

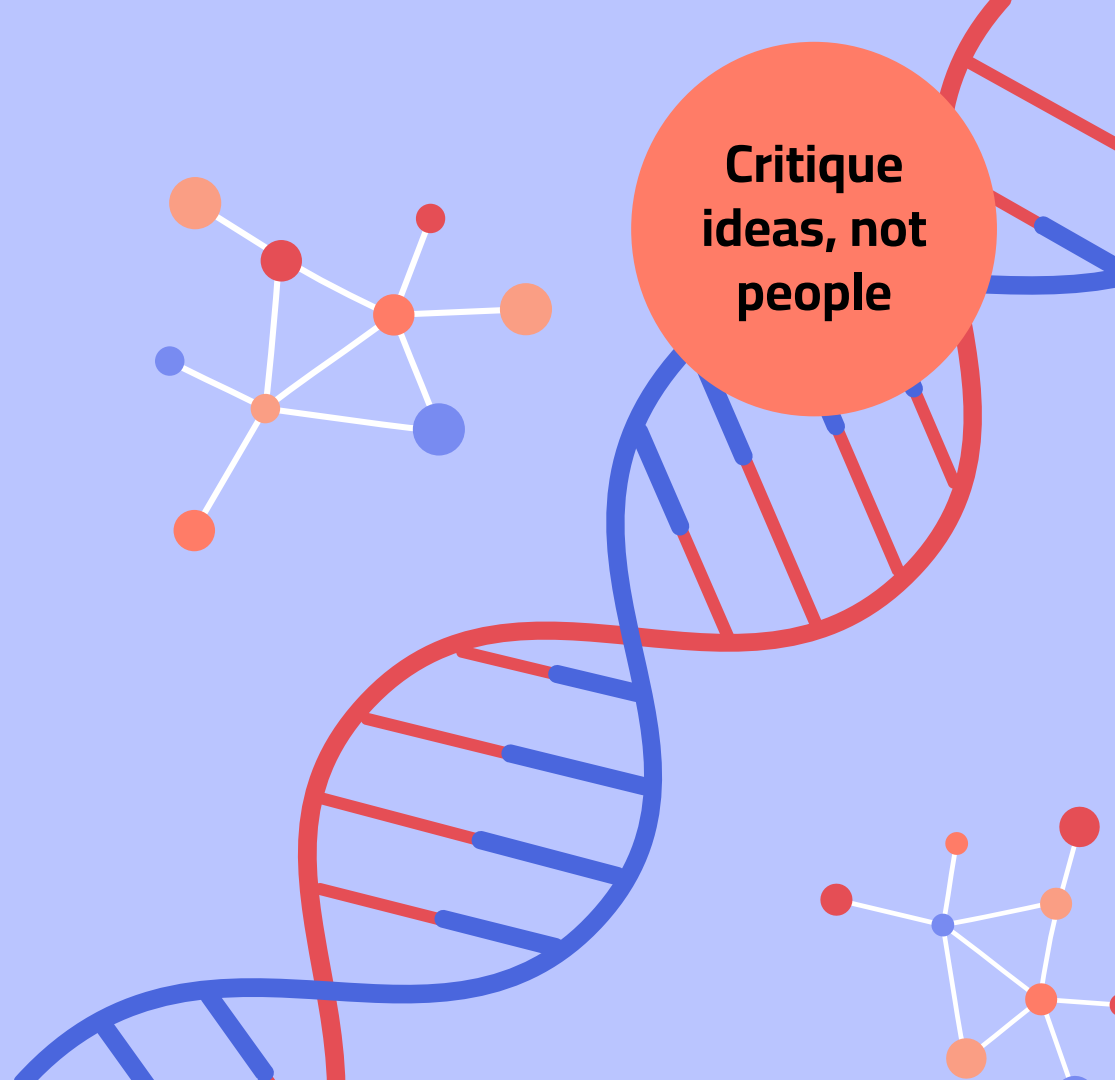


Bioethics in the

Classroom:

