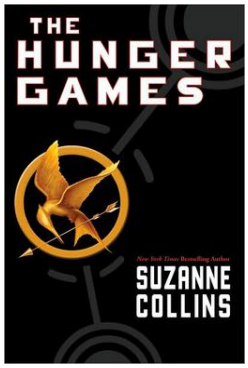
Applying:
*Interpret how bioethics is considered or not considered in both *The Hunger Games* and in contemporary society.

Analyzing:
*Compare and contrast Panem to the United States in terms of bioethics and genetic engineering.
*Compare and contrast Panem to other countries in the world in terms of bioethics and genetic engineering.

Evaluating:
*Consider how responsible Panem was in genetically engineering the "jabberjays" and "tracker jackers," as well as how responsible real-life scientists have been in engineering with regard to bioethics.

Creating:
*Formulate a plan the United States should have in place to make sure the genetic engineering being done or contemplated is ethical.

The Hunger Games
Academic Vocabulary



Collins, S. (2008). *The hunger games*. New York: Scholastic Press

Part I "THE TRIBUTES"
Chapter 1 (Pp. 3-20)

entrails (4)	predators (4)	rabid (5)
inciting (5)	rebellion (5)	maniacally (7)
iridescent (9)	preposterous (9)	ironic (12)
deterrent (12)	cumulative (13)	rant (14)
anguish (15)	adjacent (17)	terse (17)
sustenance (18)	obliterated (18)	

Chapter 2 (Pp. 21-33)

protocol (22)	tribute (22)	vaporized (23)
condone (24)	dissent (24)	tenuous (25)
reaping (26)	tesserae (28)	threadbare (28)
luscious (29)	sloshed (30)	treason (30)
spasm (31)		

Chapter 3 (Pp. 34-47)

pact (35)	bludgeon (35)	disastrous (35)

intensity (35) insurmountable (36) summons (37)

venomous (39) viciously (41) sanctioned (41)

blather (41) muttation (mutts) (42) homing birds (43)

concoction (45) entrails (45) decrepit (46)

commentators (46) disgruntled (46)

Chapter 4 (Pp. 48-72)

vile (48) apothecary (50) carcass (51)

sooty (51) tubers (52) deteriorated (54)

tureen (55) cornucopia (58) grandeur (59)

Chapter 5 (Pp. 61-85)

grotesque (63) flamboyant (64) synthetic (67)

illuminates (70) engulfed (72)

Chapter 6 (Pp. 73-85)

exhilarating (73) barbarism (74) tunic (76)

adversaries (79) maimed (80) immobilized (82)

hovercraft (82) mutilate (85)

Chapter 7 (Pp. 86-102)

intertwines (86) deluged (86) assent (87)

hollowness (90) mace (92) arrogance (95)
brutality (95) camouflage (95) skewer (101)

quiver (102)

Chapter 8 (Pp. 103-113)

impulsiveness (103) irredeemably (104) mediocre (107)

reprieved (109) pungent (109) menacing (111)

snares (111) spoils (111)

Chapter 9 (Pp. 114-130)

ludicrous (114) banal (115) eccentric (116)

sullen (116) hostile (116) humble (118)

delicacies (118) engulfed (120) longevity (125)

elusive (125) gossamer (126) banter (126)

subtle (129) anecdote (130)

Part II "THE GAMES"
Chapter 10 (Pp. 133-147)

assent (133) deafening (133) veer (134)

hysteria (134) terrain (139) frigid (139)

concealment (140) ajar (140) silhouette (140)

cannibalism (143) avalanche (143) catacombs (144)

gnawing (146)

Chapter 11 (Pp. 148-160)

grapple (150) reflexively (151) serrated (151)

snare (151) arbitrary (151) brutish (160)

Chapter 12 (Pp. 161-171)

lapdogs (161) unrelenting (166) scarcity (167)

gingerly (167) bewilderment (171)

Chapter 13 (Pp. 172-184)

suffocate (172) inferno (174) circuitous (174)

scuttle (176) crevice (178) sodden (179)

conspiratorially (183) potency (183)

