WOU Earth Science Program
Student Progress and Outcomes Assessment

Formative Assessment

Formative assessment of Earth Science students is performed on a course-by-course basis with a range of traditional methods including inquiry-based lab exercises, writing assignments (informal short essays and longer-form expose), short active-learning exercises, oral group presentation, multimedia work samples, and objective quizzes and exams (essays, multiple choice, true/false, lab practicum). The style and level of formative assessment tool varies according to instructor and course content. Some courses are based on quantitative problem solving and computer applications (e.g. ES301 Quantitative Methods, ES321 Structural Geology, ES492 GIS Applications, ES476 Hydrology), others focus on lab and field techniques (e.g. ES302 Field Methods, ES303 Petrographic Microscopy, ES450 Petrology), still others on written/oral multi-media presentation (e.g. ES473 Environmental, ES453 Geology of the Pacific Northwest, ES454 Volcanology).

As stated above in the Student Learning Outcomes section, the focus of our program is on proficiency in quantitative techniques, technology applications, multi-media communication, and problem solving through application of the scientific method. Geology and Earth Science curriculum by its very nature is activity-based and involves outdoor adventure, field trips, hands-on lab exercises, geological conundrums, and problem-solving sets. All of these active learning strategies are employed as formative assessment tools to varying levels on a course-by-course basis in our program.

Summative Assessment

Senior Seminar (ES407) serves as the degree-program assessment tool and capstone evaluation for majors preparing to graduate from the Earth Science program. Students are required to complete Senior Seminar during the final term of their senior year. The objective of the course is for students to conduct in-depth study and research on relevant topics in the Earth Sciences, by requiring students to draw on information from the full range of major courses they have completed during their time as an undergraduate. A department-wide seminar session is conducted at the end of the term, providing students with an opportunity to demonstrate proficiency in the Earth Science content areas. Seminar sessions are modeled after theme sessions at professional meetings, and each student is required to give an oral presentation on their sub-topic. Senior Seminar employs inquiry-based, work sample techniques to demonstrate student proficiency in Earth Science content areas. Students are required to satisfactorily

complete the capstone course to graduate from the program. Although ES407 was initially conceived and placed into the catalog during the 2001-2002 academic year, it is a work in progress and was implemented in earnest during the past two academic years (2003-2004, 2004-2005). During the present academic year (2005-2006), the seminar work sample methodology will be dove-tailed with the rejuvenated, university-wide, academic excellence showcase sponsored by the Phi Kappa Phi honor society and the Program for Undergraduate Research Experience (PURE).

In conjunction with seminar work-sample method described above, a capstone standardized exit exam was initially conceived and implemented during Spring Term 2005. It too is a work in progress and is actively being developed at the time of this writing. The exit exam is based on national standards established by the Educational Testing Service, and was formerly part of the Geology Graduate Record Exam used to evaluate entrance qualifications into graduate school. While ETS no longer offers the GRE Geology exam, Earth Science faculty have adapted the question sets from two editions of the ETS Geology Preparation Manuals (1st ed. 1988, 2nd ed. 1996). Exam questions were captured in digital format and imported into the WebCT class management software system for online testing and automated scoring. Exit exam procedures are modeled after those of the GRE. Students are provided practice exams and instructional materials to prepare for the test. Exam results are scored and ranked in comparison to national standardized results from Geology/Earth Science graduates in the U.S. during the late 1980's and mid 1990's.

In addition to GRE-style procedure above, Earth Science faculty are also exploring other standard exit exam tools. One is the education-based PRAXIS exam for teaching candidates with an emphasis in Earth and physical science content. Two recent Earth Science graduates completed this exam for entrance into the Masters of Art in Teaching program at WOU. The other summative assessment tool that is currently being evaluated is the Fundamental Geology Exam that forms part of the Oregon State Board of Geologist Examiners (OSBGE) professional licensing process. The state of Oregon utilizes a nationally standardized process for professional licensure of engineers, geologists, engineering geologists, landscape architects, and land surveyors. The initial registration in the professional geologist certification is that of "Geologist-in-Training" (GIT), which includes successful completion of 45 upper division credit hours in geoscience and passing a nationally standardized fundamental geology exam that is offered through the Association of State Boards of Geology (ASBOG). OSBGE and ASBOG are currently in communication with geoscience programs throughout the state of Oregon, encouraging them to adopt the fundamental geology exam as an summative evaluation tool for Earth Science / Geology graduates. One of our recent graduates from the Earth Science program passed the ASBOG Fundamentals Exam in 2005, but the tool has not been systematically adopted. As stated above, summative evaluation is a work in progress for the Earth Science

Program at WOU. The primary limitation to adopting the ASBOG fundamentals exam is the cost required of students to apply for the initial OSBGE GIT license and fundamentals exam (currently ~$300).

Post-Baccalaureate Assessment

The Earth Science program lacks an organized and systematic post-baccalaureate assessment tool. There has been some informal discussion of creating such a system, and developing a related alumni newsletter, but no action has been taken to date. The only post-baccalaureate data available is that from informal correspondence and networking between graduates and faculty (e.g. emails, phone calls, requests for recommendation). Most of this data is anecdotal and collected within the first six months after students exit the program.

As an attempt at preliminary analysis, Dr. Taylor compiled select course data from 1999-2005 (Dr. Taylor upper division class rosters; n = 176), compiled a list of ES program students, and tallied the anecdotal information regarding their post-graduate activities. Of the 176 students compiled, 124 were actively involved in the ES program as majors, minors, or related fields such as Environmental Studies or Education. There is no data available for 59 of the 124 program students (i.e. 48% "no data"), however some anecdotal post-baccalaureate information exists for the remaining 65. A tally of known student post-program activities follows:

> 21 = K-12 teaching, 6 = GIS/geospatial technology, 5 = retail sales, 4 = military, 5 = graduate school (3 = geology, 2 = MAT), 3 = geotechnical/construction, 3 = forest resources, 3 = public policy, 2 = hydrologic technician, 1 = river guide, 1 = Peace Corps Volunteer, 1 = registered nurse, 1 = watershed volunteer, 1 = physician's assistant, 1 = emergency medical doctor, 1 = librarian, 1 = law school, 1 = federal forest ranger, 1 = federal customs agent, 1 = federal homeland security, 1 = commercial fisherman, 1 = fire fighter

This preliminary post-baccalaureate analysis of a select subset of ES program students suggests that approximately 3 percent of the declared majors advance on to graduate school in either education or geoscience. Over 20 percent of the same group obtained employment as K-12 teachers, and approximately 12 percent found at least temporary employment in the fields of geospatial technology or natural resources management (GIS, forestry, geotechnical, watershed resources).