Appendix 3.2: Review of Program Review Synopses by WASC Working Groups

Note: The theme-based questions were reported differently in one working group's summary table. Learn by Doing's (p. 2) and Integration and Student Learning's (37) tables have one row for all the numerical results, with the score for each question separated by periods. Teacher-Scholar Model's table (14) has a separate row for each theme-based question, with the questions listed on the left.

Learn by Doing Summary of Program Reviews

Based on an examination of a sample of eight program reviews, the LBD working group's assessment is that Cal Poly could strengthen its signature pedagogy by developing a process that explicitly connects program goals and outcomes with *Learn by Doing*. Our examination infers possible Learn by Doing connections based on the program review reports; however, programs were not instructed to present Learn by Doing evidence during their self-study. Though inferential, we propose the following conclusions:

Theme-Based Questions and Evidence

There is little to no evidence that would indicate how LBD contributes to the a) achievement of the university's diversity learning outcomes, b) recruitment and retention of underrepresented populations, or c) student achievement of the university learning objectives (ULOs). If such a connection were to be made in the future, then faculty governance must inform this process.

Outcome-Based Assessment of Student Learning and Development

There is evidence of LBDs influence in outcome-based assessment. Program reviews consistently specified learning objectives/outcomes in terms of application, laboratory use, skill acquisition, analysis and design, performances, internships, and other activities that would suggest the impact and influence of LBD.

Evidence-Based Claims and Decision-Making

There is some indication of LBDs influence in decision-making. Programs reviews were fairly consistent in relying on direct (e.g., embedded assessment within courses using exam questions/rubrics and/or review of senior projects, performances, portfolios or similar student work) and indirect (e.g., graduating senior, alumni and employer surveys).

Use of Program Review Results to Inform Planning and Budgeting

There is some indication of LBDs influence in planning and budgeting. Evidence of closing the loop was limited to informing curricular discussions, modifying the course catalog including the addition of new courses, and making improvements to existing courses; however, it is not always clear that the changes were to strengthen the LBD experience or were related to budgeting decisions.

From our examination of program reviews, we also note that there is some consistency among the sample of program reviews; however, there needs to be a mechanism for further integration, especially among external (profession) and internal (university) review. Our examination would suggest that program review might benefit by the formation of a faculty body that would develop policy and process and that its purview would sync in a timely manner with existing administrative review. Additional direction (e.g., instructions on the role of LBD in curriculum) and systematic feedback of program review reports would better support program assessment, decision-making and planning/budgeting.

The remainder of this report contains a summary table and individual program review.

LBD Summary Table of Program Reviews

	Landscape Architecture	BioResource & Agricultural Engineering	Computer Engineering	Environmental Engineering	Materials Engineering	Music	Statistics	OCOB
Theme-Based Questions and Evidence	0.0.0	0.0.1	0.0.0	0.0.1	1.1.1	1.0.1	1.0.1	0.0.0
Outcome-Based Assessment of Student Learning and Development	2	2	2	2	2	2	2	2
Evidence-Based Claims and Decision-Making	1	2	2	2	1	2	2	2
Use of Program Review Results to Inform Planning and Budgeting	1	2	2	2	0	2	2	2

KEY

0=No Evidence
1=Some evidence but unclear
2=Clear evidence

Landscape Architecture

Assessment based on review of the following documents:
Excerpts from Landscape Architecture Self Evaluation Report (2008)
Landscape Architecture Department Action Plan (January 2009)
Report of Visiting Team – Re-Accreditation (April 2008)
Landscape Architecture Internal Reviewer Final Report (June 2008)

Themed-Based Questions and Evidence

LBD contribution to the achievement of university's diversity learning outcomes?
Doc A – 0.2 Response to Previous LAAB Review – 2 . Last Paragraph – "and the development of a campus and community outreach diversity plan. These three initiatives will guide the next major advancement campaign within the CAED."
Doc A – 3.3 Educational Sequences – LA330 – Cultural Landscapes: People, Places, and Ethical Decisions & LA433 – Cultural Environments ILC both identify student analysis, interpretation, integration, understanding and application of "diverse cultural values" in these classes.
Doc D – Page 7 – Strengths #14 – "Students enjoyed and learned a lot from their international educational opportunities."
None of the documents offers evidence of how LBD is leveraged to assist in this area or there are any goals or objectives listed relating to this area.

LBD leveraged to assist in the recruitment and retention of underrepresented populations?
Doc A – 1.4 Plans For Improvement – Student Recruitment and Support – Enhance Student Diversity (Goal B2) "Research other schools' diversity programs… Establish departmental diversity goals and programs".
Doc B – Page 3 – Student Recruitment and Support – Goal B2 – "Explore potential to increase Landscape Architecture Department input into student admissions process (e.g., portfolio review or other mechanisms)." Goal B5 – "Explore means to enhance student diversity."
Doc C – Page 11 – "The student body generally reflects diversity in the U.S. except for low representation of African-Americans."
Though underrepresented populations are addressed and goals listed by the LAD, none of the documents offers evidence of how LBD is leveraged to assist in this area.

LBD contribution to student achievement of the ULO's?
Doc A – 3.0 Curriculum and Mission and Objectives – Pursuit of Academic Interests Consistent with the Institution – "The curriculum enable student to pursue academic interest consistent with Cal Poly's mission through a number of vehicles including: learn by doing, project based learning and innovative teaching methods."
Doc B – Page 2 – Program Learning Objectives – "Apply critical thinking to make cogent decisions in a professional context."
Doc D – Page 2 – "Hands-on, learn by doing opportunities and required internship work experiences are appreciated by LA students."
Though ULO's are identified and listed as goals by the LAD, none of the documents offers evidence of how LBD contributes to the achievement of ULO's.

Outcome-Based Assessment of Student Learning and Development

Doc B - Page 12-24 – Learning Outcomes Assessment January 2009 – Program Outcomes – Course/Activity – Assessment - Numerous program outcomes are listed with detailed back-up to how specifically the assessment is derived.

Doc C – Page 5 – "While the goals and objectives appear to be forward moving and align with the university's mission, they are only in the broad formative stages and need to be more fully developed."
It is clear that outcome-based assessment is actively being pursued but a hard connection to student learning and development is not clear.

Evidence-Based Claims and Decision Making
Doc C – Page 8 – Surveys and SER "provide qualitative and quantitative metrics of outcomes." Other evidence includes "a track record of winning national design awards" and "graduates are taking the LARE and getting licensed" and "employers and practitioners indicate that students are well prepared to succeed in the profession" and "many graduate go on to pursue advanced degrees".
Doc C – Page 13 – "Studio courses often involve real-life and real-time design projects."
It is clear that evidence-based claims are being used in decision-making and clearly have a LBD element and influence.

Use of Program Review Results to Inform Planning and Budgeting
Doc A – 3.4 Assessment of Program Effectiveness – Program review task are identified and numerous, including; faculty retreat, day long course content assessment, faculty meetings, team teaching, department course evaluations, annual faculty-student meetings, visiting lecturer feedback, department strategic plan 2005-06, department and college wide senior surveys, participation in CTL workshops.
Doc B – Page 11 – Program Modification Based on Assessments – Goals for Improving Assessment are both listed.
It is clear that many devices are being used to help improve, develop, and shape the LA program but the direct applying of assessment results to program improvements are not as clear.

BioResource and Agricultural Engineering Department

Theme-Based Questions and Evidence

There is evidence in the ABET Self Study of June, 2008 that both alumni and industry representatives were more than satisfied with the Learn by Doing aspect of the program (4-10). The importance of laboratories, work experience, industry representative advice, and working in a multi-disciplinary team are key components of the ABET review

Outcomes-Based Assessment of Student Learning and Development

In Sections 2 and 3 of the ABET Self Study there are multiple referrals to student learning and the importance of student learning to BRAE Program objectives.

Evidence-Based Claims and Decision Making

In Section 3 of the ABET Self Study there are the following specific sources of data that attest to the meeting of specific learning outcomes: Fundamentals of Engineering Examination, Graduating Senior Survey, BRAE Alumnus Survey, BRAE Course Evaluations, Program Outcome Achievement, Relationship of Courses in Curriculum to the program Outcomes

Use of Program Review Results in Inform Planning and Budgeting

In the ABET Self Study, Section 4 is entitled "Continuous Improvement". The entire section is a series of improvements based on previously collected data. Thus, the BRAE program is continually collecting data to improve student learning.

Computer Engineering

Theme-Based Questions and Evidence

Learning outcome for Computer Engineering students most closely aligned with the diversity ULO (All Students who complete an undergraduate or graduate program at Cal Poly should be able to make reasoned decisions based on a respect and appreciation for diversity) is Computer Engineering Program Outcomes f, "an understanding of professional and ethical responsibility" (pp. 10, 13, 16 & 22). Student receive additional coverage by taking a USCP (United States Cultural Pluralism) designated course (pp. 17-19). The ABET Self-Study Report offers no evidence of how LBD contributes to the achievement of the university's diversity learning objective.

The ABET Self-Study Report offers no evidence of how LBD is leveraged to assist in recruitment and retention from underrepresented populations.

The ABET Self-Study Report offers no evidence of how LBD contributes to the achievement of ULOs.

Outcome-Based Assessment of Student Learning and Development

The Computer Engineering Program Outcomes (a-n) are skills based (pp. 8-11) and are assessed through both direct (course assignments and senior assessment exams) (pp. 24-2) and indirect (graduating senior, alumni and employer surveys) (26-32) means. Therefore, outcome-based evidence of student learning and development is present and consistent with LBD.

Evidence-Based Claims and Decision Making

The Computer Engineering Program's derives conclusions based on both direct and indirect evidence (p. 32). Given that Program Outcomes (a-n) relate directly to application, there is evidence of LBD influence.

Use of Program Review Results to Inform Planning and Budgeting

The Computer Engineering Program applies assessment results for program improvement, which has resulted in curricular changes as evidenced by course catalog modifications (pp. 33-36).

Environmental Engineering Program

Theme-Based Questions and Evidence

The self-study report for the Environmental Engineering Program makes no mention of Cal Poly's Diversity Learning Objectives or any efforts to recruit or retain students, faculty, or staff from underrepresented populations. While there is no mention of Learn by Doing beyond the initial statement of the university, college, and program objectives and outcomes (pages 1 and 2), the importance of "hands-on" experience is evident in the results of the numerous surveys cited within the report (see tables and figures). Questions were asked in the survey of graduating seniors concerning how well the students felt they could apply certain knowledge, design and analyze systems, reduce and validate laboratory results, prepare reports, and use computational software (Tables 3-1, 3-3, and 4-3 through 4-7). Actions taken to make improvements included adding new courses to the curriculum, adding material to existing courses, and improving available advising resources (page 29, after Table 4-8). Courses and material added concerned computer-aided drawing, computer simulations, more advanced thermodynamics, more in-depth engineering economics analysis, and a more pronounced emphasis on statistics and probability in the reduction of laboratory results (page 31). The result of the hands-on experience provided by the ENVE Program is that graduates are prepared for the challenges of the real world, value life-long learning, and are valuable and responsible members of society—all outcomes that are consistent with the goals of Cal Poly and the College of Engineering.

Outcomes-Based Assessment of Student Learning and Development

In the beginning of the self-study report, the mission statements and learning objectives of Cal Poly, the College of Engineering, and the Environmental Engineering Program are stated (pages 1-2). The ENVE mission and objectives are compared to those of Cal Poly and CENG, and are found to be thoroughly consistent with them. The ENVE Program has five sources of feedback: the students, the faculty, employers, alumni, and an Industrial Advisory Board (IAB) made up of members of the CE/ENVE profession (page 3). To determine whether the three objectives of the ENVE Program were met, a survey was sent to alumni of the program in 2007 and 2008 (the self-study was submitted in 2008). The alumni surveyed had already been working in industry for several years. The survey was structured so as to address the overall objectives, and then divisions of the objectives, whether or not the alumni approved of them, and how applicable each subdivision was to them (Tables 2-2 through 2-9). In addition to the annual survey of alumni, the ENVE faculty meets monthly to discuss issues concerning the five program outcomes. The IAB, which meets biannually, also discusses the outcomes. A Program-Course Outcomes matrix was compiled to see how the outcomes apply to each course offered in the ENVE Program (Table 3-3). The report also stated that the primary indicators of student achievement are midterm and final examinations (page 17, Achievement of Program Outcomes).

Evidence-Based Claims and Decision Making

The ENVE faculty consists of five full-time faculty members and one half-time emeritus faculty member (page 18). The report lists the meeting types and frequencies in which the faculty makes decisions: weekly department meetings, annual curriculum review, biannual IAB meetings, and a yearly faculty retreat. The example of evidence-based decision-making given in the report concerned the curriculum for students who wished to participate in the BS+MS, or 4+1, program. Originally, students who did the 4+1 program only had to complete a thesis, and the senior project requirement was waived under the assumption that a thesis would provide the design experience necessary to meet the requirements of the "Professional Criterion." It was determined, however, that a thesis may only deal with theoretical analysis and might not involve any practical application, in which case the design experience requirement would not be met. As a result, the decision was made to require all students, regardless of their participation in the 4+1 program, to take the senior project design courses (page 29, Actions to Improve the Program).

Use of Program Review Results in Inform Planning and Budgeting

The report contained the results of multiple surveys of the various constituents of the ENVE Program concerning various topics. Examples of data include employee satisfaction with employees they hired

from the ENVE Program, skill and satisfaction levels of graduating seniors, and opinions of alumni concerning the learning objectives of the Program. Another set of data comes from the Fundamentals of Engineering exam results (Tables 4-2, 4-3). The results compare how well students of Cal Poly in the ENVE discipline scored compared to the national average. Analysis of the data leads to improvement in the curriculum, as well as academic advising, and to refinement of the Program's educational objectives and program outcomes.