Chapter 14 (Pp. 185-194)

hallucinations (185) venom (185) precariously (187)

sedated (187) ointment (188) balm (188)

astronomical (188) befuddled (191) sheath (192)

eradicated (192) hyperventilating (193)

Chapter 15 (Pp. 195-207)

manifest (195) feeble (195) leaching (201)

evasion (207)

Chapter 16 (Pp. 208-221)

rations (211) forages (211) rendezvous (213)

proximity (214) foliage (215) wily (218)

dexterity (218) meticulous (220)

Chapter 17 (Pp. 222-232)

acrid (222) predators (226) fragmenting (227)

Chapter 18 (Pp. 233-244)

fretful (234) fluttered (235) audible (235)

vulnerable (236) impotence (236) despondency (238)

crescent (238) catastrophe (243) inducement (244)

Part III "THE VICTOR"
Chapter 19 (Pp. 247-261)

assailants (247) dissipate (247) pariahs (247)

ambush (249) scrupulously (249) incapacitated (249)

levity (253) caliber (257) teeming (258)

contagion (258)

Chapter 20 (Pp. 262-277)

tethered (263) ratcheting (266) plummeting (266)

mince (267) tuft (267) exasperation (268)

pang (269) coaxing (272) stalemate (275)

incoherence (276)

Chapter 21 (Pp. 278- 289)

arduous (278) vicinity (278) forte (279)

emanating (281) irreparable (281) ominous (282)

wriggle (282) quiver (282) cunning (282)

inexplicably (286) sadistic (287) futile (289)
flounder (289) dappled (289) hypodermic (289)

Chapter 22 (Pp. 289-302)

haggard (289) plaintively (294) famished (294)

mishmash (294) sinister (295) irreverent (295)

lulling (299) exorbitant (299) reluctance (301)

Chapter 23 (Pp. 303-319)

repellent (306) surreal (310) extricating (312)

emaciated (318)

Chapter 24 (Pp. 320-330)

burrow (325) consciousness (326) gaping (326)

trills (329) dissonant (329) intersperse (329)

Chapter 25 (Pp. 331-345)

yipping (333) hindquarters (334) climax (337)

staunch (338) tourniquet (340) glisten (344)

Chapter 26 (Pp. 346-359)

petrified (347) feverishly (347 feral (348)

antiseptic (348) puckered (348) cadences (350)

benign (355)

Chapter 27 (Pp. 360-374)

berserk (361) triumphant (362) instigator (364)

insidious (365) segue (368) palpable (373)

Bioethics and Bioengineering Vocabulary

Altruism the principle or practice of unselfish concern for or devotion to the welfare of others

Artificial Selection a process in the breeding of animals and in the cultivation of plants by which the breeder chooses to perpetuate only those forms having certain desirable inheritable characteristics

Asexual Reproduction A form of reproduction that does not involve meiosis, ploidy reduction or fertilization and the offspring is a clone of the parent organism (i.e. budding, fission, or spore formation), not involving the union of gametes (sperm and egg)

Bioethics (Biological Ethics) the branch of ethics, philosophy and social commentary that discusses the life sciences and their potential impact on our society

Bioengineering the application of engineering principles and techniques to problems in medicine and biology, as the design and production of artificial limbs and organs. The branch of engineering that deals with applications of biological processes to the manufacture of products

Biotechnology (Biotech) a broad field of science that focusses on biological techniques developed through basic research and now applied to research and product development. In particular, the use of recombinant DNA, cell fusion and new bioprocessing techniques. Biotechnology products include antibiotics, insulin, interferon, recombinant DNA, and techniques such as waste recycling. Much older forms of biotechnology include bread making, cheese making and brewing wine and beer

Chimera an organism composed of two or more genetically distinct tissues, as an organism that is partly male and partly female, or an artificially produced individual having tissues of several species

Chromosome any of several threadlike bodies, consisting of chromatin, that carry the genes in a linear order: the human species has 23 pairs, designated 1 to 22 in order of decreasing size and X and Y for the female and male sex chromosomes respectively

Clinical Trial the scientific investigation of a new treatment that has shown some benefit in animal or laboratory studies, but that has not yet been proven effective in humans

