**BRAIN-TARGETED TEACHING**

**LEARNING UNIT**

**Name:** Tyler Callister  **Dates (Allocated Time):** 4 weeks

**Unit Topic:/Title:** Genetic Engineering in Reproductive Medicine **Grade Level:** 9th grade

**Content Standard(s):** Genetics

**Learning Unit Overview:**

This unit situates genetics into a cultural context. It is a combination of science and social studies, and explores these topics through the arts as well as class discussions. In particular, the unit is about genetic engineering in reproductive medicine, and the ethical implications of that. For example, questions arise such as, “What if scientists could engineer the traits of future children? What potential risks and benefits would come from that?”

***Brain Target #1***

**Emotional Connection:** First, this learning unit is aware of the emotional states of adolescents. At this age, students are forming identities, so this unit explores the question “Who am I?” from the perspective of genetics. Further, it encourages empathy by taking on others’ perspectives through a creative writing assignment. The final project for the unit allows students to choose between one of the following mediums: collage, painting, short story, or poetry. Students also form emotional connections through the aesthetic experience of film; they will integrate genetics issues raised by the science fiction movie *Gattaca*.

***Brain Target #2***

**Physical Environment:** Early on in the unit, students will be presented with a brief [Power Point presentation](http://g.virbcdn.com/_f/files/78/FileItem-249589-GeneticEngineeringTylerCallister.ppt) that explores (and reinforces) basic ideas about genetic traits—we all have them, and the combination of them plus environmental influences make up, who “you” are. Following this, students will be “let loose” a bit—in groups, they will create posters on which they “design” an imaginary human, much like a Mr. Potato Head, but with less restrictions. (If scientists could truly “design” a human’s genetic traits, perhaps there would be no limits to the type of creature they could create. After the project of course, we will differentiate which of the students’ creations are currently scientifically possible, and which are science fiction—simply educated guesses about what science *might do* someday). These posters will be displayed on the walls.

The desks will be repositioned each week, allowing for a “new perspective” while a student is sitting at his or her desk. The desks are also repositioned for a class debate (*see below*). This provides novelty. If available, skylights and large windows are open in order to allow natural UV rays in.

***Brain Target #3***

**Concept Map / Advanced Organizer
(feel free to use an online tool):**

Genetic Engineering Scenario:

Students will break up into groups. Each group will have one of the six individual perspectives from the homework assignment represented. They will complete a concept map representing the opinions of each of the six individuals.

**Learning Goals:**

Overall, the goals of this unit are: 1) Discover ethical issues surrounding the practice of genetic engineering in reproductive medicine, and 2) Understand key terms and concepts related to genetic engineering.

**Introductory “Big Picture” Activity/Assessment of Prior Knowledge**

Students will be presented with a brief power point presentation that explores (and reinforces) basic ideas about genetic traits—we all have them, and the combination of them plus environmental influences make up, who “you” are. This is followed by a brief class discussion.

***Brain Target #4***

**Activities for Teaching Mastery of Declarative/Procedural Knowledge**

1) Take-Home Activity Sheet: Different Perspectives on Genetic Engineering.

Students will read a scenario concerning cystic fibrosis and genetic engineering. They will examine the scenario from the perspective of one of six individuals, including a religious person and a molecular biologist. For homework, each student will read the scenario and write a position statement from the individual's perspective.

2) Concept map: Genetic Engineering Scenario

Students will break up into groups. Each group will have one of the six individual perspectives from the homework assignment represented. They will complete a concept map representing the opinions of each of the six individuals.

***Brain Target #5***

**Activities for Extension and Application of Knowledge**

Students will have a class discussion of ethical issues about genetic engineering in reproductive medicine. After gaining knowledge about the topic, the students will discuss the question, “Should genetic engineering in reproductive medicine be allowed?” The physical environment for the discussion will be set up thusly, with the chairs like this (each square represents a chair):

*Against*

 *For*  “ForFor“No” Yes

 *Unsure*

At the beginning, students choose which chair section to sit in, depending on their personal position. Throughout the discussion, students are allowed to get up and move to a different side if they change their mind or if they want to try arguing for a different perspective on the issue. This facilitates *empathy* by taking multiple perspectives, as well as *movement*.

***Brain Target #6***

**Evaluating Learning**

Students will be evaluated throughout. In order to make sure students are picking up some concrete facts and definitions of terms, there will be a fun drill exercise once a week. The teacher asks a question, and tosses a foam ball to a student. The student answers then tosses it back. It continues like this, with the teacher tossing it to all or most of the students.

There will be a rubric for the creative writing assignment and the final project. The grade for the formal class discussion will be based on participation, and preparedness for the discussion.