Material Engineering

Theme-Based Questions and Evidence

- MATE programs outcome: "D. An ability to function on multi-disciplinary teams (p 44)" but rating rubric seems narrow (p 47). Also assessed (p 61-63).
- Focus groups to find out "are there things we can do to support the small number of women in our major? (p 26)"
- "Each course has learning objectives that are linked to ABET criteria (p 11)."
- "Conversion of tradition material engineering laboratories to project based learning activities (p 4)."
- New vision element : "focus more on student's active learning and on the development of problem solving skills (p17)."
- Emphasis on "real-world engineering challenges." Rated by EAB. (p 42) Also student teams rated by EAB on "Light Measurement System" exercise (p 53-54).
- "Oxidation Furnace" exercise was LBD, but instructions were very structured (p 55-56).
- Freshman immediately engaged in 2 projects with LBD (p 80-81).

Outcome-Based Assessment of Student Learning and Development

- "Assessment of higher skills in individual senior portfolios (p 7)."
- Program Learning Objectives (POEs) assessed formally and informally. Informal includes emails, letters, and other unsolicited input from constituents (p 25).
- Chair administers course evaluation with two open-ended questions (p 26)
- External Advisory Board evaluates student presentations (p 27).
- Alumni survey to rate their abilities as adequate or higher on PEOs (p 37).
- EAB evaluate hires based on PEOs (p 40).

Evidence-Based Claims and Decision Making

- New vision element: "management by fact" and "use of balance combination of leading and lagging performance measures" (p 18).

Use of Program Review Results to Inform Planning and Budgeting

- No evidence.

Music Department

Theme-Based Questions and Evidence

The Music program self-study states that, as one of its primary goals, the outcome (5.a.1) expected is that "Students understand music in historical, geographical, and cultural contexts." This is accomplished through the series of required courses in Music History (pp. 3,6,7), along with additional recruiting efforts to broaden departmental diversity(App. D-34). This outcome directly supports the diversity ULO to "Demonstrate knowledge of contributions made by individuals from diverse and/or underrepresented groups to our local, national, and global communities." The National Association of Schools of Music (NASM)is supportive of the "openness of the department" as it relates to non-music majors however they do not directly address diversity. (p. 2)

Leveraged to assist in recruitment and retention of underrepresented populations. None evident.

Contribution to student achievement of ULOs. Given the number of skill-based assessment opportunities, from initial audition/acceptance of the applicant throughout the student's career (pp.3- 9), the program requires that students obtain and "demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology." NASM's review indicated its support of skills-based assessment consistent with LBD.

Outcome-Based Assessment of Student Learning and Development

The Music Department's outcomes are primarily focused on skills and knowledge levels assessed through individual and ensemble performances (pp. 5, 9, 10, 22) along with a Mid-Point Exam to measure their individual level of progress (p. 8, 10, 23). These outcomes are direct reflections of LBD.

Evidence-Based Claims and Decision Making

The Music Department uses a consistent and timely evaluation cycle that contains a combination of course grades, annual juries (performance), Mid-Point Exams and Senior Projects to provide evidence of progress and success. These methods are direct evidence of LBD.

Use of Program Review Results to Inform Planning and Budgeting

The Music Department initiated a review of their jury evaluations on performance and has conducted post-jury assessments (PJA) since Fall 2006. (App. D-72) The PJAs have resulted in numerous changes to judging criteria and consistency in how individual faculty scores were assigned. (p. 16-17)

Statistics Department

Theme-Based Questions and evidence

LBD contribute to Diversity – ULO

"Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability," via GE courses (Statistics Department Self-Study 2008-2009, p. 38)

Alignment of University Diversity Learning Objectives with Curricula (Statistics Department Self-Study 2008-2009, p. 39)

LBD leveraged in recruitment and retention of diversity students, faculty, and staff

none

LBD contribute to ULOs after graduation from employers, measureable

Report of the Review Committee Department of Statistics Academic Program Review 2009, page 6 suggests tracking graduates and success post graduation, and maybe expanding to graduate programs and employers

Academic Program Review Statistics Program Review 2010, page 8-9, *Issue 12 Tracking Graduates* in response to Report of the Review Committee page 6, "we will attempt to compile a list of graduates…we now have a Facebook site for the statistics department…other mechanisms will be considered if this approach is insufficient…"

Outcomes-Based Assessment of Student Learning and Development

"Assessment is an ongoing activity; all faculty are involved; assessment information has and will continue to be used to guide changes and in the curriculum" (Academic Program Review Statistics Program Review 2010, p. 9).

2007-2008 Data Collection Learning Outcomes 1-6 (Statistics Department Self-Study 2008-2009, p. 29-31)

Evidence-Based Claims and Decision Making

Statistics Department Self-Study 2008-2009, pages 12-14, *An Analysis and Reflection on Available Student Data*: analysis of graduation rates, six-year drop-out rates, six-year graduation rates by gender, ethnic origin, and avenue of admission, enrolled undergraduates, bachelor's degrees awarded, data on first-year students: one-year retention rates

Use of Program Review Results in Inform Planning and Budgeting

Academic Program Review Statistics Program Review 2010 in response to the Report of the Review Committee Department of Statistics Academic Program Review 2009 after the Statistics Department Self-Study 2008-2009

OCOB

Theme-Based Questions and Evidence
This report focuses on the University Learning Outcomes, which does include, 'make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability", but does not specifically address Cal Poly's diversity learning outcomes. In addition, the following departments/concentrations include departmental learning goals or objectives that mention diversity: B.S. in Business Administration, page 4, learning objective 5; International Business, page 13, learning objective 1; B.S. in Economics, page 22, learning goal 3.

This report does not address how LBD can be leveraged to assist in recruitment and retention.

This report does not specifically address how LBD contributes to student success. But, it does include various examples of learning outcomes and assessments that point to Learn By Doing experiences. The focus in this report is on department/concentration area learning objectives and assessment plan(s) in relation to the University learning objectives, Cal Poly mission statement and Orfalea College of Business mission statement, not specifically related to learn by doing. Included in this is a section on Senior Projects, page 25 and specific learning objectives where learn by doing can specifically be obtained; Entrepreneurship, page 13, 2 and 3; Information Systems, page 13, 1; Marketing, page 13, 1, 5-9; Packaging and Logistics, page 13, 2. In addition, the study provides assessment from the perspective of alumni and employers through surveys and evaluations taken from college-wide rubrics which are reviewed and approved by the Undergraduate Programs committee (page 4).

Outcomes-Based Assessment of Student Learning and Development
Throughout the self study it outlines various opportunities for assessments of student learning and development. In each departments section it includes the rubric for assessing student learning and utilizes multiple methods of assessment, both indirect and direct, including graduate survey reports, employer surveys, internship report, rubrics, reviews of course material and syllabi. The Orfalea College uses two general assessment processes: a stand-alone testing assessment process and an embedded assessment process (pg. 8). Overall the process for continuous assessment and departmental collaboration of assessment is described in each departmental section, including the monitoring mechanisms.

Evidence-Based Claims and Decision Making
In each department section there are sources of data that discuss the learning objectives, goals how they are assessed and actions, including using external testing resources, and steps to be taken if goals are not met. Clearly outlined in the reports are the learning outcomes, criteria, monitoring mechanisms, where and how measured and when it will be measure (which demonstrates continuous assessment).

Use of Program Review Results to Inform Planning and Budgeting
In this self study, each department included a section on analysis, conclusions and actions and a section on the process for making changes and changes made. These are detailed on pages 9-11 and 18-20 for B.S. in Business Administration, 27 for B.S. in Economics and 45-46 for B.S. in Industrial Technology. Thus there is a direct link between program review results being utilized to inform planning and budgeting based on the curriculum, level of attainment of each learning objective outlined and/or assessment process.

Theme-Based Questions and Evidence

The program review criteria did not explicitly require that the Teacher-Scholar Model theme be characterized or assessed. Consequently, the workgroup had to search extensively through the reviews to find evidence and significance of the TSM. Most program reviews acknowledged the significance of having professionally active faculty for the primary reason that active faculty can bring a student to a higher level of competency in their respective fields. Though most programs do not have explicit standards of professional activity, a majority of programs provided a range of acceptable activities. Furthermore, most programs provided specific examples of the professional activities of their faculty. Several programs provided examples of how students were directly involved in scholarly act ivies of faculty. Of the program reviews that explicitly addressed TSM issues, all expressed similar impediments to fully implementing the TSM. Essentially, impediments were most related to time available to the faculty for scholarly activities (RSCA) due to heavy teaching loads and next most related to money in support of infrastructure that would serve the TSM. The consensus of the work group was that we would see much more evidence of TSM activities and perhaps evidence of the importance of TSM to student learning if it were explicitly requested of the Program Review process.

Outcome-Based Assessment of Student Learning and Development

Essentially all program reviews provided some form of direct and indirect assessment of student learning. The Engineering programs that were accredited by ABET use a "two-loop" (i.e. long term and short term) assessment process that assesses both student performance and faculty qualification. Other programs usually assessed student learning in similar ways through exit/alumni survey, imbedded questions during the capstone courses, employer surveys, and job placement of graduates. Other examples included the use of case studies to address a pressing issue related to student learning or their progress through a series of courses required by their program.

Evidence-Based Claims and Decision Making

Again, because outcomes-based assessment and evidence-based claims are required elements of the program review process, all of the programs reviewed by the TSM workgroup essentially provided some evidence for meeting program learning objectives. A common example was the use of direct assessment tests during a capstone course/experience, such as Senior Project or Senior Seminar. These questions/tests were used to assess the percentage of students meeting specific program learning/educational objectives. Many programs did not assess student attainment of every learning objective of the program. Embedded questions in final exams of senior level course were another example of direct assessment of meeting program learning objectives. Corrective action or recommendations stated in program reviews stemmed explicitly from these assessment tools for most of the programs reviewed. These actions/recommendations included curriculum changes, course flow and alignment and support for laboratory space or other facilities.

Use of Program Review Results to Inform Planning and Budgeting

Most evidence that programs used Program Review results to inform planning and budgeting came in a section reporting on actions taken on action items from the previous program review. Actions that did not require additional money or extra faculty time such as curriculum adjustments were usually implemented and completed by the program. Items that required time and/or money or space were most often not acted upon. Other simple ways that programs used previous reviews for planning included learning where assessment tests or surveys fail to meet their objectives (i.e. inform the program) and consequently those tests and surveys were refined.

TSM Summary Table of Program Reviews

	ARCE: Architectural Engineering	CAFES: Nutrition	CENG: Aerospace	CENG: Computer Science	CENG: Industrial Engineering	CENG: Mechanical Engineering	CLA: English	OCOB Business	CSM: Mathematics
TSM: what are TSM characteristics	1	0	0	0	1	1		1	1
TSM: success at implementing TSM	1	0	1	0	1	0		2	2
TSM: Why integrating T-S important	0	0	0	0	0	0		1	0.5
TSM goals and challenges for implementation	1	1	1	0	0	0		0	1
Outcomes-Based Assessment of Student Learning	2	2	2	1	2	2		2	2
Evidence-Based Claims and Decision making	2	1	2	0	2	2		2	2
Use of PR for Planning (Action Items acted on)	2	1	2	0	2	2		2	2

0= no evidence
1=some evidence/unclear
2=clear evidence

Aerospace Engineering

Theme-Based Questions and Evidence

The Aerospace Engineering Faculty at Cal Poly are encouraged to engage in research as broadly defined to include research and development, consulting, publications, interdisciplinary labs and projects. This has recently been further reinforced by the development of the Advanced Technology Laboratory (ATL) and Project Based Learning activities in the Bonderson building. Students are expected to achieve expertise in the various disciplines of aerospace engineering not only through course work but in the execution of senior projects, hands on labs, a capstone team design experience and a systems view of engineering which is integrated throughout the program.

The key stakeholders within aerospace engineering including faculty, students, alumni, industrial advisory board members, and prospective employers have all participated in the assessment of the aerospace engineering program. This includes on-going participation in the ABET 2000 assessment efforts. Cal Poly aerospace engineering program is one of approximately 3100 ABET accredited programs throughout the world. ABET is the recognized U.S. accreditor of college and university programs in applied science, computing, engineering, and technology comprised of over 30 professional and technical societies. Throughout this assessment process stakeholders have established and revised program outcomes, developed assessment tools, and have re-affirmed the educational philosophy for developing Cal Poly aerospace engineers with a hands-on, laboratory based learning approach with strong emphasis on systems and multidisciplinary team.

Accordingly, the success of this laboratory based hands on approach to gaining engineering expertise is leading to an increase of industry supported research projects in the department. In addition, several faculty members are collaborating with agencies such as NASA to conduct research projects with contracts extending up to five years employing and engaging numerous students. These research projects are inclusive, meaningful and fit the description of creating vibrant learning experiences for students. This is further demonstrated by reviewing the data on awards received for externally supported research projects. The college of engineering collectively has received a total of $3,926,747 in funding for the first three quarters of this fiscal of which $1,171,005 was received by ten aerospace engineering faculty.

Outcome-Based Assessment of Student Learning and Development

The aerospace engineering faculty developed specific outcomes based on program education objectives that were also mapped to ABET program specific outcomes. They were initially reviewed by the Industry Advisory Board (IAB) and student representatives and now are continually refined through the use of alumni surveys, employer surveys, faculty meetings, evaluations, and IAB meetings. Eight assessment tools provide three different metrics for the 12 identified outcomes for the Aerospace Engineering program. The assessment tools now in use include a Senior Design, Senior Project, IAB Evaluation of Senior Project, Graduating Senior Survey, Major GPA, Writing Exam, Senior Portfolio, and Graduate School Statistics. Both direct and indirect assessment tools are used. The IAB for example evaluates senior projects in the form of a formal presentation and informal poster session that takes place once a year. The senior project and senior design assessments on the other hand are evaluated by course grade for the entire graduating class.

Evidence-Based Claims and Decision Making

The various tools including alumni surveys, employer surveys, evaluations, and IAB presentations/reports are contained in 12 outcomes binders. The data from the assessment tools are summarized upon which actions are then subsequently taken. For example, the evaluation of Senior Projects by the IAB concluded there needs to be more relevant projects with improved evaluations of those projects. In response to this there has been an increased emphasis on securing more relevant industry supported projects with changes made to the evaluation form to better assess the project results. From the evaluation of the Senior Portfolio assessment tool it was determined that additional "systems" instruction was also necessary. The curriculum of the fall lecture of the senior design course was modified to add additional systems material to address this void. Other changes made were that prerequisites are now uniformly enforced with a new people soft tool to ensure students who are not qualified cannot get into a class. Other changes to curriculum continue to be made to address shortfalls in course availability and scheduling. The content of the assessments for the 12 outcomes are discussed at faculty meetings and presented to the IAB for review twice a year. The meetings are dedicated to curriculum development, department goal setting, review of student work, and ways to increase industry participation in student projects.