Cloning a cell, cell product, or organism that is genetically identical to the unit or individual from which it was derived

Codon a specific sequence of three adjacent bases on a strand of DNA or RNA that provides genetic code information for a particular amino acid

Denature to treat (a protein or the like) by chemical or physical means so as to alter its original state

DNA deoxyribonucleic acid: an extremely long macromolecule that is the macromolecule that is the main component of chromosomes and is the material that transfers genetic characteristics in all life forms, constructed of two nucleotide strands coiled around each other in a ladderlike arrangement with the sidepieces composed of alternating phosphate and deoxyribose units and the rungs composed of the purine and pyrimidine bases adenine, guanine, cytosine, and thymine: the genetic information of DNA is encoded in the sequence of the bases and is transcribed as the strands unwind and replicate

Enzyme a protein that acts as a catalyst for specific reactions

Epidemic (of a disease) affecting many persons at the same time, and spreading from person to person in a locality where the disease is not permanently prevalent

Ethics a system of moral principles. The branch of philosophy dealing with values relating to human conduct, with respect to the rightness and wrongness of certain actions and to the goodness and badness of the motives and ends of such actions

Eugenics the study of or belief in the possibility of improving the qualities of the human species or a human population, especially by such means as discouraging reproduction by persons having genetic defects or presumed to have inheritable traits or encouraging reproduction by persons presumed to have desirable inheritable traits

Gene the basic physical unit of heredity; a linear sequence of nucleotides along a segment of DNA that provides the coded instructions for synthesis of RNA, which when translated into protein, leads to the expression of heredity character

Gene Splicing a term used to refer to the process by which the DNA of an organism is cut and a gene, perhaps from another organism is inserted

Genetic Engineering (GE) The development and application of scientific methods, procedures, and technologies that permit direct manipulation of genetic material in order to alter the hereditary traits of a cell, organism, or population. A technique that produces unlimited amounts of otherwise unavailable or scarce biological product by introducing DNA isolated from animals or plants into bacteria and then harvesting the product from a bacterial colony, as human insulin is produced in bacteria by the human insulin gene

Genetic Testing a process in which a person's or an embryo's DNA is isolated and tested for the presence of specific genes or defects that could indicate the future onset of some disease

Genetically Engineered Foods foods that have had foreign genes (genes from other plants or animals) inserted into their genetic codes

Genetically Modified Organism (GMO) a living thing with a *transgene* inserted into the genomes in every cell in its body, as will its entire offspring

Genome all the genetic material in a haploid set of chromosomes of a particular organism; its size is generally given as its total number of base pairs

Green Fluorescent Protein (GFP) a protein that glows green under fluorescent light. Found naturally in the jellyfish *Aequorea victoria*, GFP fluoresces green when exposed to blue light. It has a sequence of three amino acids (serine-tyrosine-glycine) which is responsible for its fluorescence

Heterozygous having dissimilar pairs of genes for any hereditary characteristic

Homologous having identical pairs of genes for any given pair of hereditary characteristics

Human Gene Therapy rapidly growing field of medicine in which genes are introduced into the body to treat diseases

Human Genome Project a federally funded U.S. scientific project to identify both the genes and the entire sequence of DNA base pairs that make- up the human genome

Hybrid the offspring of two animals or plants of different breeds, varieties, species, or genera, especially as produced through human manipulation for specific genetic characteristics

Hybridization the process of joining two complementary strands of DNA or one each of DNA and RNA to form a double-stranded molecule

Immunization the fact or process of becoming immune, as against a disease

Institutional Review Board (IRB) is charged with protecting the rights and welfare of people and animals involved in scientific or medical related research. The IRB reviews plans for research involving human and animal subjects

Karyotype the appearance of the chromosomes in a somatic cell of an individual or species, with reference to their number, size, shape, etc.