**Preparing science
citizens for a world
that needs healthy
discourse**

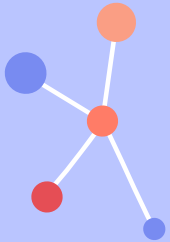
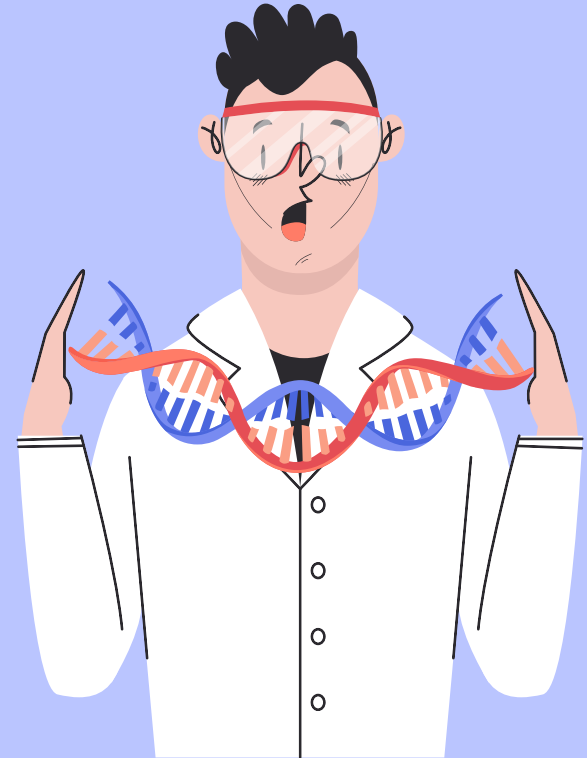
Tammy Fay
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**Critique
ideas, not
people**

Why we should create opportunities for students to engage in bioethics

- Engage in topics that enhance science understanding
- Develop critical thinking skills by evaluating claims, evidence and reasoning of currently accepted explanations
- To help prepare students make informed and thoughtful decisions
- To develop communication skills that promote open dialogue



Next Generation Science Standards (US) Support the Teaching of Bioethics

- Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3)
- Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)
- Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations. (HS-LS2-7)



Next Generation Science Standards (US) Support the Teaching of Bioethics

- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6)
- Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8)



What drives my bioethics learning opportunities



Self-Discovery

Identification of personal values & how they affect decision making



Social Responsibility

Understand what it means to act in the best interests of the environment and society



Student Agency

Topics studied and assessment.



Scientific Literacy

Knowledge of science and the framework in which it is used to make decisions



Culturally Responsive Teaching

Opportunity for all students to see themselves in the academic space

A Few Lesson Strategies



Socratic Seminars



An illustration of a scientist with dark hair, glasses, and a goatee, wearing a white lab coat over an orange shirt. He is holding a blue clipboard in his left arm and a magnifying glass in his right hand, looking at it. The background is light blue and features several molecular models with red, blue, and orange spheres connected by lines. A large red circle containing the number '01' is positioned to the right of the scientist.

01

The Quest to Keep Up

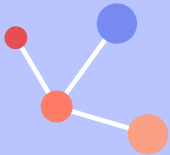
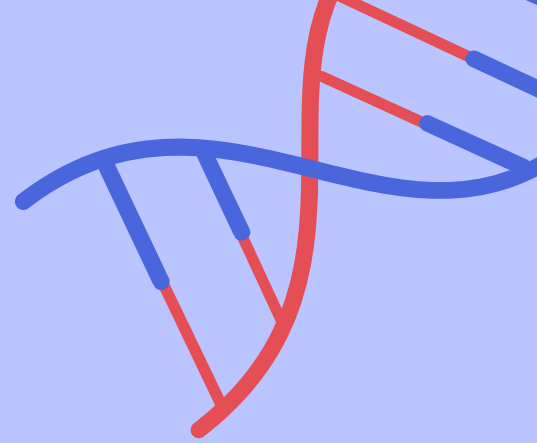
Tammy has decided to take full advantage of all that high school has to offer she plays three sports, volunteers at a local food shelf, is an active member of the Science Team, Best Buddies program and the Spanish club. In addition to being enrolled in the most academic courses, she plays the clarinet and works a part-time job. How does she do it? Lately she has had a difficult time staying awake to complete her studies even after consuming multiple cups of coffee and 5 hour energy drinks.

Tammy was speaking with her friend Steph one day about her exhaustion and Steph mentioned that she takes a prescription medicine that helps her stay focused but has heard that it could be used to help others stay awake and focused when trying to study.

Should Steph provide Tammy with some of her medicine to help her study?

4 Corner Activity

Movie Tie-In: Limitless
Real Life Limitless Pills?





02

Should we bring back the Woolly Mammoth from extinction?

