

Beyond the Book Report: Reflecting on Social, Ethical, and Environmental Issues in General Biology II

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The course:

General Biology II (GBII) is the second in a two-semester sequence of introductory courses required of all first year biology, natural sciences, and environmental science majors. This course satisfies core requirements for chemistry, physics, and math/computer sciences majors. This course provides a survey of evolution, population genetics, ecology, animal behavior, biodiversity, and conservation biology.

The students:

In Spring 2012, the enrollment in my section was 40 students, and the majority of the students were freshmen. All of the students in my section this semester were traditional-aged students.

The challenge:

During GBII, it is necessary to cover a large amount of factual material to prepare the students for upper-level courses. Thus, there is little or no time during class meetings to reflect upon the moral implications of the topics that we cover and students are not always aware of the relevance of GBII to the “real world”. Moreover, previously I had believed that it would be a challenge to directly address Ignatian values/concepts during a science survey course without seeming artificial or preachy.

The proposed solution:

I assigned a reflection essay to give students an opportunity to explore issues that accompany discoveries and events in the biological sciences. Moreover, this essay provided an opportunity to explicitly incorporate the Ignatian concept of reflection into an introductory biology class.

The assignment:

Each student wrote a reflection essay on a topic related to the subject of his or her in-class presentation of science article from the popular press. The essay was to clearly identify and discuss one environmental, cultural, social, political, or moral issue related to the subject of the article, incorporating information from outside sources. The students were to identify two viewpoints, discuss similarities and differences, and defend their own position based on the evidence.

Each group of 3-4 students identified the “best” essay from the group and that essay was posted to Blackboard. To encourage the students in the class to read their peers’ essays, I wrote one exam question based on material contained in each of the “best” essays.

From the syllabus:

Reflection paper (30 points).

Because of time constraints, we often don't have time to discuss societal implications of the topics we cover in class. The reflection paper will give you an opportunity to explore some of the issues that accompany discoveries and events in the biological sciences.

Each student will write a 5-8 paragraph reflection essay on a topic related to the subject of his or her assigned group article. The essay should clearly identify and discuss one environmental, cultural, social, political, or (NOT and) moral issue related to the subject of the article, incorporating information from outside sources.

The essay is modeled on the "5 paragraph essay" that you all learned in high school. The essay can be longer, but it should not be shorter than 5 paragraphs.

Paragraph 1 should introduce at least two different (but not necessarily opposing) viewpoints regarding causes, or possible effects, or (NOT and) solutions to this issue. You should end the paragraph with a one-sentence summary of your position.

The next few paragraphs will explain the different viewpoints. Every factual statement must be followed by a citation of an appropriate source. At least one numerical statistic (from sources) should be included to support each viewpoint.

The last 1-2 paragraphs should synthesize the different viewpoints (how do they agree, how are they different, are they based on different information, do proponents of one viewpoint dispute the information on which the other viewpoint is based, etc.) and explain your position.

The essays must include a References section and in text citations in APA format.

Observations:

Difficulties-

- Most students did not reflect upon issues at all, and instead they completed a "book report": a summary of the popular science article.
- Students were not adept at identifying appropriate source material, and as a result, essays contained many factual errors. I worried that posting these essays on Blackboard perpetuated misinformation.
 - For example, one "best" essay explored the morality of animal testing. The student derived all of his source information from the website of People for the Ethical Treatment of Animals (PETA) and did not present any alternate views.
- The class was too large to give loving and meaningful feedback on each student's paper.

Positive outcomes-

- Students were excited for an opportunity to examine science in the "real world". They seemed to enjoy the assignment.
- Technical problems with the writing in the essays highlighted common misconceptions that students had about writing for science courses. Many students were not aware that there are different writing styles for different disciplines.
 - I began offering a "Writing Tip of the Day" during most of my lectures to address common problems.
 - I designed an ungraded, in-class group activity to give the students practice using in-text citations.
 - The assignment gave me the opportunity to discuss the difference between an analysis and a summary. I encouraged them to go "beyond the book report".

Selected titles of original articles and corresponding titles of reflection essays:

Title, author, and publication date of original article from <i>Scientific American</i> (brief summary of article)	Title of “best” student reflection essay
Founder Mutations <i>D. Drayna</i> , 2005 (human evolution)	Discovering the Crux of DNA Profiling
Evolution of the Eye <i>T. D. Lamb</i> , 2011 (evidence against the “irreducible complexity” of the vertebrate eye)	Real-world Applications of Evolutionary Biology
Saving the Honeybee <i>D. Cox-Foster & D. vanEnglesdorp</i> , 2009 (Colony collapse disorder in honeybees)	The Effects of Pesticides
The Devil’s Cancer <i>M. Jones & H. McCallum</i> , 2011 (Contagious facial tumors in Tasmanian devils)	The Cost to Prevent Cancer
Just How Smart are Ravens? <i>B. Heinrich & T. Bugnyar</i> , 2007 (Intelligence and learning in birds)	Animal Testing: Plausible Alternatives or Moral Rationalizations?
Halting the World’s Most Lethal Parasite <i>M. Carmichael</i> , 2010 (Recent efforts to halt malaria)	DDT and its Effects on the Environment

Conclusions:

It seems natural to integrate the Ignatian concept of reflection into an introductory biology course, especially in a course where students struggle to find context for the course material. I will make some aspects of the reflection assignment permanent additions to my GBII syllabus, but probably not in the form described here.

In addition to the goal of incorporating reflection into the course, I had also hoped that the process of researching and creating the essays would make the students more knowledgeable and more willing to converse during in-class group presentations. Some students did integrate information from their essays into discussion, however I did not see a noticeable difference in the quality of the presentations or discussion between this semester and semesters when essays were not assigned.

Many students struggled with content and format, which often obscured meaning in their essays. This may be a result of lack of experience of younger students. Older students may be more adept at constructing arguments, so perhaps a reflection essay is better suited for upper-class persons, rather than first year students.

Overall, the students chose appropriate topics that were pertinent to their anticipated career goals and personal interests. I would like to continue to invite students to gather information about controversial ethical, moral, and/or social issues to present and discuss within the context of the in-class group presentations; however, the essay format is a bit formal for GBII. A pared down version of this assignment, such as a guided reading exercise, could contribute equally to the course’s learning outcome (e.g., integrating and applying concepts from a variety of biological subdisciplines to future educational and career goals).