

Linda Purvis & Swapna Bhat

University of North Georgia, Gainesville Campus

Department of Biology

Background:

Our current non-majors introductory biology course laboratory material has become very passive for student learning. This is a popular course yet also a basic core requirement that students must take. However, most come into the course with the predisposition that it will be boring and have no application for their career or life. Materials currently used are almost two decades old and do not reflect a lot of the recent advances made in biology. The overall goal was to introduce *guided inquiry based labs* that are up-to-date and relevant to everyday life. We developed inquiry based, creative lab experiences for non-science biology students while initiating engaging lab modules that will replace our previous passive learning set up. We believe that a successful biology course for non-majors will encourage students to develop a child-like curiosity about the wonders of the living world around them. As informed citizens they will be able to evaluate, question and discriminate information provided to them via different media.

Goal of the project:

Our project was designed around infectious agents because we have found students are usually interested in such topics, but yet also have a limited understanding of how those things work. We carried out a pre-assessment quiz to assess the general biology knowledge of our students. Most students understand what antibiotics are, however, they are not aware of their appropriate usage or targets. In fact, some students believe that drug resistance happens in humans as opposed to bacteria. Drug resistance is a major public health threat. Therefore, issues such as these should be discussed in lab to spread awareness.

Overall Outcomes:

We envision the following outcomes at the end of this project:

- Develop innovative and creative lab experiences for non-science focused students
- Initiate engaging laboratory modules to replace current passive learning ones.
- Introduce current topics in biology that students may already have been exposed to.
- Clear some of the common misconceptions among non-science students to spread public awareness.

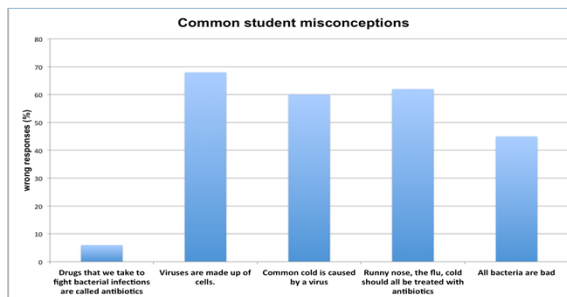


Figure 1. A sample of our pre-assessment questions. A total of 200 students took the pre-assessment quiz. We found that our students harbor several misconceptions regarding antibiotics and disease transmission.

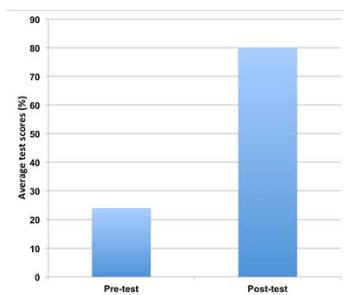


Figure 2. Pre and Post test averages from Trial lab materials in Fall 2016. Students gained approximately 60 points after material was covered in lab.



Figure 3. These photos show snapshots of interactive learning used in the classroom; group involvement as well as some of the hands on data the students gathered.

Student Response so far:

“(I Learned) how antibiotics work and become resistant” (student 1)
 “I’ve learned that disease can spread quickly” (student 2)
 “There is bacteria everywhere but a lot of it is good!” (student 5)
 “Bacteria grows on everyday things and our body protects us from it” (student 7)

Lab Modules:

The following lab modules were created or adapted for this course. The order of the modules varies depending on the semester, but they work together well with our theme of infectious agents and health.

***The Scientific Method:** How to clean your hands- Students hypothesize which is better, hand soap or hand sanitizer and they set up a test to see if they are correct.

***Bacteria where art thou?** – Students sample various places they think they can find bacteria, and a few places they think they won’t find any.

***Macromolecules and You-** Students identify basic food items using chemical reactions. Afterwards they are assigned a food diary journal for a week.

***Enzymes & Forensics-** brings enzymes to life, and students solve a crime scene using enzyme reactions.

***The Micro-Cell-** Introduces microscopes and enforces cellular components.

***The Resistance** – Focuses on antibacterial resistance and differences between viruses and bacteria.

***Dragon Genetics-** students learn about genetic principles by creating a baby Dragon.

At the end of the semester students do a small research project where they look up a topic of interest to them and put together a small presentation regarding this topic. This teaches them to use scientific literature and compare it to main stream media information, all while using collaborative learning and public speaking skills.

Special Thanks: Drs. Jeanelle Morgan, Julie Luft, Kristen Miller and Marguerite Brickman for your input, support and suggestions towards this project.

Funding provided by: UNG Presidential Innovation Grant