Using student-centered activities to promote a better understanding of how evolution applies to human health
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Introduction

Recently, the biology department has embarked upon an initiative to include Evolution Across the Curriculum through student-centered learning modules in all of our core courses. A large number of biology majors and non-majors enroll in the two course anatomy and physiology sequence; therefore, providing an opportunity to educate students about the role of evolutionary processes in shaping human health and disease. Modules were developed for this series course to give students an appreciation for how an understanding of evolution is key for advancing the field of medicine. Here we present a set of student-centered activities developed to address key gaps in student understanding of evolutionary processes and how they pertain to human health and disease. We will be focusing on those modules developed for the first course in the series, Human Anatomy & Physiology I (Human A&P).

Learning Objectives

Topics deemed most appropriate for the Human A&P course were determined based upon a departmental survey that evaluated the amount and type of coverage of evolution content coverage across the core courses.

Course-specific Learning Objectives for Human A&P:

1. Students should be able to explain the role natural selection plays in human evolution with specific regard to human health and disease.
2. Students should be able to acknowledge that evolutionary processes are random and do not lead to perfection.

Approach

1. Student-centered content modules and assessments for these modules were developed.
2. Modules were deployed in control & experimental sections in Fall 2012.
3. Effectiveness of assessment questions were evaluated.
   a. Individual learning gains were compared across sections.
   b. Difficulty & discrimination analyses used to evaluate the quality of assessment questions.
4. Assessment questions were modified modules & assessments deployed again in two sections of Bio 312 Spring 2013 semester.

Module & Assessment Tool Evaluation:

- Showed negative learning gains in experimental population
- It was determined assessment tool was not reliably assessing evolution concepts.
- Assessment tool was modified and study repeated

Implementation:

- Modules were effective at promoting a better understanding of evolution, particularly applying natural selection to human health
- Majors showed greater gains as compared to non-majors (possibly due to prior exposure to evolution concepts?)
- Students, particularly non-majors, struggled with the concept that evolution does not lead to perfection

Major Findings

- Continued assessment of student learning gains
- Development of a new module to reinforce the concept of evolution not leading to perfection
- We have developed smaller “mini-modules” to address different learning goals for the second of the A&P series course
- Comparison of extensive modules (described here) with shorter, less active modules to foster deeper understanding of impact of evolution on human health and disease

Where do we go from here?

- This work was approved by UW-IRB
- This study was part of a large curriculum-wide project, funded through a UWL Curriculum Grant.
- UWL College of Science and Allied Health
- David Howard, former Department Chair, was instrumental in moving this process forward
- We thank other members of the EACC Mike Abler, Anita Baines, Lee Baines, Gretchen Gerrish, Kathryn Perez, and Anton Sanderfoot for their feedback while developing modules and assessment tools