ENVIRONMENTAL SCIENCE ASSESSMENT REPORT

St. Norbert College

March 2011
III. Assessment of Student Learning Outcomes

A. Viable Assessment Plan (Summarize intended learning outcomes for majors and describe how the program regularly assesses student learning)

The CEPC program review of the ES Discipline in 2006 stated that the assessment plan of the program was strong. The discipline has continued to use the same basic plan during the past five years, which is summarized below. However, the issue of low sampling size because of the low number of graduates continues to be problematic in seeing trends. As such, we continue to evaluate our program both with ‘numbers’ and by looking at each graduate individually in terms of academic ability, success in the program, and what we know about their work after leaving the institution.

The principal tool used for the assessment of the program is still based on the evaluation of senior theses projects completed by all ES majors. Upon completion of the project, the student summarizes his or her activity and findings in the form of a written thesis which is distributed to the ES Faculty. The student also presents the project to a panel consisting of the entire ES Faculty (other faculty and students may attend if they wish). After the presentation, the ES Faculty ask questions of the student for clarification and assessment of the student’s understanding of the project, and to gauge the level of competence achieved by the student in the ES major. As noted in the 2006 program review, by the 2003 – 2004 academic year it was clear after consultation with the AVP for Institutional Effectiveness that a more objective and specific definition of learning outcomes was desirable to assess the performance of this capstone experience (and by extension of the program itself). As a result, a scoring rubric (see Appendix A) was developed to evaluate senior theses and has been used ever since (04-05 year). The nature of the rubric is important to understand. It focuses on several key ‘cycles’ and ‘themes’ that a student would be exposed to in several courses during the course of their curriculum. As such, because the ES faculty don’t teach many of courses in the major, these themes are deemed more important than many detailed-oriented questions that might or might not be taught in only one class.

B. Direct Evidence

Eight students graduated in the 2005-06 to 2008-09 period with major degrees in ES. The following data summarize the scores relative to the detailed scoring rubric given in Appendix A. In the first section focusing on curriculum knowledge, a score of ‘2’ on the rubric generally indicates ‘poor’ mastery of the topic, whereas a score of ‘3’ indicates ‘good’ mastery or understanding of the topic. The second area focuses on the quality of the senior-thesis research. The implications of thesis results are discussed in section C below.

<table>
<thead>
<tr>
<th>Item—curric. knowledge</th>
<th>Ave. Score (scores range from 1-4)</th>
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<tbody>
<tr>
<td>a. tropic levels</td>
<td>3.25</td>
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</table>
b. plate tectonics  3.25  
c. hydrologic cycle  3  
d. natural selection  3.25  
e. taxonomy   2.75  
f. biogeochemical cycles 2.75  
g. biodiversity/extinction 2.7  
h. human population impacts 2.3

Item—thesis project design and execution

a. hypothesis/variables    2.7  
b. experiment design       2.7  
c. protocol design         2.5  
d. statistical/data analysis 2.7  
e. thesis/writing           2.7  
f. oral presentation       2.5

C. Indirect Evidence

Current student survey data (28 surveys) show that students report they are ‘very satisfied’ or ‘satisfied’ with the ES program in virtually every category of the survey. The subject areas of ‘quality of instruction’, ‘quality of course content’, and ‘quality of curriculum’ consistently are ranked the highest by students. A few minor exceptions were noted in the areas of ‘range of courses offered’, ‘overall major program’, and ‘advisement quality’ in some years. Complete data is available in the OIE. Survey data for students who have graduated from the ES program are probably not meaningful; although they indicate 100% satisfaction with the program, only one student completed a survey.

Tracking of alumni by the College provides information on about one-third of ES graduates during the period from 1997-2008 (12 of 33 graduates). This information is available from the Office of Advancement. However, the diversity of positions held by ES graduates matches the anecdotal information known by the SNC faculty about our former students. The positions held by ES graduates are diverse and include the following: environmental projects manager, forester, graduate student, science teacher, waste-management specialist, Ph.D. candidate. Additional positions held by ES graduates not indicated by the alumni survey include environmental engineer and fisheries biologist.

D. Document program improvement efforts based upon assessment.

Several key issues have resulted from our assessment efforts and the use of a senior thesis as a capstone course to the ES major. In two instances these issues have resulted in changes to the program curriculum (briefly mentioned previously), which we hope will result in better training for our students and career preparation. Specifically,

1. The computer science course that was an original requirement of the major was eliminated, primarily because it became clear over the past decade that ES students (as most SNC students) were coming to SNC with basic computer skills already in hand. These skills included the ability to access and navigate the Internet, basic use of Microsoft Office programs, and use of email. Today, these skills are basic, but 20 years ago many students arrived at SNC with little experience with personal computers.
2. In turn, the elimination of a computer science requirement allowed the ES program to require Botany. One deficiency we observed in graduating students was a clear understanding of taxonomy and systematics. In addition, the fact that the two biology faculty in the program were largely focused on animals instead of plants meant that students didn’t get an introduction to this important area within the framework of the required courses in ecology and limnology. Thus, the addition of Botany addressed both the taxonomy issue and an introduction to plants/plant ecology as it might apply to environmental science.

3. An ongoing dilemma is whether the senior capstone course in research should be eliminated or replaced by a more flexible option in terms of a senior capstone. One of the primary issues concerns student ability. In all other lab science programs at SNC, senior research is generally considered a special opportunity for highly-motivated students who seek out such an experience. In addition, the intellectual ability of a student who likely would gain the most from such an experience is typically well above the ‘average’ SNC student. Increasingly, the ES faculty have found it frustrating to work with some ES majors who were largely unmotivated or intellectually unable to conduct an independent research project. We believe a couple of alternatives might be worth considering.

   a. one model might be that of a junior/senior capstone project, in which a small group of ES majors conducts a group research project selected and supervised by one ES faculty member (or perhaps team taught, which still appears logistically unrealistic). The team project approach would more closely simulate the working experiences that most of our students are likely to encounter in the environmental field. In addition, it would give an opportunity to work toward their strengths while having support from peers when dealing with aspects of a project that are more daunting (because of lack of skills in mathematics or statistics for example). This model is used by the UW-Madison Water Resources Program (M.S.).

   b. a second model might involve allowing students the opportunity to intern or conduct a service-learning project as part of their capstone experience. In some instances, internships have proven exceptionally valuable to ES majors, and they have used a project based on their internship to satisfy their senior thesis option. Again, one issue is the minimum GPA requirement for engaging in an official SNC internship. In recent years, a couple of ES students have been ineligible to do so.

Many of these changes are best considered with our new faculty member in ecology, Dr. Kissman, on board in the Fall of 2011, and the return of Dr. Choudhury to full-time teaching in the Fall of 2012.