Use of Program Review Results to Inform Planning and Budgeting

Since the last ABET visit, the Aerospace Engineering Department has expanded its faculty to deal with increases in students. Lecturers have been replaced with full professors that also compliment the curriculum needs. These professors have added research capability to the department and have facilitated funding for grants and contracts thereby increasing industry participation in student projects consistent with the teacher scholar model. The addition of faculty member Professor Rob McDonald is such an example having been hired as an aircraft design specialist in 2007 he has already submitted six proposals capturing two awards totaling close to $900,000. The challenge will be retaining these faculty members in the future especially if heavy teaching loads are a constraint to accomplishing research objectives. While Professor McDonald continues to remain engaged in his research activities he has recently taken a sabbatical to work for NASA. When he returns he'll have most likely formed relationships that may be instrumental in securing new industry supported grants and contracts already deemed a critical component for aerospace engineering student learning. Cal Poly's support of Professor McDonald's employment with NASA is evidence of their endorsement of the teacher scholar model, however, is at a risk if he were not to return to Cal Poly or is recruited away to another University or industry. However, it is a start and there is great benefit for other faculty to see evidence that the University is supportive of research faculty and not only that faculty that remains in the classroom.

Architectural Engineering

Background:
The ARCE Program is accredited through ABET and participates in the standard 6 year review cycle with the College of Engineering and BRAE. Al Estes, the department head of ARCE, is himself an ABET evaluator.

Theme-Based Questions and Evidence

Why is the integration of teaching and faculty scholarship important?
What are the goals and challenges for implementing a teacher-scholar model at Cal Poly?

The Architectural engineering Department has established educational objectives that are consistent with the Mission of Cal Poly to "foster teaching, scholarship, and service…" and encourage a teacher-scholar model for faculty success. The objectives include "engaged in life long learning" and "able to determine and advance in a career path primarily in structural engineering or a building industry field." Specifically they have employed a dual track approach to tenure looking at both terminal degree (Ph.D.) and state licensure (California Structural Engineering License). This mix helps promote the "learn by doing" environment and makes it possible for students to "collaborate with faculty on scholarly activities…" The ARCE program review clearly defines the importance of faculty participation in the profession through professional societies, conference participation, and publishing and/or reviewing journal articles. These activities allow the program to acquire guidance from the professional societies and "…allows faculty members to bring up to date engineering topics into the classroom in order to keep the curriculum relevant." Several changes relevant to the teacher-scholar model were addressed in the self study including giving faculty more opportunity to contribute directly to the vision of the department, increasing the number of tenure/tenure track faculty, and creation of a mentoring program where senior faculty mentor untenured and part time faculty.

Outcome-Based Assessment of Student Learning and Development

ARCE is an ABET accredited program and as such is on a six year evaluation cycle. The ARCE program uses a "two-loop" assessment process using a slow (three year) loop to evaluate educational objectives (what is expected of a graduate several years out) and a fast (yearly) loop that evaluates outcomes (what skills does a graduate possess). A mapping of all ARCE courses to the stated outcomes is presented along with a mapping of the stated outcomes to the educational objectives. Assessment is performed through student surveys, graduate surveys, the fundamentals of engineering exam results, imbedded indicators (test questions), and advisory board minutes. Other data used for assessment include student performance indicators including evaluation of senior projects, performance in competitions, employment reports, admissions and enrollment data, and student awards. Faculty performance indicators are also evaluated including faculty qualifications, teaching ratings, professional society participation, service activities, and scholarship. Lastly resources are assessed based on facilities, budget, laboratories, computers, support staff, and external support.

Evidence-Based Claims and Decision Making

- Developed program outcomes
- Documented constituency input
- Identified where in the curriculum these outcomes are met
- Established performance measures for each outcome
- Evaluated student performance against these measures and provide a rating
- Made and documented decisions and changes based on the results

Use of Program Review Results to Inform Planning and Budgeting

"Currently the annual program assessment is the primary vehicle for proposing changes to the Architectural Engineering program. The program assessment, typically presented to the Dean, the faculty and the Advisory Board culminates with a series of recommended actions for the coming year. Similarly, the program assessment begins with the status of the recommendations from the previous year, which is our means of closing the loop, reporting progress and ensuring that the actions are not forgotten. The recommendations are based on the assessment data provided in the body of the program assessment..."

The ARCE self study includes substantial evidence that the above process was followed and used to recommend future improvements to the program.

Business

Theme-Based Questions and Evidence

The OCOB programs are externally accredited by AACSB and this accrediting body requires documented maintenance of both professionally and academically qualified and active faculty. This requirement is one obvious reason for maintaining a high degree of scholarly activity within the faculty, though it is also considered to be very important to effective achievement of Program goals, as students must be familiar with and proficient in current accounting practices and taxation laws. It is further explicitly recognized that faculty engaged in the graduate program should demonstrate a higher degree of scholarly activity in their respective fields. Specified characteristics of the Teacher-Scholar within the Program are very clear, and include a minimum of two peer-reviewed, discipline-based scholarly publications within any preceding five year period for those faculty involved in the graduate program. There are a number of caveats to this rule to accommodate the diverse backgrounds of new hires either directly after attainment of their Ph.D. or JD, or those joining the academic ranks out of a non-academic professional role. To further ensure professional relevance in the Program, students are required to spend the winter quarter in an outside internship with one of a number of outside accounting firms.

Outcome-Based Assessment of Student Learning and Development

Both indirect and direct assessment methods were employed to document student learning in the Program. Direct assessment was in the form of evaluation of various assignments executed as part of a each on-site course within the three terms in which students are enrolled in on-site courses (Summer, Fall and Spring). In these cases, no single course was used for assessment of all learning objectives, but all learning objectives except for objective 4 ("Prepare state and federal tax returns for individuals and business entities") were assessed. Learning objective 4 is assessed through direct means by internship employer surveys completed for each student at the completion of the winter quarter tax preparation internship. Learning objective 4 is also assessed indirectly by a student report.

Evidence-Based Claims and Decision Making

Overall, it was concluded based on the assessment efforts undertaken that the Program's objectives were largely being met with few "does not meet expectations" cases. In the case of most learning objectives, the majority of students fell into the middle of the three categories ("meets expectations"), except in the case of learning objectives 5.1 and 5.2 in which 52% of the 25 students were assessed to have "exceeded expectations". These claims are supported by inclusion in the report of the assessment rubrics, course or other exercises that were assessed, and the summarized outcomes of the assessment. These outcomes are described as having been used to impact the Program through alterations to individual course assignments and alignment and coordination among courses within the program where there were indications of any students not attaining the objective.

Use of Program Review Results to Inform Planning and Budgeting

As stated in paragraph 3, the assessment data have been used to inform curricular design and coordination, though verification of employment of program review information in planning or budgeting decisions is impossible from this report, as it was the first for this program. In the absence of a previous report, there is no way to verify that any program review plans have or have not been implemented.

Mechanical Engineering

Theme-Based Questions and Evidence

The ME Program Review, the ABET Self-Study Report, states that "The faculty is encouraged to engage in research…" with research described as including "…R&D, consulting, publications, interdisciplinary lab and projects…." The new Advanced Technologies Lab and Bonderson buildings are given as examples of how research is encouraged. Scholarly activity by the faculty is also described as being evidenced by their active participation in professional societies. The rest of the document focuses specifically on student skills, with no other mention of the role of faculty scholarship in teaching those skills.

Outcome-Based Assessment of Student Learning and Development

The ME Program has 4 Program Educational Objectives (POEs) developed in 2000 and reviewed in 2006 by the Industry Advisory Board (IAB), faculty, staff, and students. For program accreditation, periodic assessment of PEOs is required to determine if students are meeting these objectives. Multiple levels of direct and indirect assessment were utilized for this purpose. Indirect assessment included a survey of alumni 3-5 years after graduation and an employer survey. Direct assessment of POEs was obtained from Senior Design oral presentation scores (based on industry sponsor evaluations) and results of the Writing Proficiency Exam (WPE).

Program Outcomes were defined as specific student skills corresponding to the POEs. Program Outcomes were assessed and evaluated on a prescribed periodic basis by the Curriculum Committee (quarterly assessment and evaluation), the Industrial Advisory Board (IAB; twice yearly evaluation), and faculty (assessment and evaluation at yearly Fall Retreat and as needed in Department Faculty meetings). Again, both direct and indirect assessment methods were utilized for assessment of Program Outcomes. Indirect measures to determine if students had achieved the skills corresponding to the POEs included Senior Surveys, an Employer Survey, and an IAB Survey. Direct measures included a review of Senior Projects, a Senior Exam, lab finals in two upper division courses, and specific assignments and embedded exam questions administered in multiple lower and upper division classes. The Fundamentals of Engineering (FE) Exam was utilized as a direct external method of assessment.

Evidence-Based Claims and Decision Making

Results of all assessment methods were presented and discussed in detail. In response to the two surveys conducted to assess POEs, corrective action was recommended if the minimum average achievement level on the alumni or employer survey were below "adequate" or "neutral," respectively. It was concluded that "alumni have achieved the POEs" but that three aspects of the POEs required corrective action: the ability to conduct experiments, written communication, and negotiating skills.

Evaluation of Program Objective Assessment outcomes was systematic and comprehensive. For each Program Objective assessed, all appropriate indirect and direct assessment measures were evaluated for evidence of students' success in meeting that Program Objective and any deficiencies were enumerated and discussed.

Evaluation of the Senior Exam indicated that students were not meeting some Program Objectives, including the ability to "evaluate basic geometrical quantities and mathematical expressions" and the ability to apply the principles of "basic sciences and associated analysis techniques." This was supported by a faculty evaluation of the embedded exam questions. The

Senior Exam also indicated that students were unable to design an experiment. Interestingly, the results of two indirect assessment tools, the Student Survey and Employer Survey, indicated that both students and employers believed student skills in all of these areas to be above adequate.

Evaluation of indirect and direct assessment methods FE Exam results were compared to a standard (the Carnegie 1 average) and plotted over time to determine if students had mastered specific Program Objectives. Students met or exceeded the Carnegie 1 average for all subject areas with no significant upward or downward trends over time, with the exception of ethics and business practices (performance described as "near" the Carnegie 1 average).

Even when results of the direct and indirect measures indicate "no significant deficiencies" of knowledge and/or skills, detailed critiques were often presented within the Program Review. For example, indirect and direct measures of the Program Objective addressing the ability to communicate effectively in writing were rated as adequate but were still identified as a targeted program improvement area.

Program review results used to inform planning and budgeting

Evidence of use of the Program Review Results exists in two forms (1) recommended changes based on the Program Review and (2) implemented changes based on the previous Program Review (3) proposed changes to the assessment methods to better evaluate Program Objectives.

Changes recommended based on the current assessment and evaluation were based directly on the evaluation of assessment results and were reasonable in their scope. For example, after assessment methods consistently demonstrated that most students were deficient in their ability to draw a free body diagram (FBD), a subcommittee of the Curriculum Committee was formed to develop a consistent set of criteria for a FBD, which once approved by the faculty will be implemented throughout the curriculum. The same direct assessment methods (e.g. the Senior Exam) used to identify deficiencies can be utilized to assess the effectiveness of changes such as these.

To address deficiencies in writing skills, changes were suggested that including increasing individual writing requirements (as opposed to team-based writing) and improving opportunities for instructor feedback. Several changes were recommended, such as faculty workshops and the potential integration of new or improved writing assignments throughout the curriculum. However, these plans are typically not as precisely developed or described as those changes designed to improve engineering skills and knowledge.

To better evaluate Program Objectives and improve the next Program Review, several questions and/or types of questions were singled out for improvement because they were either poorly worded questions or the assessment method itself was determined to be an inappropriate assessment method for a particular Program Objective. For example, it was suggested that Senior Exam was not an appropriate method of assessment of student design capabilities, whereas the Senior Project should be.

Mathematics

Theme-Based Questions and Evidence

A goal of the Mathematics department is to maintain a community of Teacher-Scholars. Through this they strive to create a vibrant learning experience for students, which is a characteristic of the Teacher-Scholar Model (TSM) described in the TSM Theme of the WASC CPR and Academic Senate Resolution AS-725-11 Resolution on Defining and Adopting the Teacher-Scholar Model. However, the department is currently short-staffed necessitating heavy teaching loads and makes a case in their program review in support of more hiring so as to better implement the TSM. Their case begins with a valuation of highly trained faculty who are specialized and professionally active in order to successfully implement their new pure and applied concentrations, as well as their teaching concentration. The high level of faculty training and concomitant professional activity is a direct benefit to students who are included in those activities and an indirect benefit to students in the classroom who are taught by externally-validated experts in their field. Their program review describes several research groups within which there is a high demand for highly qualified graduates, and thus, highly qualified faculty to train them. They further stipulate that professionally active faculty create vibrant learning environments for students in addition to student inclusion in faculty professional activities. This balance of highly qualified teaching with professional activity epitomizes the TSM that can be practiced sustainably at Cal Poly as described in the WASC CPR.

Currently, the Mathematics Department demonstrates several programs and projects whereby the TSM is embodied. For example, the National Science Foundation Research Experience for Undergraduates program involved 12 faculty members and 52 students resulting in several peer-reviewed publications and presentations at national conferences. The Cal Poly Math College-Based Fee Summer Research Program has involved 14 faculty members and over 50 undergraduates resulting in many presentations and publications by faculty and students at professional conferences. These student experiences have been identified as high impact activities both in the literature and student surveys reported in the WASC CPR Report in the Teacher-Scholar Model Theme.