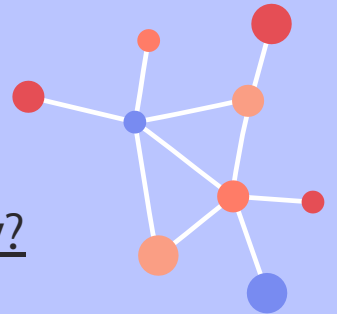


Lesson Format: Socratic Seminar

Provide students with quotes and short readings to guide their preparation.

TEDTalk: The Dawn of De-Extinction: Are You Ready?

Modified Lesson from [pg^{Ed}](#)

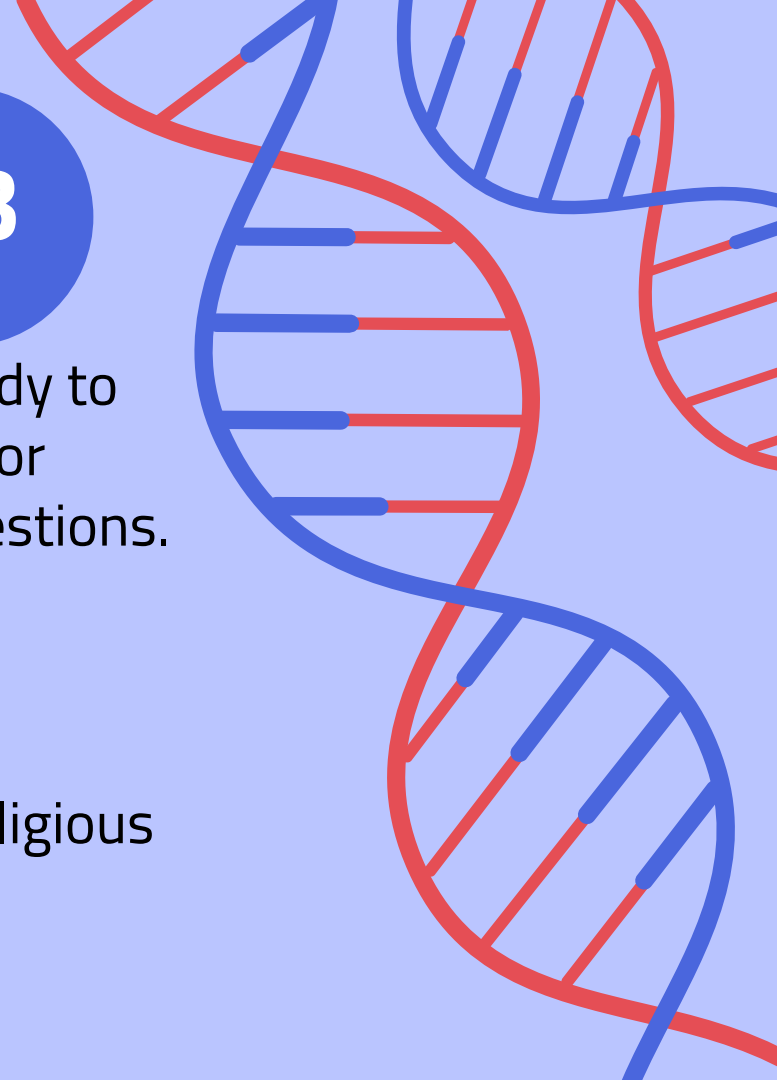
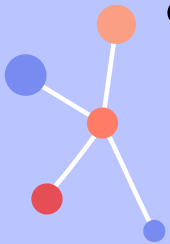


Activity: What type of question is this?

03

NWABR has a great resource that is ready to use with students. This is the baseline for having students generate their own questions.

- Scientific
- Ethical
- Legal
- Personal preferences, cultural, or religious



Students Practice Writing Questions

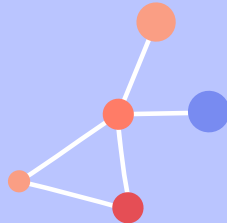
Quest for a Superbee

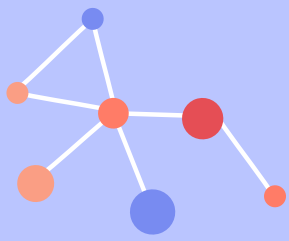
Can the world's most important pollinators be saved? How scientists and breeders are trying to create a hardier honeybee.

