**ENGAGING CONTEMPORARY ISSUES:**
**AN ESSENTIAL SYNERGY BETWEEN THE SCIENCES AND NON-SCIENCES AS LIBERAL ARTS**

_Hessel Bouma III, Ph.D._
_Professor of Biology_  
_Calvin College_

My premise is very simple: The sciences are an integral part of the liberal arts, and the non-sciences are integral to the sciences as liberal arts. Given the long, rich history of the academy—from the universities of Paris and Oxford to today—sectoring inquiry, knowledge, and professional training into discrete disciplines, the simple premise is problematic. Most of us are trained in one discipline, perhaps two, and strongly encouraged to remain not only within our specific discipline, but even our specialized, sub-disciplinary niche.

Some time in the previous millennium (1972 to be precise), just twelve weeks after completing my undergraduate degree in biology, I began my graduate work in human genetics. We were strongly encouraged to participate in Genetics Grand Rounds, offered weekly—an opportunity to put faces and personal dimensions to the genetic conditions we were studying. At one of the first sessions, a pediatrician took us to the neonatal intensive care unit. Already from the doorway we could see a bassinet at the back of the unit, the only one not coupled to copious state-of-the-art technology. As we approached, it was readily apparent that this infant with a grotesquely misshaped head was struggling for life. The doctor explained that this infant was born with anencephaly, missing its cerebral hemispheres and cerebellum, functioning only with an incomplete brain stem. None of us had ever encountered anything of this magnitude before. How were we to make sense of such profound evil? I have no idea how long we were there—time seemed both to stand still and to rush by. Mostly we peppered the doctor with biomedical questions. What caused this? How frequently did this occur? What was the prognosis? What treatment options were there? Was it appropriate to withhold hydration and tube feedings, accepting an earlier natural death rather than pursue treatments in an attempt to sustain life at the risk of only prolonging dying? At one point, my inquiry about the sex of the infant was met with a look of disdain, as if, did it really matter? The doctor peered into the diaper, announced it was a girl, but continued referring to her as “it.” For the physician, at least on this occasion, only the biomedical science mattered, and without the identity of higher cortical functioning, sex and gender were inconsequential. This disorienting moment has long haunted me. Is an anencephalic newborn a person? How are we to deal with such situations? Are we obligated to use all manner of technology to prolong the life of an anencephalic newborn, or may we withhold even ordinary treatments? Should these decisions be made by the parents, healthcare practitioners, or society? How should healthcare practitioners, friends, and relatives support parents of an anencephalic newborn? How are we to understand the relationship of the brain, mind, and soul? If God is good and all powerful, why does such evil occur? The answers to these questions, and many of those surrounding the most difficult issues of our time, call for interdisciplinary answers melding the sciences and the non-sciences as liberal arts.

In the 1950s and 1960s, William G. Perry, Harvard psychologist, conducted elaborate interviews with Ivy League undergraduates to ascertain how we develop intellectually
and morally during our undergraduate years. His seminal work, despite being based on predominantly affluent white males, remains relevant today, having been extended and updated by individuals like Lawrence Kohlberg, Marcia Baxter Magdola, and others. Although he suggested nine stages of development, I think they can be helpfully simplified into three major stages: 1) dualistic right–wrong thinking, 2) critical thinking, and 3) commitment. Much of higher education today appropriately focuses on efforts to promote critical thinking. If we are to successfully encourage intellectual and moral development, I believe the academy must engage in more interdisciplinary work, melding sciences and the non-sciences as liberal arts.

Let me briefly illustrate, from my field of biology, some key issues that need the synergism of the sciences and non-sciences as liberal arts. In the area of biomedical ethics, consider issues such as the concepts of humanness and persons, ethical theories and principles, animal experimentation, human experimentation, euthanasia (withholding and withdrawing medical treatments, physician-assisted suicide, and voluntary euthanasia), reproductive choices (assisting and limiting), gender and sexuality (heterosexuality, homosexuality, bisexuality, and intersexuality), race and ethnicity, animal and human cloning, emergency contraception and abortion, HIV/AIDS, genetic engineering and gene therapy, genetic counseling and control, embryonic and adult stem cells, fetal tissue transplantation, allocations of resources (e.g., organ transplantation, healthcare for the poor, international health, research vs. education vs. treatments), and biological warfare and terrorism. In the area of environmental ethics, there are issues such as allocation of resources, biodiversity (valuing species), deforestation, genetic engineering, global warming and climate change, invasive species, overpopulation, pollution (air, ground, water, and space) including nuclear waste disposal, sustainable living, water quality, and stewardship. And in the area of professional ethics, issues arise such as values and virtues in science, conflicts of interest, publication and openness, allocation of credit, error and negligence, misconduct in science, and responding to violations of ethical standards.