The department also allocates a portion of their operating expense budget and discretionary funds to invited speaker honoraria and travel expenses related to professional activities. They provide 12 WTU in the first year for new hires in support of professional development. They allow faculty to teach 2 larger section courses instead of 3 normal-sized sections. They provide assigned time to faculty who submit grant proposals, created research areas within the department, weekly colloquia, clear criteria for RPT outlined in the College of Science and Mathematics Personnel Policies, Procedures, and Evaluation Criteria document. All of these are typical approaches to supporting the TSM at Cal Poly with the limited resources that restrains all CSU's.

The Mathematics Department experiences typical impediments to supporting the TSM as other departments on campus: heavy teaching loads and lack of money and resources. They have also identified dispersed faculty offices as detracting from a sense of "community" among faculty members.

Outcome-Based Assessment of Student Learning and Development

The mathematics department has just over 200 majors with over 40 tenured/tenure-track and faculty and lecturers and thus should be able to assess learning within the major at a relatively high level of detail. However, the department carries a large service burden as most science and

engineering students must satisfy at least some lower division mathematics courses as required by their programs. Therefore, they restricted much of the learning assessment in lower division courses to the remediation courses and the calculus sequence.

The Program Review describes two direct methods of assessing student learning: (1) use of ALEKS (Assessment and Learning in Knowledge Spaces) in remediation courses, and (2) a case study on student success in calculus.

The department uses the ALEKS (Assessment and Learning in Knowledge Spaces) tool for their remediation courses (MATH 100 and 104) which allows them to individualize the course for each student based on the student's level of understanding. Students can maximize the time they need to focus on the concepts they most need to learn. The success rate in recent years has been near 100% in those remediation courses.

Additionally, the department initiated a case study called, Issue of Concern: Success in Calculus in 2008-09. The ABC/DF grade distribution in the calculus sequence (MATH 141,142,143 and 241) was 70/30%, which, consequently, was targeted for improvement by the College of Science and Math and Science. The department established the Calculus Steering Committee (CSC) in order to identify problems in the calculus course series that could be resolved and improve student completion rate and performance. They compiled a student survey and collected student performance metrics. The results and conclusions of this data will be reported in the next section on 'Evidence'.

The Mathematics department has implemented two metrics for attainment of three Program Learning Objectives. In order to directly assess whether students are meeting Student Learning Outcome 1 (Understand the nature of a mathematical proof and be able to write clear and concise proofs) and Outcome 3 (be able to use standard techniques to solve elementary problems), the Mathematics Department has developed and implemented the Mathematics Department Assessment Test which is given to all senior math majors during senior seminar (MATH 459). It tests for a student's ability to solve elementary problems and write mathematical proofs. Four faculty members have participated in the grading of that exam.

In order to directly assess student attainment of Student Learning Objective 2 (understanding and application of definitions of linear and abstract algebra), a question was embedded in the final exam for MATH 481. The exam tests for student ability to read a definition and make sense of a new idea related to a well-known concept from class. No indication of how the question was graded.

Evidence-Based Claims and Decision Making

Results from the student survey portion of the Success in Calculus case study reveal a majority of students have positive attitudes and understand the necessity of calculus in their majors. They wanted more active learning methods and application of calculus to their interests. This appears to be addressed by an action item that will develop workshops for each course in the series. They have also implemented a "D-stopper" stop-gap between MATH 141 and 142 which they plan to implement between the other courses in the series. Preliminary data based on student performance predictors such as calculus grades obtained thus far, highschool GPA, SAT/ACT scores found that a "D-stopper" stop-gap would improve overall GPA and efficiency in progressing through the calculus series.

Of those that were given the Mathematics Assessment Test in MATH 459 (Senior Seminar) to assess program Learning Objectives 1 (mathematical proofs) and 3 (math techniques to solve elementary problems), students fell into one of two categories: those that receive 75% or above or those below 50%. They identified MATH 248 as a key course to address the distinguishing concept that separated the two groups: the concept of function.

The embedded question to assess Student Learning Outcome 2 (understand and implement linear and abstract algebra definitions) during the MATH 481 final exam also revealed that MATH 248 could put more attention toward definitions when proving a new result. Implementing this recommendation could address a distinguishing skill that separated students who performed well on this assessment as opposed to those who did not. This assessment tool appears to be in an initial phase of development with two quarters of assessment.

The most robust evidence for student learning outcomes, though indirect, is the final product: student success after graduation. The program review reports that with an 82% response rate, most of the 88% of respondents entered graduate programs while others found employment with business, industry, or government as software engineers, actuarial assistants, systems engineers among other technical positions.

Program review results used to inform planning and budgeting:
As a result of the Success in Calculus case study, the department devised several action items for immediate implementation as mentioned above (e.g. D-Stopper, workshops) and long term action items (e.g. expanded course outline, homework related improvements, course restructuring) as indicated in the current program review. Recommendations were also made in the current Program Review related to the direct assessments of Learning Objectives 1, 2, and 3 including, as outlined above, improvements in MATH 248.

Based on the section entitled, Progress on 2003-04 Recommendations for BS degree, the department has implemented or addressed nearly half of their own recommendations. Requiring a plan for completion for senior projects (MATH 481) has resulted in an increase in graduation rates. Gaps in student advising, transfer student tracking, and budget related issues have resulted in the lack of progress for remaining action items.

The Mathematics Department has been partially successful in implementing 7 of 10 recommendations from the 2003-04 External Review team. Clarity of Retention, Promotion, and Tenure policies and procedures have been addressed since the deployment of the College of Science and Mathematics "Personnel Policies, Procedures, and Evaluation Criteria" in 2006. This document was cited as a model policy in the WASC CPR under the Teacher-Scholar Model Theme. Support for implementing the Teacher-Scholar Model have been marginally addressed: successful in providing some support such as release time for new faculty but not successful in reducing faculty workload or by providing sufficient compensation for by-arrangement courses (e.g. MATH 400, 500). Recommendations related to student learning and involvement with faculty have been addressed with some success such as providing faculty WTU compensation for senior projects and supporting students in the College of Science and Mathematics spring research colloquia.

Nutrition

Theme-Based Questions and Evidence

The Nutrition Self-Study, dated August 2009, notes that there are two types of faculty in the department. One emphasizes professional practice, while the other is more research-oriented. The latter tend to be newer tenure-track faculty. While it is a stated intention to develop research in the department – and the emphases of new faculty hires reflect this – typical impediments such as heavy teaching loads and lack of research facilities are cited.

The teacher-scholar model is mentioned in the self-study but the citations are not consistent with the definition of the model in the recent (March 2011) Academic Senate resolution (this self-study was done in August 2009). Rather, teacher-scholars seem to be defined as faculty who teach and also do research. Possible integration of the two is noted in three places: 1) faculty exploring the effectiveness of community service learning as an instructional method; 2) "involving both undergraduates as well as graduate students has been another key to accomplishing research projects at Cal Poly"; and 3) in "senior exit surveys being involved in research has been mentioned by a number of students as an important positive influence".

Two curriculum changes with possible relevance to the TSM have been made. One is positive: adding a research class (FSN 420 Critical Evaluation of Nutrition Research) to the Applied Nutrition concentration. The second is negative: changing the character of the senior project from a research project to a literature review. This measure was taken when a review of senior projects revealed that only 15% met the standards of the faculty. The decision was made to focus on writing skills and critical thinking instead, reserving a research-based senior project for "honor" students. The senior project is the best opportunity for involving students in research with faculty so this is a lost opportunity to follow the TSM that also diminishes the potential of the learning experience for students.

The population of nutrition majors is not diverse; a nutrition minor offers opportunities to increase diversity in classes. The department collaborated with Allen Hancock Community College on a USDA grant to help under-represented students complete Associate of Arts degrees in Culinology and hopefully transfer to Cal Poly.

A grant to the College from USDA in 2009 provided funding for individual students to work with faculty on a research project. One student in Nutrition received funding ($1250) to work with a nutrition faculty member.

Outcome-Based Assessment of Student Learning and Development

Multiple measures (mainly indirect) are used to assess student learning including: surveys of dietetic internship directors, surveys of alumni (last five years); graduating senior exit surveys; review of randomly selected senior projects; success on the registered dietician exam. However, one of the stated program goals is to prepare students to succeed in post-graduate study. This is not being assessed. Employer surveys are planned but had not been done. There is a timetable and frequency for all measures but many were behind schedule.

Evidence-Based Claims and Decision Making

Data obtained through the various assessment measures are analyzed and used to make changes in the curriculum/program. Missing is the assessment of preparation for graduate study. This is significant because a significant percentage of graduates goes on to graduate school (41% in 06-07; 27% in 07-08).

Use of Program Review Results to Inform Planning and Budgeting

The nutrition self-study (August 2009) noted that the program had not had a complete program review "in recent years". However, the program had completed a self-study for its application for accreditation as a Didactic Program in Dietetics by the Commission on the Accreditation for Dietetics Education. This accreditation was obtained in 2005. As a result of that review process, the department developed a program assessment plan that corresponds to American Dietetics Association requirements and also tracks other program outcomes. Curricular changes have been made in response to recommendations made in the accreditation review.

Computer Science

Theme-Based Questions and Evidence

One of the statements in the "weaknesses" section explains "One consequence of high teaching loads is lack of sufficient time for professional development of the faculty." And, in the long-term goals section, a goal is set to "Strengthen faculty development by providing additional support."

In section 3 of the report, additional information is provided about faculty scholarship and program support. Financial support for faculty development is limited primarily to those forms of support common to our campus, e.g., the SFSG and CTL grants. However, the report also explains that first-year tenure track faculty typically receive 2 courses of release time, and that faculty receive faculty development funds to attend at least one conference per year.

Efforts are also made to limit the number of course preparations each quarter for each faculty member.

A list of the professional development activities in which faculty are active include "directing undergraduate and graduate research projects".

Drawing from these highlights, there appears to be evidence that faculty are engaged in RSCA, and that RSCA are encouraged and incentivized to some degree, but there isn't a lot of evidence that there is a high degree of student engagement in faculty RSCA activities.

Outcome-Based Assessment of Student Learning and Development

<u>what kind of assessment methods are used to achieve outcomes-based assessment of student learning and development?</u>

The Program uses both direct and indirect measures for outcomes-based assessment. The indirect measures included alumni surveys, employer surveys, and student surveys. The direct measures include a series of test questions and rubrics. (see diagram below)

The Program's direct assessment efforts which are described primarily in Attachment I appear to be in the very early stages of development. Test questions and rubrics have been designed, but the rubrics were difficult to evaluate because they didn't resemble traditional analytical or holistic designs, nor were they checklists that appear to be easy to implement. It's not clear how the "performance criteria" they describe are operationalized in an actual assessment activity.

Evidence-Based Claims and Decision Making

<u>if program claims to be meeting their stated objectives (Program Objectives), is this backed by evidence (in what form, surveys) and if they do use this to inform decisions about their program (e.g. curriculum) what evidence do they provide</u>

The table beginning on page 18 incudes a column titled "how assessment results are used and by whom". In reference to the direct measures, the report indicates "The outcomes are discussed at department meetings and taken into consideration in initiating curriculum changes and in assessing impact of changes".

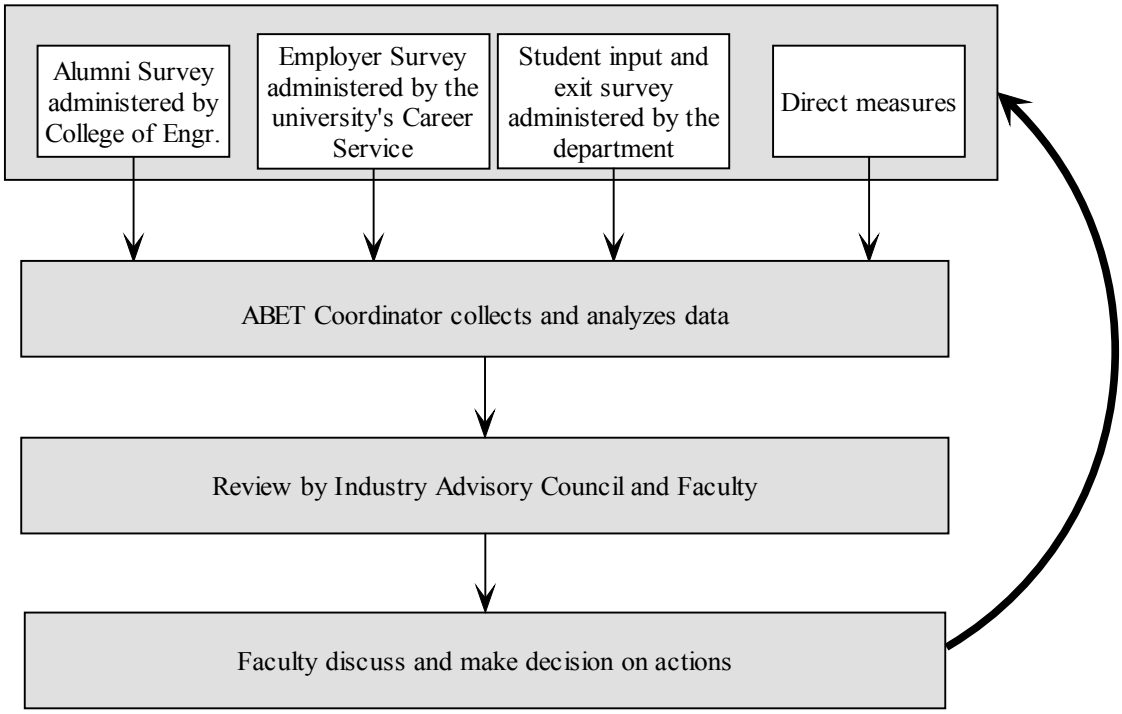
The table beginning on page 19 (includes the columns "major changes", "justifications", "assessment", "coordinator", and "impact") describes curricular and programmatic changes that

were made in the program. Although assessment data are referenced in the "assessment" column, the justifications given for the changes use phrases such as "the faculty felt", "the faculty voted", or "industry affiliates felt" to explain why the changes were made. In fact, of the 14 major changes noted in the table, none were justified on the basis of direct assessment measures.

Use of Program Review Results to Inform Planning and Budgeting
is there an action plan that is being acted upon (perhaps from previous reviews) or is it reasonable/doable? How are their program reviews used to inform?

The report includes an assessment of the Program's strengths and weaknesses, and a list of the Program's short and long-term goals. Although each of these goals seems plausible, there is no direct evidence that they are factually supported by the program review, or that the program review process informed faculty planning. It's possible that the program review process informed faculty planning, but it's not evident from the report.

The assessment process for the Computer Science program is depicted in the diagram below:



Instrument	Frequency of timing	What Data are collected	How data are collected and location of evidence	How assessment results are used and by whom
Graduating senior survey	Each spring	Responses to questions related to the program objectives.	Survey. See Attachment II at the end of this section.	The outcomes are discussed at department meetings and taken into consideration in curriculum changes.
Employer survey	Every three years	Responses to questions related to the program objectives.	Cal Poly's Career Services administers the survey and provides a summary of the responses. See Attachment III at the end of this section.	The outcomes are discussed at department meetings and taken into consideration in curriculum changes.
Alumni survey	Every three years	Responses to questions related to the program objectives.	Conducted by the office of the Dean of the College of Engineering. See Attachment IV at the end of this section.	The outcomes are discussed at department meetings and taken into consideration in curriculum changes.
Industrial Advisors (IAC) Group discussions	Fall and spring meetings	Review of department mission, program objectives and program outcomes; review of assessment outcomes; evaluation of student projects.	Verbal and written comments are recorded by the department's Administrative Analyst. In fall 2007 the IAC filled out an evaluation form to assess the program's attainment of its objectives. See Attachment V at the end of this section.	The recorded comments are discussed at department meetings and taken into consideration in curriculum changes.

Instrument	Frequency of timing	What Data are collected	How data are collected and location of evidence	How assessment results are used and by whom
Faculty discussions	Retreat every fall; Curriculum Committee, assessment committee and department meetings.	Comments from faculty participants. See Attachment VI.	Verbal comments are collected by the ABET coordinator.	The recorded comments are discussed at department meetings and taken into consideration in curriculum changes.
Meeting with students	Once a year or more	Comments from student participants.	Verbal comments are collected by the chair. See Attachment VII at the end of this section.	The recorded comments are shared with the faculty and taken into consideration in curriculum changes.
Senior project archival	Ongoing	Work performed by student for senior project, including documentation and code files.	Upon completion of project, a student submits a CD containing all relevant files. These CDs are available from the department office.	It is the department's plan to have the projects reviewed by an independent source such as the IAC
Direct measures	Ongoing	Tabulation of graded student works designed to measure program outcomes and changes.	Graded test questions and student works. See Attachment I at the end of this section.	The outcomes are discussed at department meetings and taken into consideration in initiating curriculum changes and in assessing impact of changes.

The table below summarizes the major changes:

	Major changes	Justifications	Assessment	Coordinator	Impact
1.	The required 4-unit science elective course has been moved from Technical Elective category to the required Support Courses category	This is a procedural change.	N/A	N/A	The science requirement in the curriculum has been clarified.
2.	CSC 225 was introduced for CS majors as an optional substitute for CPE 219/259 **(CS – 2)**	The course contents of CSC 225 is less hardware oriented and more appropriate for CS majors. Industry affiliates recommended reduced emphasis on hardware architecture (fall 2003 IAC minutes)	A prerequisite test was conducted. See Attachment VIII a.	Dr. Diane Franklin/Dr. John Seng	CS majors now have an option of taking either CSC 225 or CPE 219/259. A pre-requisite test shows that CSC 315 (Architecture) students coming from CSC 225 performed at least as well as students who took EE 229 in key areas - digital design, computer organization, and binary arithmetic
3.	Software engineering courses was renumbered from sophomore-level (205-206) to junior-level courses (307,308-309) **(CS-4)**	The faculty and industry affiliates (fall 2003, spring 2004 IAC minutes) perceived that students did not have sufficient maturity and experience to significantly participate in the activities required by the course.	None.	Dr. Gene Fisher and Dr. David Janzen	Students are now taking the Software Engineering course in their third year.
4.	CSC 307 was introduced as a one-quarter substitute for CSC 308-309 **(CS-4)**	A majority of the faculty felt that CS majors should have the option of choosing a one-quarter course in	Student survey. See Attachment VIII b.	Dr. Gene Fisher and Dr. David Janzen	CS majors now have an option for taking one course instead of two courses in software

	Major changes	Justifications	Assessment	Coordinator	Impact
		Software Engineering. CS majors may continue to take a two course SE sequence, with the second course counted towards technical electives.			engineering, allowing them to take a technical elective course in another approved area.
5.	Systems programming (CSC/CPE 357) is a required course and is prerequisite to many upper-division courses. **(CS-2)**	The faculty felt that students did not have sufficient knowledge in systems before enrolling in advanced systems courses.	Monitoring of student grades earned in CSC 453 (Operating Systems.) See Attachment VIII c	Dr. Phil Nico	Assessment indicates that this change has had a positive effect on students' learning of the subject matters.
6.	A second programming-language course (CSC 431) is required. **(CS-4)**	For program objective 4, the faculty felt that there is a need for students to engage in a capstone project. This course provides the opportunity for such a project – students are asked to build a language processor (a compiler or a translator)	An online student survey was conducted at the end of spring 2008. See Attachment VIII d.	Dr. Aaron Keen	The impact of the change does not start significantly until spring 2008.
7.	The Theory of Computing course (CSC 445) now requires CSC 430 as a prerequisite. **(CS-2)**	The faculty voted to make the change to reduce duplication of coverage of material.	None.	Dr. Hasmik Gharibyan	The courses are now more streamlined.
8.	The first foundation course (CSC/CPE 101) is taught using the C language instead of Java.	Industry affiliates felt that it was very important that students learn a procedural	An assessment test to be conducted at CSC 103 is expected to	The foundation-series assessment committee (chaired by	A pilot assessment will be conducted either in spring or fall 2008.

	Major changes	Justifications	Assessment	Coordinator	Impact
	(CS-2)	language as well as an object-oriented language in the first year (fall 2003 and spring 2004 IAC minutes.) Faculty voted in favor of this change.	start in fall 2008. See Attachment VIII e.	Dr. John Clements)	
9.	8 units of support courses are required to be chosen from a list of approved support electives. **(CS-5)**	Industry affiliates (Employer survey 2004, IAC meeting minutes spring 2007) and student input (June 2000 focus group) indicated that students need improved communication and teamwork skills in the workplace.	Writing Proficiency Examination and Employer Survey. See Attachment VIII f.	Dr. Phil Nico, Chair of Curriculum Committee	This change took place in 2005-06. The impact is inconclusive as of the writing of this report.
10.	The technical electives have been re-structured. Instead of requiring two technical elective sequences, students are now required to take 8 units of Prerequisites and Individual courses that are mainly prerequisites to courses in specialization areas, 8 units of which are also required. **(CS-2)**	The former two-sequence structure was incompatible with increasing diversification of courses in technical elective. The faculty felt that students were not gaining depth in more than one specialty areas.	Student responses to senior survey and Employer survey. See attachment VIII g.	Dr. Phil Nico, Chair of Curriculum Committee	Students now have more flexibility in choosing technical elective courses and are now required to take advanced courses in at least two specialty areas. Student input indicates that they are positive about the current technical elective requirements.
11	A lab component was introduced to CSC 300 Professional Responsibilities. **(CS-6)**	The change was proposed to provide hands-on activities for the course to enhance students' learning.	Student survey. See Attachment VIII h.	Dr. Clark Turner	Assessment indicates that this change has had a positive effect on students' learning of the

	Major changes	Justifications	Assessment	Coordinator	Impact
					subject matters
12	An elective introductory freshmen-level course, CSC 171X (Introduction to Interactive Entertainment), was introduced since fall 2007.	In response to the college's promotion of project-based learning (PBL) and the nationwide problem of retention of CS majors, a cornerstone course was proposed to improve freshmen retention rates.	Student survey. See Attachment VIII i.	Dr. Michael Haungs	

2008-09 CHANGES

	Major changes	Justifications	Assessment	Coordinator	Impact
1	CPE/EE 129 and CPE/EE 169 (Digital Design) are removed as prerequisites to CSC CPE/ 225 (Computer Organization), making the prerequisite only CSC/CPE 102 (Foundation II); CSC/CPE 315 (Architecture) is removed as a prerequisite to CSC/CPE 453 (Operating Systems)	To harmonize with Software Engineering Curriculum requirements and to reduce the length of the prerequisite chain for students. Industry affiliates recommended shortening the architecture sequence (fall 2003 IAC minutes.).	Student grades in CSC/CPE 453 will be monitored starting in fall 08.	Phil Nico	Students are now able to take CSC/CPE 225 in their first year, and to take CSC 357 and 453 one quarter sooner.
2	An additional technical elective course is required.	To further strengthen Program Objective CS-2 outcomes	Assessment for CS-2, to be defined.	Phil Nico	Students will be required to take 4 additional units in technical electives.

Integration and Student Learning Summary of Program Reviews

Eight Cal Poly programs were reviewed by the Integration and Student Learning (ISL) work group, which concluded that, in terms of integration, all reviewed programs have clear evidence that is being collected and utilized to make evidence-based decisions. The most consistent use of that evidence has been as a basis for decisions regarding planning and budgeting. Although not a stated purpose of any of the reviews as they were first developed, these program reviews can also provide input on the four theme-based questions—with all programs showing either "some evidence" or "clear evidence" of student achievement of program learning outcomes, university learning objectives, and of an integrated educational experience. Further, the program reviews were utilized to suggest ways of improving academic performance (including for those students from underrepresented populations). The following general conclusions can be drawn from these program reviews:

Theme-Based Questions and Evidence

There is strong evidence that students are achieving program learning outcomes; evidence is drawn from a variety of sources and venues and is stronger in some programs as compared with others. There is also strong evidence that students are achieving the university learning outcomes and all programs have mapped program learning outcomes to university learning outcomes. It is evident that via project-based learning opportunities, college and program sponsored student organizations, student research and senior projects, programs are effectively focused on the integration of the educational experiences of our students. Several programs touched upon the importance of the improvement of academic performance and success, but in the area of student success for underrepresented students, clear, direct evidence needs to be addressed as opposed to the occasional reference to the university learning outcomes. Some of the colleges have focused success programs for underrepresented students but clear evidence of the value-added capacity of these programs is not necessarily evident.

Outcome-Based Assessment of Student Learning and Development

All programs presented some level outcome-based assessment methodologies and curricular frameworks. All programs have mapped program outcomes to the university learning outcomes across the span of students' undergraduate and, where applicable, graduate experiences. Internal and in many cases, external assessments are utilized as opportunities to connect learning to outcomes and outcomes to evidence, especially for more advanced work in courses and capstones. Examples include senior interviews, group project reports, cumulative exams, capstone course evaluations and videography.

Evidence-Based Claims and Decision Making

All programs report that they are making decisions based on the evidence they have gleaned from their assessments. Faculty are active in this process, including using direct and indirect evidence to design experiences for expanding critical thinking and program solving skills, as well as defining specific courses of action; e.g., implementing those courses of action and measuring the results of the implementation. Minimum and prioritized achievement levels have been established in several programs, from which improvement areas were identified. Multiple sources were used for assessment input, from current students and alumni to employers and advisory boards to focus effectively on continuous improvement. In most programs, multiple years of data are presented to provide baseline and comparative reference points.

Use of Program Review Results to Inform Planning and Budgeting

Most programs (seven out of eight) use assessment information to decide which inputs and data will inform planning for improvements in the programs. Budgeting appears to be relevant to the activities that have been planned, especially as related to faculty positions and class size, although actual monies may not have been noted in the program self-studies.

Clearly, these are strong starting points from which to develop common aspirational goals for the integration of student learning, stronger consistency in the expectations for project-based learning and the senior project, as well as further learning outcome-based assessment development, and evidence-based decisions and implementation. The focus on student success and integration of student learning is essential to our enterprise and the additional expectation to assist with the success of underrepresented students appear to be of relevance overall to the programs reviewed, although specific, direct evidence of the success of underrepresented students is not yet well-developed in most programs.

A summary of the overall results of individual program reviews follows.

ISL Summary Table of Program Reviews

	CAED: Landscape Architecture	CAFES: Forestry and Natural Resources / Environmental Management	CENG: Civil Engineering	CENG: Electrical Engineering	CENG: Industrial and Manufacturing Engineering	CLA: History	CSM: Mathematics	OCOB
Theme-Based Questions and Evidence	2.2.2.1	2.2.2.2	2.1.2.1	2.2.2.1	2.2.2.1	2.2.2.2	2.2.2.2	1.1.2.2
Outcome-based Assessment of Student Learning and Development	2	2	2	2	2	2	2	2
Evidence-Based Claims and Decision-Making	2	2	2	2	2	2	2	2
Use of Program Review Results to Inform Planning and Budgeting	1	2	2	2	2	2	2	2

KEY

0 = No evidence
1 = Some evidence but unclear
2 = Clear evidence

Landscape Architecture

Documents: Internal Review 2008, Self-evaluation excerpts 2008, External Review 2008, Action Plan 2009

Theme-Based Questions and Evidence

The Landscape Architecture Program Review Reports demonstrate well-defined PLOs, which are intentionally aligned with the ULOs. The Program Review Reports show that student achievement of the PLOs and ULOs is systematically measured and documented regularly by qualified persons and committees familiar with the demands and expectations of the department, university and profession. These review reports give sufficient knowledge of the Landscape Architecture department's educational planning, implementation, and ongoing evaluation and assessment strategies to understand that this program could be used as model for other university programs seeking to intentionally develop program / curriculum changes, measure impacts of change and improve their holistic support of student learning. While the review reports briefly report departmental acknowledgement of the need for improving diversity, of faculty /staff / student populations, through attraction, inclusion, and retention of under-represented populations to the program, no indications of improvement, or actual activities to implement set objectives, are noted within the Program Review Reports. Overall, when reviewing the FTE student diversity profile, the information is limited to "in-state m/f, "out-of-state m/f", "foreign m/f", "total m/f" for the years 2002 – 2008. In that time, the male population has dropped slightly (by 4) while the female population has increased somewhat (by 10), with the foreign student population remained essentially static (0). No information on the population diversity of the faculty and staff was available in these review reports.

