

**External Review of the Assessment Plans of the Department of Biological Sciences,
California State Polytechnic University, Pomona - June 6, 2007**

Reviewers: Dr. Judith Kandel, California State University, Fullerton and Dr. Stephen Davis, Pepperdine University

**Assessment of the Graduate Program in Biology
California Polytechnic University, Pomona**

The Graduate Program Assessment Plan (GPAP) provided us on 4 June 2007 for review and evaluation appears to be an appropriate beginning towards the effective assessment of graduate student learning outcomes (SLO) in the Biological Sciences Department at Cal Poly Pomona. The GPAP appears to be faculty generated, having faculty ownership, and to be manageable and sustainable. In our opinion, there are several reasons for likelihood of success. Firstly, a good number of the faculty in the biology department have grants and research contracts with specific expectations from the granting agencies, thus providing built-in structure for graduate student research and training. This is commendable and should be enlarged upon, encouraged, and supported by the administration and the university. Secondly, the graduate degree program requires a written Masters Thesis and oral defense, which insures significant structure and terminal assessment of most of the stated SLOs. Thirdly, faculty members appear to be exceptional mentors to their graduate students, providing advice, being approachable, and providing guidance where needed. The 10 graduate students that were interviewed spoke glowingly of their faculty mentors, stating that the high quality of faculty in the biology department was one of the main reasons they decided to attend graduate school at Cal Poly Pomona, and that the excellent mentorship they receive from faculty was the source of their greatest satisfactions with their graduate experience.

As outside reviewers, we did have some concerns about the potential success of the biology department's GPAP. Our main concern was lack of well-structured, interim checks of progress toward student learning outcomes. These concerns can be grouped into several categories. Firstly, embedded assessment in the GPAP is to take place in the written exams, research projects and lab practical exams of the program courses taken by graduate students. However, a unanimous complaint among the 10 graduate students that were interviewed was that not enough graduate courses were offered in any given term and frequently graduate students were forced to take courses they felt were not appropriate for their research specialty. In some cases, this was perceived to delay progress toward their degree. This perceived problem needs to be addressed in order to realize the stated GPAP goal of embedded coursework assessment. Secondly, the graduate students we interviewed greatly enjoyed the opportunity and responsibility of teaching undergraduates; this experience was important to their career objectives, but unanimously they felt a need for more and better training of how to grade and assess undergraduate student performance. They felt they were not given adequate guidelines or rubrics for assessment of undergraduate SLOs in many of the same categories that graduate students themselves will be evaluated for graduate SLOs (e.g. mastery of the scientific method, performing experiments, critical thinking and communication).

Thirdly, writing experiences with appropriate critique and feedback were perceived weaknesses in the graduate program, not only verbalized by graduate students but also by faculty and administrators that were interviewed. Thus it seems prudent that at least a written proposal for a graduate student's thesis project be added to the current requirement of an oral proposal presentation. This would provide early detection and feedback on writing skills and an interim monitoring of other SLOs by the student's graduate committee. The addition of interim, annual progress reports might also be considered. Fourthly, there was concern about the apparent lack of an early formation of a learning community among graduate students, sometimes referred to as an "identity group." Graduate students were concerned about having a dedicated place or space for graduate students to meet, lack of an initial orientation to graduate school, possibly in the form of graduate student retreats or first year orientation course. Both students and administrators suggested a perceived need for greater structure for the acceptance process, committee selection, and approval of thesis projects. We believe these concerns need to be addressed for two reasons: 1) to realize the goals of the GPAP and 2) to empower graduate students to fulfill their key role in the assessment of undergraduate Student Learning Outcomes (see next section).

There was some concern among faculty and administrators about realizing SLO #2 for graduate students, "identify research questions on a contemporary issue in biology, and critically analyze the relevant literature", and SLO #3 "develop specific hypotheses pertaining to a research problem." This concern was stated in the form of a question "are graduate students assigned a research question for their MS thesis project or are students allowed the freedom of generating their own question?" It appears from interviews with graduate students that this varies among labs and possibly among sub-disciplines. Most importantly, the graduate students we interviewed felt good about the process in their particular lab setting. Their view was that it depended in part on whether or not the lab had research funding and commitment to specific, funded projects. Thus labs without funding allowed more flexibility for student-generated projects whereas labs on contract were restricted to expectations of granting agencies. The appropriate solution to this possible disparity in evaluation of SLOs might be addressed by insuring diversity among thesis committee members. That is, the make up of graduate committees might include at least one person outside the sub-discipline and a committee comprised of members from both funded and non-funded labs.

