

Title: Current Topics in Biotechnology

Grade Ranges:

_____ K-4
_____ 5-8
_____ X 9-12

Subject Tag:

Science: Biology

Science: The Human Body

Synopsis:

This lesson allows students to pick a current topic in biotechnology and research the latest related developments. Through this assignment, students learn detailed information about biotechnology tools and techniques and develop their own opinions about the commercialization of biotechnology.

Keywords:

biotechnology, gene therapy, DNA fingerprinting, DNA chips, DNA sequencing, DNA, biotech firms, genetic modification, bioengineering

Body:

This lesson requires two products from students. These products along with the summary presentation will be used to assess the student's knowledge of the topic.

Activity #1: Create a pamphlet

1. Each student should choose a controversial issue in biotechnology. They should be sure that the topic is in fact controversial (has a pro and a con side). Students should clearly define their issue and submit it to the teacher for prior approval.

Note: Students often have trouble getting started. The following topics can help get their thoughts going:

- gene therapy, DNA fingerprinting, DNA chip technology, biological warfare, bioengineering of food, cloning, stem cell research
2. After students choose their topics, they should research BOTH sides of the debate surrounding the controversy and formulate persuasive arguments to defend BOTH sides. These arguments will be included in their pamphlets. Arguments should include scientific explanations and scientific data, as well as ethical issues and implications for society. Encourage students to see the issue from different sides — the scientific community and society. They should also look at the pros and the cons.
3. Using the information they have gathered, students should predict what the future may hold for this issue. Will there ever be a solution to the controversy? Will another biotechnological advance come along that will make this topic obsolete? What do you think the future holds for your issue?
4. After all of the information is assembled (using Internet, books, publications, etc.), students should create a pamphlet describing the issue, detailing each side of the debate, and suggesting future implications.

Activity #2: Poster advertisement

1. This activity allows students to formulate an opinion regarding their controversial biotech topic. Using the same issue from Activity #1, students should design poster-size advertisements expressing their points of view. Are students for the use of biotechnology? Do they reject its use? The ads

should clearly show their feelings and should attempt to persuade others to take the same side in the debate.

2. All advertisements should include the following:
 - Catchy title
 - Summary statement (should be obvious what the issue is)
 - Name and logo of the “fictional group” that paid for the ad
 - Pictures

Activity #3: Presentation

Students will present their findings to the class. They should use their pamphlet and poster as visual aids. Encourage them to be creative in their presentation. They could do a commercial or a radio broadcast, for example.

Related Links:

Bioworld Online

<http://www.bioworld.com/>

Calling itself “the Worldwide Biotechnology News and Information Source,” this site offers articles on a variety of issues.

National Center for Biotechnology Information

<http://www.ncbi.nlm.nih.gov/>

Created by the National Library of Medicine and the National Institutes of Health, this site’s goal is to be a “national resource for molecular biology information . . . for the better understanding of molecular processes affecting human health and disease.”

Features:

- Contains special education tips
- Quick Activity
- Requires Internet access for students to complete

Objectives:

1. Students will be able to formulate an opinion and express it clearly.
2. Students will be able to research two sides of a controversial issue and adequately defend both sides.
3. Students will be able to organize information.
4. Students will be able to discuss and write about current issues in biotechnology.

Standards:

NY: Living Environment 7: Human decisions and activities have had a profound impact on the physical and living environment.

NYC: S2a. The cell, such as cell structure and function relationships; regulation and biochemistry; and energy and photosynthesis. **S2b.** Molecular basis of heredity, such as DNA, genes, chromosomes, and mutations. **S5f.** Works individually and in teams to collect and share information and ideas. **S6d.** Acquires information from multiple sources, such as print, the Internet, computer data bases, and experimentation. **A2 a.** Make an oral presentation of project plans or findings to an appropriate audience. **A3a.** Gather information to assist in completing project work. **A3b.** Use information technology to assist in gathering, organizing, and presenting information.

CT: 1. The Nature of Science. Students will experience an inquiry-based learning environment in which they are free to ask questions, seek information and validate explanations in thoughtful and creative ways. Students will also understand that the processes, ways of knowing and conceptual foundations of science are interdependent and inextricably bound. **14.** Science and Technology. Students will understand the relationships among mathematics, science and technology, and the way they affect and are affected by society.

NJ: Science 5.4: All students will develop and understanding of technology as an application of scientific principles. **Cross-Content Workplace Readiness 2:** All students will use technology information and other tools. **3:** All students will use technology, information and other tools. **4:** All students will demonstrate self-management skills.

Prerequisite Skills:

1. Students should have prior knowledge of basic biotech tools (i.e. restriction analysis, gel electrophoresis)
2. Students should have prior knowledge of current issues in biotechnology.
3. Students should know how to navigate the Internet and do basic library research.

Time Required:

Approximately two to three research days in class, one day for creating products, and three to five minutes for each student presentation.

Technology and Materials Needed:

Access to the Internet and recent science publications.

Assessment Criteria:

Students should be evaluated on pamphlet, poster, and presentation. You can also have the class come up with a grading rubric for their products several days before they are due.

Recommended Lesson Plan Review Date:

one year

Review Comments:

Review yearly to modify based on current topics in biotech and to check out the Web site.