Outcome-Based Assessment of Student Learning and Development

Evidence of the alignment of the PLOs with the ULOs is highly developed in all the Program Review Reports. In demonstrating evidence of the results of the programmatic outcomes assessment to show students are achieving the PLOs and ULOs, when all documents of the Program Review are taken in aggregate, the evidence of the educational effectiveness of the Landscape Architecture program is recognized by the faculty, the students, alumni, and practice professionals. The Program Review Reports, especially the Internal Review Report, do make clear that the Landscape Architecture program uses multi-modal assessment strategies, both objective and subjective, to monitor, assess, and refine curriculum and keep PLOs updated and reflective of intent in guiding student learning and acquisition of skills and knowledge. It is particularly noted within the Program Review Reports that the 5th year student experience and assessment represents a successful integration of student learning derived from the prior 4 years of meticulously orchestrated program of study, which is created to ensure the graduates of this program are well-positioned for successful practice employment.

Evidence-Based Claims and Decision Making

The Landscape Architecture department significantly remodeled its curriculum 2005-2007, with transitional implementation beginning 2008. The Program Review Reports make clear the remodel was in response to evaluative assessment feedback from all stake-holders, which pointed to a need for changes in resource use, programmatic flexibility for the students and interdisciplinary experiences for faculty and students.

Use of Program Review Results to Inform Planning and Budgeting

The Program Review Reports strongly tie evidentiary feedback to program planning departmentally. The reports also define the connection of departmental resources allocation with

program plan development, remodel of curriculum programming and facilities, and support for faculty development; however, the Program Review Reports provide little indication or understanding of university-level budgetary allocations being a data-driven response to departmental needs evidence. It appears that actually the reverse has been happening; that is, that the department has responded to university general funds allocations by decreasing enrollment in 2003-2005 (to maintain an effective faculty to student ratio), but the university increased general funding in response to enrollment increases demanded by CSU in 2006-2008. The Self-evaluation Report provides a minimal knowledge of the department's participation in university-level budget decision-making. While a formal process of fact-finding and collaborative planning may occur between the Landscape Architecture department and the university, the review reports, as available to this reviewer, do not give evidence of this.

In summary, the Program Review Reports of the Landscape Architecture program, are well developed to present a clear understanding of this dynamic program, and its intentional planning for student education across a variety of instructional experiences and environments, measurement and assessment of student learning, use of cyclical and circular objective and subjective feedback for evidence-driven decisions for continual curriculum refinement; however, the Program Review Report documents, available to this reviewer, do not provide satisfactory information on the scope of involvement in a formal process at the university–level for budgetary allocations decisions, or on the department's planning for the development of diversity of faculty/staff/student populations. The Program Review Report documents do represent a thorough, well-organized and intentional planning of Landscape Architecture dept. programming, curriculum development, resources allocations, and goals / objectives-guided decision-making, which are well-founded in ongoing subjective and objective evaluation and assessment of student learning, in and out of the formal classroom setting. It is clear that the dept. paramount goal of providing students with the preparation necessary to obtain and maintain successful professional careers is well-achieved and recognized academically and professionally.

Forestry and Natural Resources / Environmental Management

Theme-Based Questions and Evidence

How well are students achieving academic program learning objectives?
Evidence of educational effectiveness of all programs: results of programmatic outcomes assessment, including application of findings for continuous improvement

The self study provides the University Learning Objectives, the College and finally the program learning objectives. Each course in the program links to the University Learning Objectives. The NRM faculty self assess its status on the five WASC standards as follows:

- Comprehensive List [of Learning Outcomes]: "**Highly Developed**"
- Assessable Outcomes: "**Developed**"
- Alignment [outcomes to curriculum]: "**Developed**"
- Assessment Planning: "**Emerging**"
- The Student Experience [students understand outcomes & process]: "**Emerging**"

Review of the report provides evidence including several matrix forms assessing each learning outcome per University policy, mapping the learning pathways that connect the required coursework in both FNR and ENVM majors to ULOs.

How well are students achieving our new university learning objectives? Evidence of educational effectiveness in achieving university learning objectives?
Academic Years 2004/05 and 2005/06
A direct method was used to assess

- Critical Thinking/Problem-Solving Skills
- Written and oral communication competencies
- Technical Knowledge

An imbedded question was administered to 44 students in the spring 2004 capstone course's (FNR 465) last mid-term focused on assessing program outcomes critical thinking, written communication, and integrative, technical knowledge. A test grading rubric was designed and two faculty evaluated all responses. Conclusions were that:

- Grading rubric needed more refinement
- There was a broad range of writing competency
- Critical thinking competency was judged to have achieved our standards.

Graduation rates emerged as a critical issue for the FNR program in Academic Year 2006 - 2007. From the early 1990s until around 2002, university and department assessments increasingly showed that FNR graduation rates of first-time freshmen cohorts were far below expectations. As for the ENVM program, they did not have degree progress problems due largely to the greater flexibility built into the curriculum unlike the more rigid FNR curriculum driven largely by accreditation standards.

"The FNR Tracking System" was designed to monitor individual student progress-to-degree for all 6 FNR student cohorts based on the standard six-year metric of graduation rates used by the U.S. Department of Education (Table 13). In late 2007, Dr. Thompson was assigned administrative duties (10%) to assist the Department Head in managing the ENVM and FNR programs with emphasis on improving student success.

How do we more effectively integrate the educational experiences of our students?

Evidence Assessment of integration of educational experiences

The Environmental Management and Protection major was an outgrowth of the Environmental Management Concentration that was a part of the Forestry and Natural Resources major and the NRM major before that. It was designed as an integrated, interdisciplinary major that relied exclusively on both the existing FNR classes and coursework from some 19 different campus prefixes. It was not a typical stand-alone major as it did not have courses with an ENVM or similar prefix, and the faculty who governed the program were the same faculty that taught in the FNR program. There is no accrediting body for the ENVM program. Results from the "FNR Tracking System" and related assessments induced the faculty to revise and reorient two lower-division courses to intervene earlier with students to ensure that their current major was facilitated.

What can we do to improve academic performance and success of all students, including those from underrepresented populations?
Evidence Demonstrated progress toward achieving student performance and success goals; assessment of progress toward achieving diversity –related goals and objectives.

The College has four programs designed to attract and retain students from diverse ethnic and cultural backgrounds:

- Blacks in Agriculture
- MESA Agricultural Initiative
- Multicultural Ag Program
- Latinos in Agriculture

Outcome-Based Assessment of Student Learning and Development
The document uses assessment of educational outcomes for specific curricular elements articulated in Standards. It also provides an indication on whether academic and professional goals are being met. Another goal in the document is to verify that the interests of students and external constituents are represented in the assessments.

Their outcomes assessment process is judged acceptable if it follows an outcomes assessment procedure endorsed by the parent institution that involves assessment of knowledge enhancement and retention across the curriculum relative to the learning objectives, includes alumni and employer feedback, and has a clearly identified link to curriculum review and improvement. Valid metrics, which need not all be used by any given institution, include

- Internal assessments such as senior interviews, group project reports, cumulative exams capstone course evaluation, videotaping speeches.
- Instruments such as institution-wide competence testing, standardized tests, or evaluations.
- External assessments such as industry/public agency/NGO surveys, graduate surveys, employer surveys.
- External instruments such as state licensing tests, SAF certification, performance in various competency testing, postgraduate course work.

To summarize, the NRM faculty have employed the following assessment techniques either as a test of the technique or for repeated use.

Internal/Direct Assessment Methods

- Imbedded question in capstone course exams assessed by faculty using rubric (Appendix 6).
- Grading rubrics for individual and team technical reports (see Appendix 7).
- Self-assessment rubric of capstone course team report (instituted in 2005, Appendix 7).
- Exit interviews of graduating Students – questionnaire & results (Appendix 8).
- Course-level Assessments (FNR 412, Appendix 9) and University Course Evaluations.
- University and Department analysis of enrollment and graduation rates (annual).

External/Indirect Assessment Methods

- Alumni Surveys (Appendix 10).
- Employer Surveys (Appendix 11).
- Surveys of students who discontinued their program (Appendix 12).
- Results from California State Licensing of Professional Foresters.

Evidence-Based Claims and Decision Making

Program Modifications and Effects Resulting from Assessments

Results from the "FNR Tracking System" and related assessments induced the faculty to revise and reorient two lower-division courses to intervene earlier with students to ensure that their current major achieves their expected career interests – FNR 201 to FNR 141, and FNR 202 to FNR 142. This change will become effective in the 2009-2011 catalog.

Faculty have re-intensified their efforts to develop new pedagogies that instill critical-thinking and problem-solving skills in students (*e.g.,* FNR 315, 326, 414 and 465). For instance, FNR students learn the basics of sampling and measurement in FNR 215, 247, and 315. This knowledge is then "tested" by requiring students to develop their own sample designs in FNR 365 and FNR 414. Another example is the team project in FNR 465 where students apply the breadth of their knowledge to self-selected environmental problems; whereas earlier the projects were given to students with known problems and solutions.

Based on the trend analysis from FNR 414's grading rubric of the forest management plan, greater emphasis was placed on understanding how their plans would be assessed and weekly drafts were required that incrementally built the final product.

Program Modifications and Effects Resulting from Assessments

After two-years of greater emphasis on weekly products in FNR 414, early results indicated an improvement in understanding and performance.

The State of California requires licensure for foresters (Registered Professional Forester) to practice on private or state land. In order to obtain the license, experience and passing (75%) a very difficult day-long written examination is required. The exam is comprehensive testing a broad range of subjects in the forestry profession.

If all the FNR graduates pursued careers in traditional forestry, the examination results would be as useful as the Professional Engineer license in assessing learning outcomes. However, to-date most FNR graduates pursue other non-traditional forestry related careers, such as fire management.

Nevertheless, we obtained the results for those graduates who sought the RPF license.

Use of Program Review Results to Inform Planning and Budgeting
Proposed for the next catalog changing the course prefix from FNR to NR to better reflect both the FNR and ENVM majors.

NRM faculty have made significant commitments in time and financial resources to improving student success -- improving both percent graduating in six-year time-to-degree for FTF, and learning by enforcing prerequisites. Three significant developments were:

- to offer more sections of major courses forcing a reduction in concentration and GE courses;
- "The FNR Tracking System" of each FNR student for all six cohorts;
- the Peer-Advising Center now staffed over 20 hours per week per quarter.

Results
All indications from external/indirect assessment methods indicate a "highly developed" correlation between anticipated programmatic learning outcomes and graduate/employer responses.

There are early indications of improved six-year graduation rates, now trending above 50%.

There are early indications of improved performance on technical knowledge and written communication learning outcomes as seen in FNR 414 and FNR 465.

Civil Engineering

Theme-Based Questions and Evidence

The Civil Engineering Department does have a Mission and Program Level Objectives stated in their document and mapped to the Program Level Outcomes. The objectives are continuously updated on a 3 year cycle and include alumni input the appropriateness of the outcomes. The achievement of the program level objectives is also surveyed every three years and the results displayed through a series of charts to illustrate level of achievement

This process does not explicitly address ULOs although the University Mission and Learn-by-Doing is referenced. Integration of ULOs is not addressed nor are underrepresented students specifically mentioned in this document.

Outcome-Based Assessment of Student Learning and Development

There is discussion and graphic matrices that link the five educational program objectives to program outcomes. For each of the educational objectives, specific assessment data were collected, the methods listed in a series of tables, and the results presented in a series of charts indicating the level of attainment.

The program outcomes are handled in a similar fashion using several instruments with the results presented in very extensive charts and tables. The outcomes are written using Bloom's Taxonomy and revised on a two-year cycle.

Further, these program outcomes are mapped to specific courses in the curriculum using an extensive matrix.

The assessment instruments are listed in a table and include: Graduating Senior Survey Senior Design Project Evaluations, Senior Design Assignments and Exams, Writing Proficiency Exam, Course Assignments and Exams, Extracurricular Projects, and the FE Examination Employer Survey.

Evidence-Based Claims and Decision Making

As stated above, the direct and indirect performance measures are listed. Changes to courses and courses delivery are mapped based on the results and listed in tables of "actions" and "basis for implementation" and "results of implementation."

Use of Program Review Results to Inform Planning and Budgeting

discussed how to improve the assessment techniques, suggestions for improvements, i.e.: more advising, etc.

The documents include the actions taken since the last review of the program. For each of the 17 improvement actions, a table summarizes the description of the action, linkage with program outcomes and performance metrics, the basis or justification for implementing the action, and the results of the implementation.

Several examples of the actions include:

- Stepped-up our undergraduate advising efforts.
- Incorporated formal writing, oral presentation, and self-directed learning elements into the Senior Design course.

- Providing our students with more opportunities to improve their understanding of environmental regulations relevant to civil engineering design.

Electrical Engineering Program

Theme-Based Questions and Evidence

Faculty members have identified measurable abilities for each program outcome, and evidence is collected on regular intervals from a variety of assessment instruments. Minimum performance and a ranking of importance are associated with each outcome. This provides a basis of prioritizing program improvements.

Assessment of student learning is done in terms of ABET outcomes ("A-K"). See below. A-K map well to the campus ULOs. Thus benchmarks of student learning gathered for ABET support the conclusion that students achieve the ULOs. Program faculty members have identified the level of proficiency desired for each outcome.

An area of good integration for student learning is the senior project. Design courses and technical electives also provide integration, albeit these are more discipline-specific. The senior project, design courses and tech electives are all required in the degree program. It is also typical for students to engage in co-curricular activities (e.g. clubs and student organizations). These can provide significant breadth and opportunities for integration, however they are not required for the degree so involvement varies. At present self-selection on the part of the student is the only mechanism to determine participation. *A clear articulation of the benefits to integrated learning may help guide students in the self-selection process*. Individual clubs and organizations could provide this articulation.