Over the last fifteen years, I have sought to assist students in thinking and addressing these kinds of issues in various courses I teach. In my human biology course for non-majors, my approach has been to use one class session per week to engage students in the issues of biomedical ethics through small group discussions. I have prepared 8-10-page essays accompanied by recent news articles on specific issues and thought-provoking questions. Students are required to read the essays and news articles, think about the question assigned to their group, and write a pre-discussion response in preparation for their small group discussion. During small group discussion, students share their positions and rationales for their positions, critique each other’s arguments, and try to identify points of commonality and the basis for differing responses. After small group discussion, each student writes a summary of his or her group’s discussion, and then re-answers his or her question in light of the discussions and his or her further thinking. The small groups consist of five to six students per group; we gather in an environment conducive to small group discussions. On the day we gather in small groups, about fifteen to twenty minutes are spent in small group discussion; thereafter the convener of each group provides a brief summary of the group’s discussion to the class, and the students and instructor ask questions or make comments.

As part of my assessment of this endeavor over the semester, I invite students to complete pre- and post-course surveys in which I ask them their viewpoints on a host of biology-related issues. In addition, for each small group discussion, students are asked to score their position (see below) to a variation of their question before
discussion and then again after completing the post-discussion assignment; I also have their pre- and post-discussion written work. These allow me to ascertain the effectiveness of this approach and some of the dynamics that affect students’ positions. Permit me several illustrations.

In my human biology course, we talk about the biology of sexually transmitted diseases including HIV/AIDS. Students learn about the virus, how it is transmitted, the etiology of an HIV infection progressing to AIDS, means of preventing viral transmission, and currently available treatments including their side effects and costs. In the moral issues component of the course, one group addresses:

**Question:** Is society obligated to protect prisoners from the spread of HIV?

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Students are given information that in the United States, approximately one in six incarcerated persons is HIV positive and that we segregate prisoners according to sex in prisons that are generally overcrowded and inadequately guarded—a scenario conducive to the further spread of HIV though sexual contact and intravenous drug abuse (Braithwaite). In one recent semester, I taught two sections of this course and therefore had two groups addressing this question. Of the eleven students in the two sets of groups, four persons did not change their positions at all, each agreeing society has some such obligation (one scoring it 3.3, two scoring it 4.0, and one scoring it 3.5). Of the remaining students, all but one shifted away from being neutral towards agreeing that society does have an obligation (scoring it: 3.1 → 3.7, 3.1 → 3.9, 3.1 → 4.0, 3.2 → 4.0, 3.7 → 4.0, and 4.0 → 5.0). One student disagreed from the outset, and only shifted ever so slightly towards disagreeing a little less (2.2 → 2.3). The responses of these last two students are instructive.

The student who disagreed that society had an obligation was a first-year male student who struggled in the course (course grade = D+) yet revealed on several occasions that the moral issues discussion were the most interesting facet of his studies. In his pre-discussion response, he wrote:

One side of me wants to say yes they deserve fair and equal treatment but is our job as a society to work to protect them? I believe in fairness and equality but some will argue that the prisoners are getting what they deserve. Seeing as most HIV is spread by homosexual relations then I don’t feel nearly as bad.

After the small group discussion, he wrote:

I came in with the answer of no we shouldn’t and I left with that same answer….I would have to say that blood screening is important but not necessary. Most of the people who are spreading HIV around are not going to get out of jail.

This student has given me a window on his mind and soul—a privilege and a trust that is to be probed and nudged for further development (and not to be violated by disparaging remarks). Notice how he couches the rationale for his initial position as what “some will argue,” as if he is not so sure he would agree, yet his scored position
indicates his sympathies. His post-discussion response reveals little change in his position. He only partially acknowledges what others in his group have said about the possibility of HIV screening, but he dismisses it and then manufactures a false reason why he believes he can hold to his position. This student’s responses on this and other questions throughout the semester strongly suggest he is still in Perry’s very first level of moral and intellectual development.

The student with the most dramatic shift from agree to strongly agree that society has an obligation to protect prisoners from the spread of HIV/AIDS was a first-year female who excelled in the course (course grade = A-). In her pre-discussion response, she wrote:

I believe that society is obligated to protect prisoners from the spread of HIV, because they are still human beings. While consenting behavior (such as anal sex) cannot be prevented, prisoners should be protected against unwanted sexual advances from fellow prisoners or guards. I don’t think prisoners with HIV should be isolated, but am unsure whether or not prisoners should be informed about others’ infections.

After the small group discussion, she wrote:

As far as how to protect prisoners from the spread of HIV, we were not positive on a solution, but had some good ideas....I believe inmates should be protected from sexual aggression, but I don’t know how this is possible.

This student demonstrates engagement in critical thinking, bringing previous discussions on the value of persons into this question, listening carefully to her peers, and assimilating their ideas into her own.

Over the semesters and years, it is not uncommon for students to entertain the notion that perhaps there is no obligation to protect. But usually they shed this initial personal intuition and move towards considering mandatory HIV testing with issues of cost, frequency of testing, potential problems caused by false-negatives and false-positives, and the stigmatization associated with being HIV positive or having AIDS. Some suggest segregating prisoners according to HIV status, though less for their benefit than for the benefit of the HIV-negative prisoners. More frequently, students perceive there is an obligation to protect, but there seems to be an insurmountable implication to acknowledging this obligation—a need for more public funding. As a consequence, only rarely do students suggest that society provide more guards and/or prisons to allow for one prisoner per cell and adequate guarding that are likely to reduce the occurrence of intravenous drug use and sexual contact. Only once has someone suggested that perhaps society should consider sentencing alternatives to incarceration.

In the course of discussing HIV/AIDS, we also touch on the issue of moral ambiguity. What are we to do if we have two choices, and both choices involve good and evil? In pre- and post-course surveys, students are asked whether it is morally permissible to provide intravenous drug abusers with clean needles and syringes to curb the spread of HIV (Watters). Before the course, students are inclined to disagree, but after the course, are inclined towards agreeing. Even though only one group in each class deals directly with this question in our small group discussions during one period of the semester, the carry-over effect on all the students in the class is clear.

In the course of discussing genetic engineering, one group is asked whether governments should require genetically-modified foods that have been approved by governmental agencies to be labeled as such for consumers. The students’ intuition is
that consumers have a right to know and it ought to be done. But in the course of discussion, they learn about the rigorous standards that must be met before genetically-modified foods are approved for human consumption, the dearth of harms that have occurred since genetically-modified foods have been a part of the human food supply, and the difficulties including expense of requiring the food stream from farmer to manufacturer to stores to have separate streams for genetically-modified versus non-modified foods.

Most biology textbooks are reticent to touch the hot-button issue of animal welfare and experimentation despite the fact that animal experimentation is at the basis of most of what we know in human biology. We spend a period discussing this issue. Comparing the pre- and post-course surveys, there is evidence that students come to realize the importance and necessity of animal experimentation that now include efforts to limit the numbers of animals used in experiments, and to avoid or minimize the pain and suffering of animals used in essential experiments. As a consequence of these conversations bridging the sciences and non-sciences as liberal arts, students gain an appreciation of the uncertainties and risks of using medications and the need for testing first in animal experimentation prior to human experimentation. The recent checkered histories of the dietary drug Phen-Fen and the arthritic medications of Celebrex and Vioxx poignantly illustrate these lessons.

My sense is that these small-group discussions usually produce only small shifts in students’ positions, but more significant shifts in the sophistication of their thinking and degree of critical thinking. Over the semester, there is considerable evidence of intellectual growth, moral development, and interdisciplinary learning and thinking. There is a synergism here: students seem to be more willing to delve into the sciences because they see they are relevant to many of life’s significant issues, and they appreciate the information and perspectives of the non-science disciplines throughout the liberal arts as they can be brought to bear upon the sciences.

On course evaluations at the end of the semester, I do not ever recall a student saying, “This was supposed to be a course in human biology” or “This was a waste of time.” Students have acknowledged, “You made me think of things in ways that made me think of them all day, or even discuss them later!” Or, “The moral issues classes really made me think. Before I was so set in my views, but when I really thought about them, I wasn’t sure what they were based on. Now I know what I believe and why; and I can admit I don’t have the difficult answers in some cases.” And, “This is what I came to a Christian college for.”

Recently, our Social Work Program underwent a site visit for re-accreditation. I was privileged to be invited to meet with the site visitors as one of several professors teaching cognate courses to the program. The following day, my colleague who directs the Social Work Program wrote to me:

The site visitors were particularly impressed with your Biology 115 course, particularly the inclusion of ethical issues. In fact, it was a main topic of our discussion over dinner that evening. They had never heard of such a thing—where ethical content useful to social work students gets addressed in a human biology course. They were very impressed.

Such a response is both heart-warming and disconcerting. What has happened to the academy such that merging the natural sciences, the social sciences, and the non-sciences as liberal arts seems so novel? They ought to be synergistic. If we take our roles seriously to promote the intellectual and moral development of our students to
serve themselves and society with an active life of the mind and social engagement with life’s vexing problems, the sciences sorely need the non-sciences as liberal arts, and the liberal arts are incomplete without the sciences.
Works Cited


Related Bibliography