Mitosis the usual method of cell division, characterized typically by the resolving of the chromatin of the nucleus into a threadlike form, which condenses into chromosomes, each of which separates longitudinally into two parts, one part of each chromosome being retained in each of two new cells resulting from the original cell

Meiosis part of the process of gamete formation (sexual reproduction), consisting of chromosome conjugation and two cell divisions, in the course of which the diploid chromosome number becomes reduced to the haploid

Mutation a sudden departure from the parent type in one or more heritable characteristics, caused by a change in a gene or a chromosome

Natural Selection a process resulting in the survival of those individuals from a population of animals or plants that are best adapted to the prevailing environmental conditions. The survivors tend to produce more offspring than those less well adapted, so that the characteristics of the population change over time, thus accounting for the process of evolution

Placebo a substance having no pharmacological effect but given merely to satisfy a patient who supposes it to be a medicine. Also administered as a control in testing experimentally or clinically the efficacy of a biologically active preparation

Plasmid a small, independently replicating, piece of extra chromosomal cytoplasmic DNA that can be transferred from one organism to another. Linear or circular DNA molecules found in both pro and eukaryotes capable of autonomous replication

Recombinant DNA spliced DNA formed from two or more different sources that have been cleaved by restriction enzymes and joined by ligases

RNA (Ribonucleic Acid) any of a class of single-stranded molecules transcribed from DNA in the cell nucleus or in the mitochondrion or chloroplast, containing along the strand a linear sequence of nucleotide bases that is complementary to the DNA strand from which it is transcribed; the composition of the RNA molecule is identical with that of DNA except for the substitution of the sugar ribose for deoxyribose and the substitution of the nucleotide base uracil for thymine

Restriction Enzymes any of a group of enzymes that catalyze the cleavage of DNA molecules at specific sites: used for gene splicing in recombinant DNA technology and for chromosome mapping

Sexual Reproduction reproduction involving the union of gametes (egg and sperm)

Species the major subdivision of a genus or subgenus, regarded as the basic category of biological classification, composted of related individuals that resemble one another, are able to breed among themselves, but are not able to breed with members of another species

Stem Cells a cell that upon division replaces its own numbers and also gives rise to cells that differentiate further into one or more specialized types, as various B cells and T cells. (an undifferentiated cell that gives rise to specialized cells, such as blood cells)

Trait a distinguishing characteristic or quality (i.e. hair color, eye color)

Transformation the genetic alteration of a bacterial cell by introduction of DNA from another cell or from a virus

Transgene foreign genes that are introduced into an organism by injecting the genes into newly fertilized eggs. Some of the animals that develop from the injected eggs (animals, transgenic) will carry the foreign genes in their genomes and will transmit them to their progeny

Transgenic an organism that has had genes from another organism put into its genome through recombinant DNA techniques

Transplantation to transfer (an organ, tissue, etc.) from one part of the body to another or from one person or animal to another

Vaccine any preparation used as a preventive inoculation to confer immunity against a specific disease, usually employing an innocuous form of the disease agent, as killed or weakened bacteria or viruses, to stimulate antibody production

Variation a marked deviation from the typical form or function. A characteristic or an organism showing this deviation. (i.e. height distribution in a population)

Wild Type an organism having an appearance that is characteristic of the species in a natural breeding population. (the form or forms of a gene commonly occurring in nature in a given species)

Name_____
Date_____
Period_____

***The Hunger Games:* Bioethics**
Pre-Knowledge Self-Check -In (Day 1)

Instructions: Please read *The Hunger Games* excerpt (pp. 42-43) that is attached to this assignment. After you have completed the reading, answer each of the following questions below using complete sentences. You may use the back of this assignment if needed to finish your answers to each question.

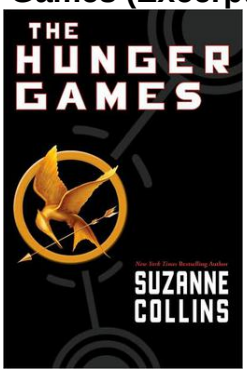
1. What is genetic engineering (GE)? What is a genetically modified organism (GMO)? What are some examples of GEs and GMOs?

2. How does the biology in this book relate to our lives in America?

3. Why did the leaders in Panem create only male jabberjays? How did this plan backfire? Do you see any parallels with actually genetically modified organisms?