Graduate students are pivotal to sustainable assessment of undergraduate Student Learning Outcomes (SLO). Graduate students at Cal Poly Pomona are the teaching assistants in laboratory sections of required classes in the curriculum for each of the six majors in biology. Graduate students enjoy their teaching assignments at Cal Poly Pomona, are responsible for small laboratory sections where they gain intimate knowledge of their undergraduate students, and many graduate students have career plans that include teaching as part of their profession. Graduate students read and grade undergraduate student research papers and also design and grade lab practicals, research projects, and laboratory quizzes. Some of these labs include undergraduate original research poster sessions and oral presentations. Thus many of the SLOs for undergraduates in the stated "assessment matrix for each undergraduate major" are

appropriately evaluated through “embedded assessments” by graduate students as TAs in their assigned biology labs. For example, “demonstration or mastery” SLOs of 1) scientific method, 2) perform experiments, 3) quantitative skills, 4) information skills, 5) communication, and 6) critical thinking. Many of these are feasible assessment goals for small lab groups of 20 to 25 students each that meet for extended hours each week. This assumes that graduate students are given proper instructions on assessment theory and are properly trained in the use of standardized rubrics for grading and assessment of SLO. Furthermore, it assumes that graduate students meet and communicate regularly among themselves as well as with faculty mentors regarding pedagogy and assessment. The ten graduate students that we met during our one-day visit to Cal Poly Pomona unanimously showed enthusiastic interest in teaching with a strong desire for more training in pedagogy and increased provision of rubrics for assessment and grading. Graduate students stated that they also desired a “physical space” to meet, interact, and cultivate an identity group, which is currently lacking. They thought an annual retreat, especially early on for beginning graduate students, would make a significant improvement in this goal. Furthermore, the requirement of a written research proposal for graduate students, very early in their graduate program, would be helpful. This is currently not a requirement and certainly would assist graduate students in evaluating mastery SLOs for undergraduates in the lab sections that they teach (items 1, 2, 4, 5, and 6 listed immediately above). A key component to the realization of a manageable and sustainable evaluation of undergraduate SLOs is the empowerment of graduate students (see next two sections for additional rationale).

Graduate students at Cal Poly Pomona are uniquely qualified to assist in sustainable assessment of undergraduate SLO. Most graduate students were also undergraduates at Cal Poly Pomona and thus many have been with the university for 4 years and will continue for another 3 to 7 years during their graduate work. They can knowledgeably assist with longitudinal assessment and they have a historical perspective on institutional change. Among the 10 graduate students that we interviewed, virtually all were undergraduates at Cal Poly Pomona before pursuing their graduate work. The only exception was one graduate student who followed her undergraduate professor to Cal Poly Pomona upon his recent acceptance of a tenure track position. Graduate students remain dedicated and supportive of Cal Poly Pomona. According to our interview, what graduate students liked best about their graduate experience was their working relationship with their faculty advisers. The primary reason they chose to pursue a graduate degree at Cal Poly Pomona was the positive influence of their undergraduate experience, especially the dedicated biology faculty who challenged and guided them. Faculty mentorship appears to be key to the perceived satisfaction and retention of graduate students, at least to the 10 that we interviewed.

Graduate students at Cal Poly Pomona benefit from the experience of undergraduate SLO assessment. The majority of the graduate students greatly enjoy their teaching experience and their TA responsibilities. A few of the graduate students that we interviewed expressed some initial apprehension of teaching but stated that they quickly learned to enjoy the rewards of teaching and personal interactions with learners. Virtually all were interested in pursuing some aspect of teaching in their future career

plans. Graduate students expressed a strong desire to learn more, receive more training in teaching, and to be provided more structure for grading and assessment of SLOs. We believe that assessment will become even more prominent in academia in the near future, that educators will be held increasingly accountable, and successful research and educational funding will be increasingly dependent on assessment methodologies. As a result, some assessment experience and training seems appropriate for graduate students. If they should apply for governmental research fellowships or research grants, they will be asked to address issues of pedagogy, outreach, broader impacts of their proposed research and in some cases, innovative statements of how they propose to integrate research with education. For example, the NSF Graduate Research Fellowship Program (NSF-GRFP) places equal weight on an applicant's statement of their proposed research (should be progressive and innovative) with their statement of broader impacts (which also should be progressive and innovative). Training and experience in the assessment of undergraduate SLOs should strengthen graduate student applications for fellowships and grants.