

ICORE Action Proposal- First Draft

Title: Do I Have to be a Pre-Med Major?

Name and Correspondence:

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Abstract:

This project will target my AP Biology students who are mostly upperclassmen and getting close to college and feeling the pressure of choosing a college major. As I cover the unit of biotechnology, I will teach the students lab protocol and diagnostic skills that will help them in lab. However, I will also continue to highlight careers or degree pathways in which these techniques are important.

Biotechnology is a wonderfully growing field and an exciting field now and in the future. Students with interest in agriculture and agronomy, microbiology, virology, aquatic pathobiology, public health, or the food industry, just to name a few, can all find exciting possibilities with this wide field. A degree in this field can also then lead into the medical, dental, or veterinary schools in that is the interest.

Rationale:

It is 1994 and I am graduating high school. I know I love science, but what should I major in? I could be a pre-med major. That is what all the smart kids major in, right? Now, it's 2011. My step-daughter is graduating high school. We attend preview at UF and about one-third of the students that the session are currently entering UF as a pre-med major. Why don't strong science students know the possibilities that exist? Teachers don't know about them or don't tell them! I plan to change this so that students know different avenues for careers in the field of biology.

Description of teaching unit, including expected outcomes:

This will be an ongoing teaching theme throughout the school year: Do I Have to be a Pre-Med Major? focusing on career choices within the field of biology. However, I will focus on the biotechnology unit in the fall semester where I will bring much of what I have learned in ICORE into the curriculum. This unit will follow my study of genetics and introduce the topic of evolution. I will use the designer pipetting, mosquito hatchers and a part of the Dengue curriculum, Outbreak! Fingerprinting Virus DNA lab, a bioinformatics lesson using BLAST, a trip to UF to do a water contaminants PCR analysis, the pGLO bacterial transformation, and finish with a proteomics labs that will segue into evolution. I also plan to incorporate a case study "Selecting the Perfect Baby" into the unit and the stem cell Science Take-out kit. Throughout this unit, I will introduce the different careers available in this field as we go through the labs and notes.

Florida State Standards Covered:

SC.912.L.16.7: Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.

SC.912.L.16.10: Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.

SC.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

Student Objectives:

* Demonstrate understanding of core concepts in biotechnology including (but not limited to) cellular biology, DNA, RNA, proteins and viruses.

* Identify and follow common protocols used in a biotechnology laboratory (i.e. DNA extraction, PCR, reverse transcription, etc)

* Identify careers in biotechnology.

Data collection techniques:

In August, I will give journaling questions to the students, asking about specific career options and what they are interested in. I will give the same questions after the biotechnology unit and compare the answers. I will quantify this data. As a culminating activity, we will hold a job fair and students will research and present a career that they see as a possibility for themselves. I also plan to do a brief survey of the students, asking if the integration of career topics into the course has helped them.

Use of equipment lockers/UF visit:

- * Pipetting Lab
- * Mosquito Hatchers
- * Outbreak! Fingerprinting Viral DNA Kit
- * UF visit for water contamination/PCR lab
- * Pipetting locker and heat block for proteomics lab
- * Science Take-out: Stem Cells

Non UF Equipment needed:

- * BioRad- Comparative Proteomics and pGLO
- * Carolina DNA Fingerprinting kit

ICORE elements specifically included:

I will use many of the biotechnology labs from ICORE in my unit, including the designer pipetting, Outbreak!, and part of the dengue curriculum. I also plan to incorporate a bioinformatics activity using BLAST, adapting the activity from Dr. Burleigh. I plan to use the stem cell kit from Science Take-Outs. I will also use parts of presentations and powerpoints from Dr. Chen and Ms. Green. Lesson 10 from Viral Quest will also be used.

Literature cited:

Dr. Burleigh. "Bioinformatics." ICORE. Gainesville, FL. 2012. Lecture and powerpoint.

Dr. Chen. "Protein Lecture." ICORE. Gainesville, FL. 2012. Lecture and powerpoint.

Foglia, Kim and Brown, Stuart. "Sickle Cell Anemia and the Hemoglobin Gene Lab." www.explorebiology.com. 2012.

Green, Linda. "ELISA." ICORE. Gainesville, FL. 2012. Lecture and powerpoint.

Greenwood, Jim. Celebrating the Promise of Biotechnology, 2012, Biotechnology Industry Keynote Address. <http://www.bio.org/celebrating-promise-biotechnology>

Klosterman, Sadler, & Brown. "Viral Quest." ICORE. Gainesville, FL. 2011. Curriculum.

Omarzu, Julia. "Selecting the Perfect Baby: The Ethics of Embryo Design." National Center for Case Study Teaching in Science. 2002.

Two career profile videos to show to the class from the following website:
<http://www.teachersdomain.org/resource/biot09.biotech.car.careers/>

Biotechnology Unit Cost Analysis 2012-2013		
Item	Source	Cost
Outbreak! Fingerprinting Viral DNA 6-station kit	Carolina	\$89.00
Comparative Proteomics kit	BioRad	\$165.00
Proteomic gels (for one class)	BioRad	\$9.60 ea x 4= \$38.40
pGLO kit	BioRad	\$89.00
	Total:	\$381.40

I am going to apply for a Hillsborough Education Foundation grant to buy more Science Take-outs. I also plan to use some of my department money to supplement this unit.