The College of Engineering Advising Center monitors student progress and strongly encourages student success via administrative measures. The Women's Engineering Program and the Multicultural Engineering Program provide tutoring services that target underrepresented groups. *Improved methods of interventional advising would help student success.*

FYI - The expectations for graduates as defined by ABET's A-K outcomes are:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design and conduct experiments, as well as to analyze and interpret data
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function on multidisciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Outcome-Based Assessment of Student Learning and Development
In the EE program, outcomes assessment is performed in a summative fashion. ABET's (A-K) define program outcomes. EE faculty have identified 3-5 measurable abilities for each outcome using Bloom's taxonomy. These are core skills, essential to graduates and similar conceptually to the idea of 'transferable skills', which have been discussed in GE.

The EE Program uses a variety of assessment instruments. Together these provide multiple measures for each outcome. The diversity of instruments provides a synergy where shortcomings in one method are compensated by strengths in another. A yearly plan identifies where and when assessment instruments are employed. Assessment processes are implemented by a variety of units across campus (and by a State organization in one case). This broad implementation improves sustainability.

Assessment Instrument	Direct or Indirect Measure	Organization Responsible for Implementation
Junior-level exam	Direct	Program
Senior-level exam	Direct	Program
WPE	Direct	University
Fundamentals in Eng'g Exam	Direct	State
Senior project analysis	Indirect	Program
Senior survey	Indirect	College
Alumni survey	Indirect	College
Employer survey	Indirect	University
Survey of industry advisors	Indirect	Program

Evidence-Based Claims and Decision Making
EE faculty established minimum achievement levels for each ability and assigned priorities to each outcome. Considering performance and importance, the faculty identified improvement areas for the program. Priorities for each improvement were identified based on faculty judgment. Prioritization also involved surveys of industrial advisors and employers. Multiple years of data are presented in the self-study.

Use of Program Review Results to Inform Planning and Budgeting
Continuous improvement is a required part of ABET criteria. EE faculty members discuss assessment results at department meetings and with industry advisors. Program improvements include the following areas:

- Synthesizing concepts between courses
- Technical skills in computer architecture
- Advanced math skills
- Technical skills in integrated circuits
- Multidisciplinary team skills
- Ethics and professionalism

To help close the loop EE faculty used a special survey to gauge the benefit of improvements. These surveys were deployed at a point in the curriculum near a given improvement (e.g. same course or subsequent course). This strategy provided more immediate and more accurate information, rather than waiting to see benefits revealed later in the curriculum via summative measures.

Industrial and Manufacturing Engineering

Theme-Based Questions and Evidence

Achievement of academic program learning objectives

IME Educational Objectives were last revised in 2000 that focus upon four areas: immediate practice, solid engineering foundations, broad education and life-long learning.

Results: Alumni surveys for both majors show that they are "generally achieving the Program Learning Objectives as a result of their Cal Poly education", with strongest successes shown with Objectives 1, 2 and 4 and mixed responses to attainment with #3. Comments speak to the "idea that leadership and distinguished success are not easily taught in college and may largely be a reflection of one's natural abilities". Employer surveys reflect similar results in these areas, including a score of 4.3 out 5 that they are satisfied with the quality of the IME grads. Graduating senior placement data shows that high value is placed on IME grads by employers in industry and indirectly shows evidence of achievement" of IME graduates. The Industrial Advisory Board is regularly solicited for feedback via focus group and discussions regarding the achievement of the Program Educational Objectives, revealing similarly high (4.0-4.4) results with a slightly lower (3.8) result in 2007 and higher (4.4) in a 2008 survey of the 8-member IAB.

IME Program Outcomes directly correlate with the 11 outcomes in ABET Criterion 3. Regular alumni surveys are jointly sponsored by CENG to collect feedback on how well the program is achieving its stated objectives with a focus on the importance of the program outcomes to the alumni. Although both programs had relatively low respondents (4-17 in 2007 and 14-64 in 2008), the importance of the outcomes to the alumni show that the math/science/engineering focus areas are more important to the alumni with slightly lower importance placed on the issues of *broad education, life-long learning, contemporary issues and modern tools.* IAB surveys show similar results, although the IAB recognized the importance of *modern tools.* Employers are additionally surveyed and have shown similar results

Achievement of university learning objectives

All IME outcomes have been mapped to the ULOs and further mapped to the major curricula in both IE and MfgE and are used as the basis for program assessment solicited from all constituencies. The IME program review document references clearly the relationship between the department, college and university missions and objectives, from "learning by doing" to civic engagement, integrating their knowledge across systems, ability to work in teams, effective communication and dedication to continuous learning. Evidence of and the extent of the achievement of these objectives are outlined in detail in the program review.

Integration of student educational experiences

In addition to the focus on program objectives and outcomes, IME notes the significant contribution of GE courses, USCP and a multi-disciplinary engineering requirement that expects a culminating experience will be provided to master student team skills via an array of experiences, including those such as a team senior project, co-op or internship, service learning or specific club activities. IME 314 and 319 serve as one venue for team projects, but students are now being encouraged to participate in team senior projects, especially those with a community service component.

Efforts to improve academic performance and success of all students, including those from underrepresented populations

Diversity-related goals focus more on other areas of the 6th university learning outcome, rather than on ethnic/cultural diversity; diversity is noted as part of communication, functioning on multi-disciplinary teams, ethics and sustainability outcomes and objectives. Ethnic/cultural diversity is also noted in skills related to multi-disciplinary teams. The MFGE program review also references the USPC requirement.

Outcome-Based Assessment of Student Learning and Development

Program outcomes (ABET Criterion 3) are mapped to the four program objectives and all faculty contributed to the creation of a course-outcome matrix that relates courses to program outcomes. The relative coverage (low, medium, high) that each outcome receives in each course is further noted in the matrix. Multiple methods of direct and indirect assessment, both summative and formative are used as the basis for the IME ABET accreditation self-study reports, as well as the program's internal review. Current students, alumni, employers/supervisors and the Industrial Advisory Board are included in assessment venues.

- Alumni surveys – How well the program has achieved its stated educational objectives (Teamwork, professional and ethical responsibility and communication noted as most important outcomes by alumni on 2006-07 survey)
- Industrial Advisory Board and employer surveys – Formal focus groups, general discussions and informal comments from IAB and survey of IAB and employers (Designing/conducting experiments/ analyzing data; designing system/component/process, multidisciplinary teams, identifying/formulating/solving engineering problems, communicating effectively are noted as the most important; assessment of achievement of graduates also surveyed relative to importance)
- Graduating senior exam – direct measure of student performance (Key areas noted as excellent with two averages falling below the minimum acceptable score)
- Graduating senior surveys – assess graduates' satisfaction with their attainment of educational outcomes
- Senior exit interviews – survey of perceived attainment of program outcomes
- Senior project evaluation – student oral presentations of progress and results; evaluation form with scoring rubric to assess projects relative to dimensions corresponding with program outcomes; advisory board review of final written reports.
- Fundamentals of Engineering (FE/EIT) Exam – Few MfgE students actually take this exam; however, results provide objective program feedback regarding achievement of program outcomes on twenty contents areas, including chemistry, math, thermodynamics, statics and production systems.
- Writing Proficiency Exam (Cal Poly Graduation Writing Requirement)

Evidence-Based Claims and Decision Making

Data and input from all assessment sources are aggregated, reviewed, summarized and utilized as a basis for department decision-making. Criterion 4 of the MfgE external accreditation framework involves "continuous improvement", requiring outline of each area above with regard to how these forms of assessment are being used and the conclusions drawn from the direct and indirect measures.

Use of Program Review Results to Inform Planning and Budgeting

Annually, the MfgE faculty review the eight areas of assessment information noted above to decide what input and data will inform improvement planning for the program. This review

includes areas were the assessment process itself is being improved to provide better direct measurements, dissemination of data, survey redesign and improvement of document management. Most importantly, eleven areas are identified as warranting department-wide focus for improvement. This section clearly outlines the focus of the information (the "opportunity"); responsible party; root causes; planned activities and approximate timeline; actions completed; and evidence of improvement. Budgeting is relevant specifically to the planned activities, actions completed and evidence of improvement but is not noted in terms of actual monies expended.

History

Theme-Based Questions and Evidence

Students in the History Department are showing achievement of the academic program learning objectives through the department's integrated approach to assessment and application of their findings for continuous improvement. The department has mapped their 87 course curriculum to show how the eight department learning objectives are incorporated throughout the curriculum. Student skills are introduced and developed in the major 100-200 level courses, and the GE D1, D2, and D3 courses. As students reach the 300 and 400 level courses, both major skills are GE skills (D5) are developed and mastered. The department has also mapped their course curriculum to demonstrate integration of the Cal Poly Learning Objectives (ULOs) at the introductory, developmental and mastery levels. The learning of the ULO introductory and developmental skills occur in the 100/200 level courses, and further development and mastery of the skills occur in the 300/400 level courses.

The evidence of educational effectiveness, results of programmatic outcomes assessment and application of findings for continuous improvement are covered in more detail in the "evidence based claims" and "outcomes-based evidence of student learning and development" sections of this report.

The integrated educational experiences for History majors are evidenced by the addition of new courses, extracurricular programs, and the collaborative activities of students and faculty. A more cohesive curriculum has been implemented to promote student success, provide a greater sense of community, and develop student skills progressively. Implemented in fall 2009, freshmen are now required to take HIST 100- Introduction to the Study of History, which is the starting point of the integration, as well as the first point for assessing skills. This course provides a complete overview of the program, career opportunities, collaboration methods, and develops early skills needed to prepare students for upper-division research and writing needed in the 300-level courses.

HIST 460 and 461 (Senior Project) have also been improved to standardize expectations, encourage camaraderie and to elevate the senior project as a capstone experience. HIST 467 (Internship program) has been revitalized through efforts in the department to build more partnerships with the local community. Discussion is also in place to reduce the minimum number of units required for the course, with a goal of attracting additional students. On the global spectrum, the department provides staffing for Cal Poly Spain with the goal of producing independent-minded, culturally sensitive and broadly educated students. In addition, the department has added an East Africa Indian Ocean as geographical areas of emphasis along with a proposal for an Asian Studies Minor to further address the department, University, and Diversity Learning Objectives.

In the extracurricular area, the department has chartered a local chapter of Phi Alpha Theta, the national history honor society, to facilitate faculty and student interaction outside of the classroom, publish a department journal, and participate in regional and national conferences. They have also created "the *Friends of the History Department"* Advisory Board, comprised of faculty, undergraduate and graduate students, alumni and local supports. The board has sponsored career-focused events for students, organized presentations at local historical societies and assisted the department in locating local organizations to provide students with internship opportunities. Much of the funding for these integrated programs has been made available

through appropriation of the student-based quarterly fee of $150.00. Student representatives on the College Based Fee committee have impacted decisions in spending priorities.

In diversity, the History Department has demonstrated progress toward achieving student performance and success through assessing the progress of diversity-related goals and objectives. The Diversity Learning Objectives have been mapped throughout the history curriculum with the input of faculty. Skills are introduced and developed in the 100/200 level courses, developed further in the 200/300/400 level courses, and mastered in the 300/400 level courses.

In 2008, the department publicly responded in the Mustang Daily to the ***Cal Poly Crops House incident*** (the public exhibition of racist behavior through paraphernalia and slurs). They affirmed their commitment to change the campus culture, reinforced their pledge to educate students better in the crucial issue of equality, and to teach them to embrace diversity in all its forms.

The department has assessed students ***indirectly*** on diversity learning objectives (DLOs) #1 and #2 (see page 19 History self-study for DLO listings) through use of a student survey administered to all class levels. In March 2009, 1294 surveys were sent to students. 261 (20.1%) surveys were completed and returned. Results showed that from 74 to 94% of students felt that history courses helped them achieve both DLO #1 and #2, as compared with classes taken in other departments, and 81 to 100% of history majors felt that the major as a whole helped them achieve the objectives in DLO #1 and #2. Upper-division students tended to answer the questions affirmatively at a higher rate than students in the lower-division levels, which indicates a greater mastery of the DLOs as student's progress through the curriculum.

Evidence-Based Claims and Decision Making

The History department has used evidence from their 4th, 5th and 6th year graduation rates to explore why there is a significant drop in graduation rates for 6th year students. Graduation rates for 4th and 5th year students are above the Cal Poly average, but 6th year graduation rates drop below both the Cal Poly and the College of Liberal Arts average. The department is exploring whether this trend could be related to the difficulty of the department's senior project in HIST 460-461. They are researching this task with the CLA advisors, to be more aware of which students are finishing up at Cal Poly without completing their senior project. They are also reviewing sample senior projects to assess skill levels of students, as well as potential difficulties.

Outcome-Based Assessment of Student Learning and Development

For the 2008-09 academic year, the History Department Assessment Committee reviewed the current student learning outcomes and assessed student progress. The committee replaced a set of loosely aligned list of department learning objectives with eight distinct learning outcomes. Next, they created a rubric to define each of these outcomes and evaluate the skill level, as "Not employing skills of the major (Level 1), "Advanced" (Level 2) or "Mastery" (Level 3. *(Rubric - page 9-10 of History self-study)*

The department used this rubric to score 32 senior projects in HIST 461, and evaluate pre-test scores in HIST 303: Research and Writing Seminar, and HIST 304: Historiography. The results of the pretest scoring in HIST 303 and 304 showed that students demonstrated an awareness of primary sources and their use in research (LOL 1 and LOL 2). The majority of students showed little or no knowledge of historiography (LOL 5).

The senior project testing analysis showed that students were weakest in analytical reading (LOL 1), constructing a historically viable thesis statement (LOL 3), and understanding historiographical information, (LOL 5). Students showed some level of synthesizing historical Information (LOL 2). Students scored higher in thinking analytically (LOL 4) and strongest in understanding content knowledge (LOL 6).

The department's comparison of their assessment of senior project in relation to pre-test scores showed that students demonstrated limited improvement in the use of primary sources, both in terms of locating and analyzing them. This may have an impact on the student's ability to think analytically and construct a historically viable thesis statement. The pre-tests did not evaluate student skill levels of synthesizing historical information (LOL 2), constructing a historically viable thesis statement (LOL 3), thinking analytically (LOL 4) and understanding content knowledge (LOL 5). As a result, this set of skills could not be measured adequately.

