Notes from Division III Meeting

January 29, 2014

**Introduction and Goals for Meeting**

Pam Propsom and Jackie Roberts began the meeting by describing their recent sabbatical project as an investigation of “best practices” in undergraduate science education. Although interested in exploring ways to improve their courses, they also want to help facilitate a broader discussion within the division regarding goals for general education in science and math.

They reported that the literature in this area suggests that institutional curricular change occurs when it comes from faculty initiative, not from an administrative mandate; when it has administrative support; when it is transparent and includes input from all constituencies; when it evinces a sustained effort; and when it is responsive to the institution’s dynamics and mission.

As facilitators, they further noted that it was important to involve departments as units of change, and thus envision coordinating closely with departments. They suggested that on-going discussions were best located in a small working group, but that coordination with departments is important. Although they cautioned that it is not reasonable to expect unanimity regarding general education in science and math, they suggested that reaching substantive agreement (perhaps 80%) was sufficient.

Pam and Jackie outlined as a goal for this semester that we develop a set of division-wide learning goals for science and math general education.

**Small and Large Group Discussion of Survey Results**

In October faculty teaching SM courses were sent a brief, five-question survey asking about the pros and cons of the current SM general education requirements, and asking about what SM general education courses should accomplish. Those attending the meeting were divided among five tables, and each table was asked to read the responses for one question, discuss themes emerging from the responses, and report back to the larger group.

*Table 1: What do you think is positive about our current general education requirement in science/math (i.e. two courses with SM designation) for non-science majors?* Michael Roberts reported the following as themes emerging from the survey responses: that the requirement is at least two courses; that the courses must come from different departments; that there is flexibility in course offerings; and that students are encouraged to complete the requirement during their first two years.

*Table 2: What could be improved?* Lynn Bedard reported the following as issues raised by the survey responses: there were many suggestions that students should be required to complete at least one lab course, although a few responses advocated for not requiring a lab course; there were many suggestions that SM courses should more explicitly highlight the scientific method; other suggestions included more courses that improve the scientific literacy of citizens and more emphasis on quantitative reasoning.

*Table 3: How important is it for undergraduate non-science majors to learn science/math content (important concepts, facts, knowledge, etc.) versus science/math skills (understanding the process of science and research, interpreting graphs, etc.)?* Jim Mills reported that approximately 60% of survey respondents felt that skills are, at some level, more important than content, and that approximately 35% felt that skills were at least equally important as content; respondents also noted that skills cannot be taught in the absence of content, and that content provides a means for delivering skills. They noted, as well, the importance of skills to ensure that students better understand the relevance and importance of science in their everyday lives. Finally, they noted that our current students many not understand why they are being asked to complete general education SM courses.

*Table 4:* *In your opinion, what are the three most important skills for students to master in a general education science/math course that meets the SM requirement?* Mary Kertzman reported the following as important skills identified by survey respondents: the ability to work with numbers, including graphing and statistics; understanding the scientific method; the ability to read and evaluate sources, and to recognize a source as one that is reliable; and the ability to link scientific inquiry to the needs of society.

*Table 5: In your opinion, what are the three most important concepts for students to master in a general education science/math course that meets the SM requirement?* Sharon Crary reported that there seemed to be some confusion within the responses between skills and concepts, and that the most common responses addressed the process of doing science and the importance of quantitative skills, including statistics and probability.

Pam began the larger group discussion by noting that there seemed to be a general sense that our learning goals for students are not clear. She noted that DePauw’s rationale for distribution requirements consists of two paragraphs, and that the description of SM courses is more a definition of what is covered than of what students should expect from an SM course. Although one might question whether our students appreciate why we ask them to complete general education courses, this should not dissuade us from being more intentional in what we want for our students. (*Editor’s note: What follows is the language from the current catalog describing general education and SM courses.*)

**Distribution Area Requirements**

Liberally educated students connect disciplines and approaches, integrate learning, consider the ethical values and problems inherent in the acquisition and interpretation of knowledge, and develop skills to communicate clearly the results of their investigations. With these purposes in mind, students explore different modes of inquiry, content areas, and languages early in their college career, becoming aware of their intellectual opportunities and better informed to choose meaningful paths for their lives.

To build a foundation for a liberal arts education at DePauw University, students complete two course credits in each of three distinct areas of study and attain second-semester ability in a language other than English. Each of the six course credits used to complete the Arts and Humanities, Science and Mathematics, and Social Science distribution requirements must be from different course listing areas to ensure that students explore a broad spectrum of the liberal arts and are introduced to the ways these areas study and describe the world.

**Science and Mathematics**: Two course credits in the behavioral, computational, mathematical, and natural sciences. These courses explore the physical, mechanical, and quantitative working of numbers, matter, and life. Through observation, experimentation, and scientific and mathematical reasoning, they seek to comprehend the world and model its operations.