National Geographic May 2015

General Information:

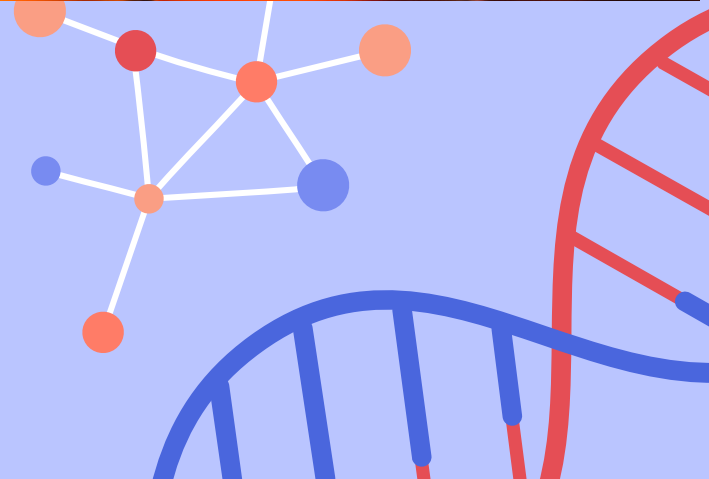
- Bee colonies can be infested with mites which drain the hemolymph from their hosts making their immune systems less effective.
- Beekeeping used to need minimal upkeep but with mites there is a need to be diligent in the care of the colony.
- Most farmers use chemicals but are not happy doing so.
- The search is on for a non-toxic treatment for mite contamination.
- Beeologics (arm of Monsanto) wants to use RNAi to control the mites.





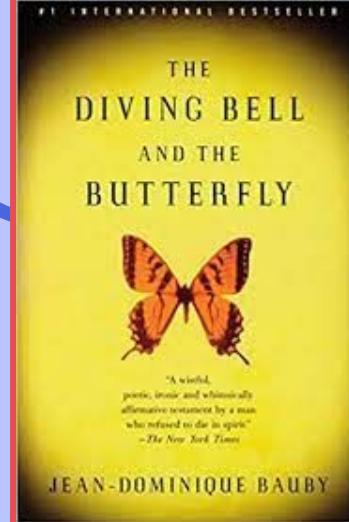
Work in groups create at least one of each question type as indicated on the index card you have been distributed.

- Scientific (S)
- Ethical (E)
- Legal (L)
- Personal preferences, cultural, or religious (P/C/R)



Bioethics Resources: Books & More

- *The Sports Gene* (David Epstein)
- *An Entirely Synthetic Fish* (Anders Halverson)
- *Intuition* (Allegra Goodman)
- *His Brother's Keeper* (Jonathan Weiner)
- *Unwind* (Neal Shusterman)
- *The Immortal Life of Henrietta Lacks* (Rebecca Skloot)
- *My Sister's Keeper* and *Handle with Care* (Jodi Picoult)
- Science & Nature Magazines (start with the news sections)
- National Geographic & Smithsonian Magazine



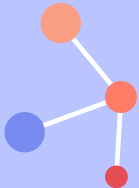
A NEW YORK TIMES NOTABLE BOOK

The dramatic story of real doctors and patients making impossible choices at a big-city hospital.

**FIRST,
DO NO
HARM**

"Ms. Belkin's book is crammed with provocative insights, raw emotion and heartbreaking dilemmas."
—THE NEW YORK TIMES
BOOK REVIEW

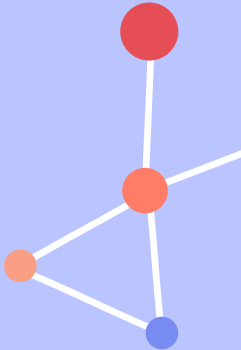
LISA BELKIN



Movies and Other Visual Resources



- *Gattaca*
- *Cracking the Code (NOVA)*
- *Jurassic Park/Jurassic World*
- *Genetic Roulette (may be used to examine bias)*
- *My Sister's Keeper*
- *Lorenzo's Oil*
- *Miss Evers' Boys (HBO, Tuskegee syphilis)*
- *The Atlantis Gene*
- *Harvest of Fear (Frontline)*
- *Limitless*



Resources

- [NYU Grossman School of Medicine: High School Bioethics Project](#)
- [Northwest Association for Biomedical Research Teacher Resources](#)
- [Harvard Medical Personal Genetics Education Project Lessons](#)
- [Hastings Center \(NIH\): Exploring Bioethics Curriculum](#)

