Biotechnology: Convenience or Intrusion?

Lesson Topic
Biotechnology: DNA Technology

RIEL Biology Element
Multiple Modalities

Time Required
3 Days

Standards Addressed
- SC.912.L.16.10 (H) – Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.

Content Learning Objectives
- Biotechnology
- Ethics

Science and Engineering Practices
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Lesson Summary

Students will engage with information about biotechnology and different ways in which it is being utilized in the scientific community through multiple modalities. Students will then engage with the content to form an argument and defend their point of view in small groups through presentations that will allow them to express their thoughts and have open debates with their classmates.

Summary of RIEL Element in Lesson: Throughout this activity, students will be exploring multiple applications of biotechnology utilizing various modalities including but not limited to visual, modeling and reading and writing. This RIEL element will help students achieve the learning goal and engage in the SEP by providing diverse mediums through which they can derive information from the material provided and make sense of it. By doing so, the teacher can ensure everyone is engaged and learning from the activity.

Summary of Science and Engineering Practice: Throughout this 3-day lesson students will explore content through various modalities. These include reading and interpreting text, watching videos, engaging in class discussion utilizing evidence from various resources and creating models to communicate information.

Materials
- Biotechnology PowerPoint
- Lab Station Printout
- GMOs and Our Food Supply article (for station #3)
- Poster paper/ Anchor charts
- Colored markers, pencils for posters

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Before the Activity:

- Print copies of Lab Station Printout
- Set up the stations (materials are in the PowerPoint):
  1. Transgenic Organisms
  2. Cloning
  3. Genetically Modified Organisms

Lesson Activities:

- Students can use multiple languages during the lesson
- Students will be paired with partners they can communicate with through multiple languages when possible

Day 1

1. Bellwork (10 mins)

- The teacher will begin by playing the video "What is biotechnology?" (recommended modification: Turn on closed captions by clicking the CC icon at the bottom left of the video. Playback speed may also be adjusted at the bottom left of the video to 0.8 in order to increase word recognition and overall understanding of the concept).
- At the end of the video, the teacher will give students 1 minute to look at the questions on the board/screen and read them quietly to themselves (time may be extended on a need-to-need basis).
  - In your own words:
    1. What is biotechnology?
    2. List 3 examples of how biotechnology is used to improve human life.

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- Next, the teacher will give students 3 minutes to turn to their shoulder partner and discuss the questions. When time is up, the teacher will ask 2-3 partners to discuss their thoughts with the class.
- Goal: To ensure that students understand the concept of biotechnology and recognize some of it applications.
- Complex terminology that would be important to better understanding the main idea should be addressed with the class during this time.

2. Stations (30-40 mins)

- There will be 3 stations set up around the classroom (make doubles and create 6 stations to maximize use of time).
  - Students will work in groups of 2-3 people (no more than 3 per group).
    - Students should preferably work in mixed groups of varying WIDA proficiency levels in reading, writing and overall understanding of the language.
  - At each station, students will have 8 minutes to read the passage/view video, analyze the information, and complete the tasks on the lab station printout.
    - Should students need additional time, they will be able to revisit any station at the end of the activity with their groups.
    - Teacher should monitor stations and continuously move around the room assisting students and ensuring everyone is maximizing their time at each station.

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Day 2

1. Recap (5 mins)

- The teacher should begin class by recapping the concept of biotechnology and its various applications as well as the work from the stations.
  - Ensure that before moving on to posters that student can clearly describe what biotechnology is and some of the ways it is being utilized in the scientific community.

2. Posters (45 mins)

- For this activity, students will be working in groups of 3-4 to research and create posters in support or against various applications of biotechnology in different fields such as, medicine and agriculture.
  - Teacher should preferably keep students in the groups they world on during the lab stations.
  - Mixed proficiency levels are encouraged.
- While students work in their groups, the teacher should actively move around the room helping to clarify any misconceptions and helping students conduct research.
  - Students are to center their research on biotechnology's impact on the individual, society, and the environment.

Day 3

1. Poster presentations and class discussion (45 mins)

- Each team will have 5 minutes to present their poster in the front of the class.
  - Each member of the team must participate throughout the presentation.
- Once the team has concluded their presentation, they may take questions from the class.
  - If the class has no input the teacher may begin a discussion utilizing probing questions that could lead to a broader debate by including opposing views from other teams presentations.

2. Exit slip (5 mins)

- Students will be given the last 5 minutes of class to answer the exit slip on a separate sheet of paper.
  - This should act as a conclusion to the lesson on Biotechnology.

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