4. In what fields and for what purposes do you think genetic engineering (GE) is used today or could be used for in the future?

The Hunger Games (Excerpt: pp. 42-43)



Collins, S. (2008). *The hunger games. New York: Scholastic Press*

"At the last minute, I remember Madge's little gold pin. For the first time, I get a good look at it. It's as if someone fashioned a small golden bird and then attached a ring around it. The bird is connected to the ring only by its wing tips. I suddenly recognize it. A mockingjay.

They're funny birds and something of a slap in the face of the Capitol. During the rebellion, the Capitol bred a series of genetically altered animals as weapons. The common term for them was muttations, or sometimes mutts for short. One was a special bird called a jabberjay that had the ability to memorize and repeat whole human conversations. They were homing birds, exclusively male, that were released into regions where the Capitol's enemies were known to be hiding. After the birds gathered words, they'd fly back to centers to be recorded. It took people awhile to realize what was going on in the districts, how private conversations were being transmitted. Then, of course, the rebels fed the Capitol endless lies, and the joke was on it. So the centers were shut down and the birds were abandoned to die off in the wild.

Only they didn't die off. Instead the jabberjays mated with female mockingbirds, creating a whole new species that could replicate both bird whistles and human melodies. They had lost the ability to enunciate words but could still mimic a range of human vocal sounds, from a child's high pitched warble to a man's deep tones. And they could recreate songs. Not just a few notes, but whole songs with multiple verses, if you had the patience to sing them and if they liked your voice.

My father was particularly fond of mockingjays. When we went hunting, he would whistle or sing complicated songs to them and, after a polite pause, they'd always sing back. Not everyone is treated with such respect. But whenever my father sang, all the birds in the area would fall silent and listen. His voice was that beautiful, high and clear and so filled with life it made me want to laugh and cry at the same time. I could never bring myself to continue the practice after he was gone. Still, there's something comforting about the little bird."

Name_____
Group Discussion Members Names:
1._____

2._____

Group Discussion of Pre-Knowledge Check-In Questions
(Day 1)

Instructions: After completing the pre-knowledge self- check-in questions, you will be assigned to work with two other students to discuss and gather additional information about each of the questions from your group members.

1. What is genetic engineering (GE)? What is a genetically modified organism (GMO)? What are some examples of GEs and GMOs?

2. How does the biology in this book relate to our lives in America?

3. Why did the leaders in Panem create only male jabberjays? How did this plan backfire? Do you see any parallels with actually genetically modified organisms?

4. In what fields and for what purposes do you think genetic engineering (GE) is used today or could be used for in the future?

Name_____

Whole-Class Discussion of Pre-Knowledge Check-In Questions (Day 1)

Instructions: The entire class will now discuss each of the pre-knowledge self-check-in questions in order to gain a broader knowledge base. During this discussion time, you should write down additional information and examples to assist with your future research that you will complete in the future on genetic engineering (GE).

1. What is genetic engineering (GE)? What is a genetically modified organism (GMO)? What are some examples of GEs and GMOs?

2. How does the biology in this book relate to our lives in America?

3. Why did the leaders in Panem create only male jabberjays? How did this plan backfire? Do you see any parallels with actually genetically modified organisms?

4. In what fields and for what purposes do you think genetic engineering (GE) is used today or could be used for in the future?

Name_____
Date_____
Period_____

***The Hunger Games: Bioethics* (Days 2 & 3)**
Internet Based and Outside Resources Research Assignment

Instructions: You will now conduct internet based research (see recommended list of websites) and outside sources (library resources, media, books, movies, etc.) in order to collect information to answer the five questions below. Make sure to site your sources (APA or MLA format).

- Describe the pros and cons of genetic engineering (GE). Describe why bioethical issues need to be considered when engaging in genetic engineering.
- Interpret how bioethics is considered or not considered in *The Hunger Games*.
- Compare and contrast Panem to the United States in terms of bioethics and genetic engineering.
- Define what constitutes ethical or unethical genetic engineering (GE), using the guidelines on the *Presidential Commission for the Study of Bioethical Issues* website.
- Students often find engaging viewpoints by surfing environmental websites and corporate food distributor websites that present one-sided arguments for or against genetic engineering. How does one determine whether a source is credible or not?