Among the themes that emerged during this discussion were the following:

* There seems to be general agreement within the division regarding general education, which suggests we might be able to create common learning goals. There was some discussion as to whether it might be inherently easier to develop shared learning goals in Division III than in other divisions.
* It was pointed out that not all SM courses are taught by faculty in Division III and that they will need to be included in this discussion at some point. (Editors note: ANTH 152, Human Origins and PHIL 251, Logic were offered as SM courses during the 2012-13 and 2013-14 academic years).
* A question was raised about how different departments view their introductory courses. Are they designed to attract new majors? Are they intended for non-majors? Are they preparation for upper-level courses in the major? If this is the last course that a non-major takes, what should it provide the student? It was suggested that departments need to decide this, that courses must meet the needs of the department.
* There was some discussion of the impact of having non-majors in the same introductory course taken by majors, particularly in terms of balancing the content needed for courses that build on introductory courses with, perhaps, an increased emphasis on skills. In response, it was suggested that we might consider whether our majors might benefit from an increased emphasis on skills, and whether we might trade a bit less content for better recall of that content later. It was pointed out that it is not always clear which students eventually will be non-majors. Many first-year students enter with the goal of eventually going to medical school, but many of them eventually choose to pursue other academic goals. Other students take an SM course without yet knowing what they will major in and find that the course sparks their interest. It was suggested that one goal is to develop a greater interest in science amongst our students, regardless of their eventual major, and that the retention of students should be a goal as well. It was noted that there are no AH courses designed specifically for non-majors.
* The role of the faculty advisor in working with advisees on selecting general education courses was discussed. A question was raised about how to help advisors in the AH and SS areas in advising students about SM courses. Jackie noted that she has talked with a few non-science faculty members about this project and will begin additional conversations with them.

Pam and Jackie closed this portion of the meeting with their summary of the survey responses:

* *What is positive about our current general education requirement in science/math for non-science majors?*
  + better than zero or one course; at least science is required (56%)
  + breadth; courses in at least two departments (17%)
  + exposure to how science works, scientific inquiry, and/or principles (14%)
* *What could be improved?*
  + common goals and/or student outcomes; intentionality (29%)
  + ensure exposure to scientific method and/or literacy (29%)
  + require a lab course (20%)
  + more interdisciplinary courses, non-major courses; courses with themes (20%)
  + more structure; more prescriptive (14%)
* *How important is it for undergraduate non-science majors to learn science/math content vs. science/math skills?*

Agreement with one of the five response options

* + skills more important than content (31%)
  + skills a little more important than content (31%)
  + skills and content equally important (33%)
  + content a little more important than skills (0%)
  + content more important than skills (5%)

Written comments

* + skills will allow students to learn and/or apply new content at a later date (23%)
  + content will be forgotten (21%)
  + cannot learn skills without content or context (13%)
  + skills will last longer (13%)
* *What are the three most important skills for students to master in a general education science/math course?*
  + interpreting a graph or data (37%)
  + statistical/quantitative skills (34%)
  + evaluating quality of evidence (23%)
  + using science for everyday decision-making (14%)
  + developing skepticism (14%)
* *What are the three most important concepts for students to master in a general education science/math course?*
  + scientific method or process (31%)
  + statistics, probability, and other quantitative skills (16%)
  + relationships and differences between the sciences (12%)
  + energy (12%)

**Discussion of Next Steps**

Jackie and Pam began this portion of the meeting by noting that learning goals should identify specific skills and/or content that we want all students to learn before they graduate, and that they will still recall and be able to draw upon after graduation. In addition, learning goals should be assessable. They pointed out that there is increasing pressure from accreditors and granting agencies for better assessment, and that many tested and validated resources for assessment are already available. Preliminary discussions with OIR have taken place regarding the feasibility of testing students when they first enroll at DePauw and when they graduate. Pam and Jackie then outlined plans for forming a working group—one member per department—to draft a preliminary statement of learning goals that draws upon the literature, the survey results, this division meeting, brown bag and brown bottle meetings, and departmental feedback. The goal is to have the draft statement available in April for a division-wide discussion.

The response to this plan was favorable. Among the suggestions and comments were the following:

* Discussions with non-science faculty seem important as we do not have the experience of what it like to be a non-science major in a science course. We need to remember that we must be able to “sell” any plan to our non-science colleagues and that one possible outcome is that a proposal to the faculty might not pass. It was noted that learning goals, themselves, can be incorporated into existing courses without faculty action.
* It will be useful to survey alumni regarding their experience in SM courses. It also will be helpful to know what skills (as opposed to content) is desired by employers, particularly those employing our majors.
* We need to remember that we are in our disciplines because we love them, and that we need to suspend that love enough to avoid turf wars.
* It was noted that the more resources we devote to general education, the fewer resources are available for other areas of our curriculum.
* There was a reminder that making substantive changes to a course is a “big ask,” and that we need to be clear on the problem we are trying to fix and to identify the points of resistance.