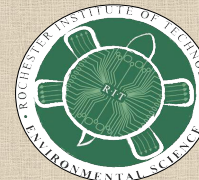




Using Program Assessment in an Environmental Science Program

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Abstract:

As part of semester conversion at the Rochester Institute of Technology, the faculty associated with the Environmental Science Program revised the learning outcomes and program benchmarks for both the BS and MS degrees. The new outcomes include course-embedded assignments as well as external goals, such as job placement rates and study abroad participation. We have been measuring outcomes for several years now, and will share our strategies for how to engage program faculty in the assessment process, as well as how to use information to inform future changes in the program.

Introduction:

The Environmental Science Program at RIT encompasses BS, MS and BS/MS degrees, as well as general education courses and two minors. As part of our commitment to continuous review and improvement of the program, the faculty have developed an annual cycle of review that includes five steps (Figure 1). This cycle includes planning sessions, implementation, data collection, analysis of results, and then planning how to use the results to improve curriculum, instruction and future assessments. Because the program is interdisciplinary by design, this assessment cycle also includes discussions with other programs from other colleges, adding a level of complexity. The program is fairly small however (typically 70-80 students for all programs combined), so the faculty are able to carry out most of the assessment work as part of our regular meetings.

Table 1 illustrates an example of our MS planning and assessment spreadsheet. Program goals, student learning outcomes, benchmarks and results are shown for data from 2012/13 for our MS program.

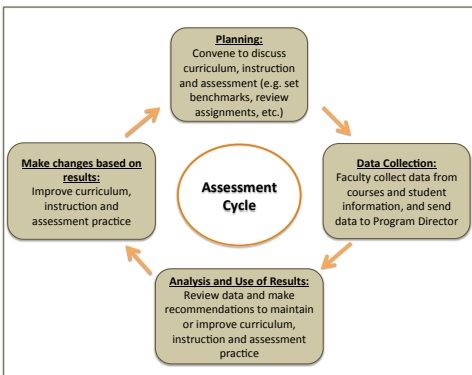


Fig 1. Environmental Science Program Assessment Cycle includes five main steps for engaging faculty in the assessment and continuous improvement of the program.

Table 1: Program Goals, Student Learning Outcomes, Benchmarks, Data and Conclusions for Environmental Science MS program in academic year 2012.