On the Web:
Exploring Bioethics. Presidential Commission for the Study of Bioethical Issues.
www.bioethics.gov
Exploring policy. U.S. Food and Drug Administration
http://1.usa.gov/5BWpG
http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm148768.htm
http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm352067.htm
http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm143980.htm
http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm092738.htm
Exploring positions and current applications. Iowa Public Television (click on all side tabs to explore different perspectives on genetically engineered organisms)
http://bit.ly/1e3YUJI
Genetic Engineering and Farm Animals
http://bit.ly/GDI20z
Genetic Engineering in Crops
http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/genetic-engineering/
Glofish
http://bit.ly/1hwIQjB
Transgenic pigs
http://www.newscientist.com/article/dn8900-transgenic-pigs-are-rich-in-healthy-fats.html#.U71yQth7RHY

The Hunger Games: Bioethics (Days 4 & 5)
Roundtable Discussions Topics

Instructions: One way that scientists communicate—an essential part of scientific inquiry—is by holding roundtable sessions. Scientists present their findings, then other scientists ask questions and offer suggestions for future research. Our class roundtable discussion will cover the theme: "Bioethics in *The Hunger Games*: Evaluating the Effects of Genetic Engineering Through Popular Fiction." Guidelines:

1. Divide up into groups of three.
2. Individuals take turns giving five-minute presentations of their topic, addressing scaffolded assessment prompts, discussing sources, describing connections to data-driven research and offering a clear conclusion or recommendation. You may use one index card (3x5) with bulleted points, but you may not read the presentation from printed text.
3. Next, the presenter answers questions from other students at the table for about five minutes. The other students should also make suggestions and provide feedback. Note: This should be done in a critical but collegial way. The focus should be on helping people to see connections in a different way, not attacking what they think.

Prompts:

- Consider how responsible Panem was in genetically engineering the jabberjays and tracker jackers. Defend and argue your position on genetic engineering with regard to bioethics
- Formulate a plan the United States should have in place to make sure the genetic engineering done here is ethical

Rubric:

Discussion of issue (addressing prompts, discussion of sources, connections to data-driven research, and clear conclusion/recommendation):

0 5 10 15 20

Comments:

Ability to answer related questions posed by peers:

0 5 10 15 20

Comments:

Contribution to overall discussion/asking other questions, offering suggestions/feedback:

0 5 10 15 20

Comments:

Overall professionalism (clarity, enunciation, eye contact, listening to others):

0 5 10 15 20

Comments:

Roundtable Presentation Instructions and Rubric (Teacher)

One way that scientists communicate—an essential part of scientific inquiry—is by holding roundtable sessions. Scientists present their findings, then other scientists ask questions and offer suggestions for future research. Our class roundtable discussion will cover the theme: "Bioethics in *The Hunger Games*: Evaluating the Effects of Genetic Engineering Through Popular Fiction." Guidelines:

1. Divide up into groups of three.

2. Individuals take turns giving five-minute presentations of their topic, addressing scaffolded assessment prompts, discussing sources, describing connections to data-driven research and offering a clear conclusion or recommendation. You may use one index card (3x5) with bulleted points, but you may not read the presentation from printed text.

3. Next, the presenter answers questions from other students at the table for about five minutes. The other students should also make suggestions and provide feedback. Note: This should be done in a critical but collegial way. The focus should be on helping people to see connections in a different way, not attacking what they think.

4. The instructor moves from group to group asking questions as well. In this way, each student is assessed individually on the ability to present, discuss and answer questions about the topic.

Rubric

Name of Student: _____

Discussion of issue (addressing prompts, discussion of sources, connections to data-driven research, and clear conclusion/recommendation):

0 5 10 15 20

Comments:

Ability to answer related questions posed by peers:

0 5 10 15 20

Comments:

Contribution to overall discussion/asking other questions, offering suggestions/feedback:

0 5 10 15 20

Comments:

Overall professionalism (clarity, enunciation, eye contact, listening to others):

0 5 10 15 20

Comments: