

“Clean dlo, dlo, everywhere?”

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Abstract: This action proposal will allow the students in my biotechnology class, to enhance their laboratory skills and use inquiry based learning to further their study of proteins and the re-emerging pathogen known as Cholera. This real-world problem and global public health issue is designed to have the students use their current skills in a real and relevant application. The majority of this project will center around the growing number of people living in Haiti suffering from unclean drinking water that is contaminated with *Vibrio cholerae*. Students will participate in a variety of activities including but not limited to: a technology based webquest of proteins & antibodies and the companies that manufacture these substances, a hands-on lab activity centered around Cholera outbreaks in Haiti, and creating public service announcements to the citizens of Haiti describing how to avoid contracting Cholera and the symptoms & treatment associated with it.

Rationale: This project will target the 10th grade, Biotechnology II students. It will allow the students to use their previously learned laboratory skills and apply them to a real-world situation that directly relates to them. A majority of our student population are Haitian in descent. We received over 100 students after the earthquake that devastated the region and have many students who often return every summer to visit friends and relatives. By examining Cholera and its potentially harmful and deadly effects, the students will be able to learn how a tiny bacterium can produce a protein toxin and how to test for the antibodies and antigens it produces. This module will also better prepare the students to take and pass the Industrial Biotechnology Certification Exam which is the goal of our Biotechnology Magnet Program.

“Clean dlo, dlo everywhere?” will give the students the opportunity to hone their pipetting skills while incorporating new skills such as: introducing the topic of proteins & antibodies, connecting with companies who manufacture these products, and learning how to complete and analyze an ELISA (Enzyme-Linked Immunosorbent Assay). The unit will also include a computer-based inquiry component which will allow students the opportunity to further their knowledge of various careers within the vast biotechnology field. Up until this point, there has been a real disconnect between what students are learning in lecture, applying a skill to it, and seeing it materialize into a possible career path. The Biotechnology Magnet was put in place to give young, minority students from low income families and neighborhoods

another career choice after graduating high school. My goal is to give each of my students the tools they will need in order to be productive members of today's biotechnology workplace.

Benchmarks and Learning Outcomes:

Biotechnology 2 Academic Knowledge Standards:

- 24.0
- 24.01
- 31.0
- 31.03
- 32.0
- 32.04
- 33.0
- 33.02

CTE Performance Standards:

- 34.0
- 34.02
- 34.03
- 34.04
- 37.0
- 37.01
- 37.02
- 37.03
- 38.0
- 38.11
- 38.12
- 40.0
- 40.02
- 44.0
- 45.0
- 45.01
- 45.02

Student Objectives:

1. I can differentiate between proteins that function as structure or as antibodies.
2. I can describe the structure of antibodies.
3. I can explain the relationship between antibodies and antigens.

The student learning outcomes will be achieved through the following activities:

- Quick write/Bell Ringer
- Webquest: HER2, IgG, and IgE; Oh My!
- Webquest: Antibody Manufacturers
- Preview: *Vibrio* Background Powerpoint with Cornell Notes and Costa Questions
- Lab Activity: Cholera Conundrum
- PSA Crazy Cholera

- Extension: UF Campus Visit and Lab Activity: Bacterial Protein Extraction and Vertical Gel Electrophoresis, MASCOT Protein Activity

Assessments:

- Share Out Quickwrite
- Student Presentations of Webquests (mini science boards & speed dating with note taking sheet)
- Qualitative ELISA analysis
- Public Service Announcements
- Protein Identification by PMF
- MASCOT

UF Connection:

- Cholera Conundrum Equipment Locker
- ELISA Equipment Locker
- Bacterial Protein Extraction and Vertical Gel Electrophoresis Lab Equipment Locker
- UF Campus Visit to complete the Bacterial Protein Extraction and Gel Electrophoresis Lab

ICORE Connections:

- Use of Johnson *Vibrio* Powerpoint
- Use of Weppelman Powerpoint
- Use of Cholera Conundrum Activity
- ELISA Lab Skill
- UF Campus
- Bacterial Protein Extraction Lab Skill
- Vertical Gel Electrophoresis Lab Skill
- MASCOT Activity

New Pedagogies:

The action proposal will allow me to teach this topic in a way that is easy and relevant to the students. In the past, we have talked about each topic and practiced each skill but not in a way that connected why the students were learning the skill. The ICORE program has given me strategies and scenarios to share with the students to help them better understand the practical applications for those skills.

Literature Cited:

Daugherty, Ellen. "Biotechnology: Science for the New Millenium." Paradigm Publishing, Inc. 2012.

Johnson, Judith. "*Vibrio*" Powerpoint. 2013.

Budget:

Item	Source for Purchase	Catalog Number	Price
Vibrio anguillarum	Carolina Biologics	155722	10.25
Vibrio fischeri	Carolina Biologics	155721	10.25
Oysters	Amazon		80.00
Bus for field trip	Horizon		?

Total Cost:			500.00
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