1) Analyze a wide range of environmental problems confronting contemporary society using an integrated interdisciplinary approach.	2) Demonstrate advanced knowledge in environmental science and specialized knowledge in a subfield.		3) Utilize modern, cutting edge technologies to define and address environmental problems.	4) Provide opportunities for students to participate in significant independent research through the process of preparing a master's thesis or project.	5) Provide students with the education and training needed for employment in the environmental industry.			
1.2) Environmental Science Grad Studies (ENVS-601) proposal and presentation with grading rubric and peer evaluation.	1.2) Biodiversity and Society (SI250-630) class assignments, projects, and reports and presentations with grading rubric and peer evaluation.	1.2,3) Advanced Applications of GIS (ENVS-760) and project report and presentation with grading rubric and peer evaluation.	1.2) Advanced Conservation Biology (BIOL-775) lab assignments, Independent Science Thesis project report and presentation with grading rubric and peer evaluation.	1.3) Conducting Independent research (ENVS-790-Environmental Science Thesis) assignments, paper or poster at a local, regional, or national conference.	1.2) Environmental Science Thesis (ENVS-790) or Environmental Science Project (ENVS-780) thesis proposal and thesis or project documents and presentations.	1) Environmental Science Thesis (ENVS-790) or Environmental Science Project (ENVS-780) thesis proposal and thesis or project documents and presentations.	1) Supervised and independent student research projects and presentations at local, regional, and national conferences.	2) Placement/ Alumni Survey.
80-85% of students should achieve a B or better on the project reports and final presentations.	80-85% of students should achieve a B or better on the project reports and final presentations.	80-85% of students should achieve a B or better on the project reports and final presentations (both group and individual grade components).	80-85% of students should achieve a B or better on the project reports and final presentations (both group and individual grade components).	85% or more of ES graduate students should successfully defend their proposals and final thesis products.	85% or more of ES graduate students should successfully defend their proposals and final thesis products.	80% participation in conference activities.	75% of Environmental Science graduates employed within a year of graduating.	
outcome partially met	outcome met	outcome met	outcome not met	outcome partially met	outcome partially met	outcome not met	outcome met	
100% of students attempting proposal during AY 2012 passed	92% of students had 85% or higher on project	80% of students had 85% or higher on project	average per active student = 0.4	removed from program = 3	removed from program = 3	average per active student = 0.4	83% (includes 1 unknown)	
100% of current students had not completed proposal defense by 20124	100% had 80% or higher	80% of students had 80% or higher on project	students presenting at least once = 8	100% had 80% or higher	total students tracked = 54	total students tracked = 54	students presenting at least once = 8	
50% of incoming class of students attempted proposal (3 students)			% presenting = 30%	successful completion to date = 28	successful completion to date = 28	% presenting = 30%		
8.1 quarters = current time to proposal defense (running mean)				% removed of total = 6%	% removed of total = 6%			
				successful completion to date = 89%	successful completion to date = 89%			
When students attempt proposal, they pass (or achieve a provisional pass), but the time to completion of proposal defense is longer than desired. The ideal time to proposal defense is 3-4 quarters. The running mean is 8.1 quarters.	Students are successful in completing coursework objectives	Students are successful in completing coursework objectives	Only 20% of students presented their research one or more times during AY 2012. We need to provide more opportunities for students to present research.	Students are successful in completing coursework objectives	89% of students successfully complete the MS program. However, the average time to program completion is 13 quarters, which is longer than an ideal completion time of 7-12 quarters.	89% of students successfully complete the MS program. However, the average time to program completion is 13 quarters, which is longer than an ideal completion time of 7-12 quarters.	Only 20% of students presented their research one or more times during AY 2012. We need to provide more opportunities for students to present research.	Of 12 graduating students, we were able to track 11. 91% of these students were employed. 82% of these students were employed in Environmental Science position.

This particularly concerned us, and we chose to focus on ways that we could decrease the time to proposal defense. We are currently revising the graduate curriculum, and have particularly focused on revisions to ENVS-601 Intro to Graduate Study, which helps to prepare students for writing their thesis proposals.

Environmental Science Program in a nutshell:

- BS, BS/MS and MS degrees offered
- Interdisciplinary, with required courses from multiple colleges
- 12-15 undergraduates, 6 graduates entering per year on average
- 4-6 primary faculty, who also support other degree programs

Discussion

The MS program revisions:

On the whole, we were pleased with many of the assessed outcomes, which show that our students do well in their coursework, successfully get placed into environmental jobs, and finish their degree programs.

However, one of the surprising outcomes of the assessment was the time to proposal defense of 8 quarters, which is approximately two years. Ideally, students should be finishing their proposal defense by the end of their first year in the program. The newly redesigned course, ENVS-601 (Introduction to Graduate Study), includes outcomes related to proposal development. We also are developing a project based track for the degree, so students who are better suited for applied research can finish the degree in a timely fashion.

To address the shortfall in the number of graduate students presenting at conferences, we are exploring additional opportunities for students to present their work. These include more local conferences, such as the annual GIS/SIG conference held in Rochester, as well as increased opportunities to present at RIT, such as the Graduate Research Symposium and Imagine RIT. Further, with the use of future endowment funds, we will work to establish a student travel fund to support students that present their work at meetings.

Future Work:

The faculty of the Environmental Science program are in the process of revising the BS and the MS programs as a result of findings from the assessment process. This includes streamlining the MS curriculum (too many course pre-requisites are delaying students from starting their thesis research), providing greater flexibility in course selection and tracks within the MS program, developing collaborative BS capstone projects with other RIT programs (to facilitate increasing numbers of double majors in our program), and adding new environmental concentrations for the BS and BS/MS degrees (such as Earth Science). We plan to submit changes this spring to the appropriate curriculum committees for approval in the coming academic year.

This work was supported by a grant from the RIT Student Learning Outcome Assessment Office.