Use of Program Review Results to Inform Planning and Budgeting

The complete assessment report, including testing information, development of the new learning outcomes, and rubric scoring was shared with all History faculty members in several meetings, and was posted to a WIKI on Blackboard. Faculty members were encouraged to add edits and share comments. During this collaborative process, there were some modifications made to the rubric which slightly modified headings to describe student performance. (P.12-13 History self study). There was consensus among faculty and students to incorporate primary sources and historiography into the new HIST 100 course. A new HIST 100 pretest will be administered at the beginning of the quarter to assess students on all of the learning outcomes, and help instructors gain a sense of the students' skills and knowledge levels.

The History Department will also use the modified rubric to assess the final paper for HIST 303, as a mid-term assessment level for the majors. Senior projects will be scored again by the assessment committee in 2012-2013, as the cohort of fall 2009 students complete their senior projects. The existence of the three aligned assessments (pretest, midtest, and senior project) will give the department a much clearer picture of the student's knowledge and skill progression in the program. Future results will be used to close the loop and improve student performance.

Mathematics

The following documents were reviewed for this report:

- Academic Program Review submitted in June 2009 by the Department of Mathematics for its Bachelor of Science Degree in Mathematics and its Masters of Science Degree in Mathematics,
- Report of the External Review Committee, and
- Action Plan Templates for the Mathematics Bachelors of Science Degree and the Mathematics Masters of Science Degree

Theme-Based Questions and Evidence

How well are students achieving academic program learning objectives?

Evidence of educational effectiveness of all programs: results of programmatic outcomes assessment, including application of findings for continuous improvement

The department mapped the courses in the undergraduate math curriculum with the program learning outcome (PLOs). These courses, as well as GE courses, are also mapped with the university learning outcomes (ULOs). No such mappings are presented for the graduate curriculum in this report.

The mapping shows that all of the PLOs are addressed across the undergraduate mathematics curriculum, some more extensively than others. For the 2009 program review, the department reported data on three of their eight student learning outcomes (SLOs):

- SLO 1: Understand the nature of mathematical proof and be able to write clear and concise proofs
- SLO 2: Develop the ability to read, understand, and use basic definitions in linear and abstract algebra and real analysis, and be able to provide simple consequences of these definitions
- SLO 3: Be able to use standard mathematical techniques to solve elementary problems.

See section B.1 for more detailed information on the department's assessment activities surrounding these SLOs.

How well are students achieving our new university learning objectives?

Evidence of educational effectiveness in achieving university learning objectives.

According to the maps, the following ULOs are developed to the level of mastery at the undergraduate level:

- Think critically and creatively
- Communicate effectively
- Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
- Work productively as individuals and in groups
- Engage in lifelong learning.

The following ULO is said to reach the developed level:

- Use their knowledge and skills to make a positive contribution to society.

And the department suggests its graduates are only at an introductory level (diversity and sustainability) or developed level (ethics) with regard to the ULO

- Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability.

The department, although it discusses places in the undergraduate Mathematics program where attention to diversity issues might occur, does not specifically assess students' development in this area, nor are sustainability and ethics examined. Although the department's assumption about student learning on this ULO may be accurate for its majors, it is possible that students' completion of the USCP requirement and GE courses outside of science and math may contribute to their attainment of this ULO (especially with regard to diversity) to at least a developed level. Assessment would provide the department information on the level of attainment and the sources of that learning (perhaps both curricular and co-curricular).

In general, the focus of the program reviews by the Mathematics department was not specifically on the university learning objectives. However, the assessments in the undergraduate program can be taken to provide evidence towards each of the following ULOs:

- Think critically and creatively
- Communicate effectively
- Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
- Work productively as individuals and in groups
- Engage in lifelong learning

The graduate program, perhaps more clearly, provides evidence towards the following ULOs:

- Think critically and creatively
- Communicate effectively
- Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
- Work productively as individuals and in groups
- Use their knowledge and skills to make a positive contribution to society
- Engage in lifelong learning

<u>How do we more effectively integrate the educational experiences of our students?</u>
Evidence: Assessment of integration of educational experiences (linking to effectiveness of learning)

Integration of student learning in the Mathematics undergraduate curriculum is examined to some degree in the department's report on its department funded College-Based Fee Research Program, which directly involves Cal Poly undergraduates. Each summer from 2003-2009 (the period covered in the report), 8-17 students participated in research projects with faculty members, for a total of about 50 undergraduate students and several graduate students. As an indication of the success of the program, 16 of the program's alumni had gone onto doctoral programs; others had earned Masters degrees. A list of projects presented in the program review shows that the faculty-student research has resulted in several co-authored presentations and publications.

<u>What can we do to improve academic performance and success of all students, including those from underrepresented populations?</u>

Evidence: Demonstrated progress toward achieving student performance and success goals; assessment of progress toward achieving diversity-related goals and objectives

The program review summary for the Mathematics department examines this question only tangentially, reporting on the admissions data for Hispanic students (13.6% per year, slightly higher than the university's average). There is more information about women -- both in terms of admissions rates (more women admitted than men for the past 5 years) and the distribution of Bachelor degrees awarded (approximately the same).

Outcome-Based Assessment of Student Learning and Development

The program review for the undergraduate degree program in Mathematics tended to focus solely on PLOs rather than both program and university learning objectives. Nonetheless, the department implemented two well-developed direct assessments of student learning at the undergraduate level, focusing on three of their eight PLOs. At the graduate level, comprehensive written qualifying exams in algebra and analysis and a culminating oral exam provide direct assessments of student learning, while the graduate alumni survey provided an indirect assessment of program outcomes. The external reviewers praised the overall level of ongoing student assessment, further recommending "In addition to program level assessment, undertake small assessment studies to get snapshots on the health of the departments [sic] courses and its advisement practices."

For the <u>undergraduate program</u>, an 8- to 13-item exam was given to students in 3 different sections of Math 459 - Senior Seminar. The exam was designed to provide data on student learning for two of the department's eight (8) PLOs, specifically student learning outcome (SLO) 1: "Understand the nature of mathematical proof and be able to write clear and concise proofs," and SLO 3: "Be able to use standard mathematical techniques to solve elementary problems." Although only the summary results were available for use in this current report (full results are available on a CD with the complete program review), it was reported that across the two testing periods, students (n=36) averaged 67.3% on the exam. It was further reported that a more fine-grained analysis of the data showed that there seemed to be a type of bi-modal distribution: there was a group of students scoring 75% and greater and another group that scored 50% or less. The test items contributing to the difference in students' scores related to material covered in Math 248 - Methods of Proof in Mathematics, a course that was then identified as needing revision to better address these gaps in student learning.

SLO 2: "Develop the ability to read, understand, and use basic definitions in linear and abstract algebra and real analysis, and be able to provide simple consequences of these definitions" was assessed with an embedded question in the final exam of two sections of Math 481 - Abstract Algebra I. Although the breakdown of student scores was not available in the summary report (again, available on the CD with full results), it appears that students were moderately successful on this PLO. Again, the department recommended additional attention in Math 248, this time with regard to "revisit[ing] definitions when faced with proving a new result."

For the graduate program, assessment data came from three sources: written qualifying exams in algebra and analysis, the culminating oral examination, and a survey of recent alumni. The written qualifying exams contain five proof problems each: students must earn 15 points out the 25 possible on each exam in order to continue in the program; only 3 students during 2003-2008 have been unsuccessful. Students have to the end of the second year to pass the exam; success on the exam serves as the prerequisite to more advanced classes in the program.

Although sample questions for the different exams are available on the DVD, it seems to be the case that the program provides no breakdown on the questions (or students' success on them) on the exams in relation to the program's SLOs. It also seems to be the case that the program SLOs were not specifically addressed in the survey questions, though the MS graduates in the survey results did find that the program prepared them well for graduate study at the doctoral level or for the teaching positions they attained upon completion of the degree.

Evidence-Based Claims and Decision Making

A particular focus of the program review was to examine the department's Calculus sequence in an effort to identify improvements and modifications that would improve student success. The department used a multi-method approach (quantitative and qualitative data) to examine this issue, analyzing GPA as it related to course sequencing and success in later courses in the sequence as well as surveying students on their attitudes towards and experiences in taking calculus. As well, the department looked at its own and other's practices to examine ways to better support student learning in calculus.

Based on their evaluation, the following modifications were among those suggested:

- Piloting an on-line support system called ALEKS for Fall 2009
- Looking into increasing on-campus workshop support for enrolled students
- Expanding the course learning objectives
- Streamlining and reorganizing course content
- Instituting a "D-stopper" for students before they move into Math 142

The student survey data also presented a need to shift attitudes, especially those of some non-engineering majors, who "view the calculus sequence as another hurdle to complete before their major classes" and "… believe that a C indicates sufficient level of understanding."

Use of Program Review Results to Inform Planning and Budgeting

This has been very effectively done in both the undergraduate and graduate programs. The results of the 2003-2004 program review were used by the department to make the following modifications to the undergraduate program:

- worked to improve senior project completion rates via revision of MATH 461 and increased follow up with students
- updated computers in one lab; converted another lab to a Learn by Doing lab
- kept grader funds at a consistent level
- kept the department's colloquia occurring on a regular basis
- provided assigned time, though in a limited amount, to support research grants
- implemented a blended 4+1 program leading to an MS
- drafted and adopted written criteria for promotion and tenure
- utilized 3-person review subcommittees for RPT, with roles as evaluators rather than advocates
- recognized senior projects through an annual student research conference

and to the graduate program:

- increased the quality (though not the quantity) of graduate students
- limited the number of 4+1 students in the graduate program
- improved communication about qualifying exams
- involved graduate students in research
- implemented MAT 505 Teaching Seminar to run concurrent with students' first teaching

experience.

The 2008-2009 review resulted in the following action plan items for the undergraduate program:

- improve advising
- implement the D-stopper for Math 143
- create a second functional computer lab
- increase the percentage of courses taught by regular T/TT full-time faculty
- streamline the content in the calculus sequence
- create greater coordination among multiple sections of courses
- provide assigned time for new faculty
- undertake small assessment studies to get "snapshots" on courses and advising practices
- consider ways to improve program level assessment

and for the graduate program:

- move graduate student offices closer
- reduce the number of units needed in the 4+1 program
- make the thesis an option to the comprehensive oral exam
- grow the graduate program
- institute a formal TA mentoring program
- improve student success on qualifying exams and make pass rates available to faculty.

Evaluation of the Mathematics Program Review using the WASC Rubric for Assessing the Integration of Student Learning Assessment into Program Reviews

Criterion	Level	Explanation
Required Elements of the Self-Study	emerging to developed	The Mathematics program faculty do more than provide a list of program-level learning outcomes; they systematically examined three SLOs in their 2009 report, reported their assessment findings, studied other elements of their programs, and submitted action plans for the next assessment cycle; the university has not consistently required annual reports.
Process of Review	developed	Program review is not yet highly developed to a point where evaluative feedback occurs across a number of elements.
Planning and Budgeting	developed	Mutually agreed-upon commitments with regard to planning and budgeting do not appear to be part of the action plan process at the level of the college or university.
Annual Feedback on Assessment Efforts	initial to emerging	University and college-level feedback is provided at the time the action plan is developed, but it is not clear whether such feedback occurs between cycles.
The Student Experience	developed	Student feedback and work provided important and relevant information for the department's program reviews.

Business Administration Integrated Program Review

Theme-Based Questions and Evidence

How well are students achieving academic program learning objectives?

The purpose of this assessment was to evaluate Business students' written work from Business course assignments, WPE samples, and EN 134 samples (all samples were from Business students)

It addressed the program learning objective "demonstrate effective writing and speaking skills, peer leadership and participation in teams"

The assessment indicated that Business students were writing at a minimal to average level of attainment

How well are students achieving new University learning objectives?

The writing assessment directly addressed the ULO "communicate effectively", however it indirectly addressed "think critically and creatively".

The assessment concluded that students achieved minimal to average attainment when using the University Writing Programs Office rubric

By using the University adopted rubric, it shed light on a new way to assess Business students' writing samples

How do we more effectively integrate the educational experiences?

This writing assessment attempted to integrate English faculty into Business department writing samples and evaluate these samples based on the University Writing Programs rubric

The judges evaluated writing samples from Business students who took the WPE, EN 134, and students enrolled in two different Business courses

Judges used the University Writing rubric that was developed as part of the ULO's

The Business department will revisit how they are assessing their program learning objectives and specifically the writing of Business students

They have definitely identified a weakness of their students and want to strive to do better

Writing samples were reviewed by two judges and only one English instructor was involved in the process, this appeared to be a weakness by only involving one English instructor

What can we do to improve academic performance and success of all students including those from underrepresented populations?

There was no mention of underrepresented students in this review

It sounded as if the Business department was committed to the University Writing Rubric in some instances for evaluation, linking business courses to English courses, utilizing English TA's to help grade written work and possibly integrating the University Writing Rubric into written assignments in Business courses that require written work

Outcome-Based Assessment of Student Learning and Development
This review did a nice job of using the adopted University Writing Rubric to assess Business student learning, which will enable the Business department to reflect more on student's writing skills and how to more effectively assess it in a consistent manner

The rubric was developed as part of the ULO project and it demonstrated that Business students were writing at a minimal to average level

Evidence-Based Claims and Decision Making
Evidence was based on an adopted University Rubric; writing samples from three areas: EN 134, WPE Business students, and two different Business courses

Students lacked most in the "style" area of the rubric, which focuses on sentence structure, word choice, and tone

This evidence seemed to shed much light on Business student writing and the review indicated that the department will be revisiting their assessment of student's writing

There were many ideas at the end of the review that the Business department should be commended on if they decide to follow through, such as the continued use of the University Writing Rubric to assess written assignments in Business courses and the future collaboration with the English department to assess Business student writing samples

Use of Program Review Results to Inform Planning and Budgeting
Several ideas seemed to stem from this study with regards to planning and budgeting:

- Use of English TA's to help grade papers
- Professional development for Business faculty to use consistent writing rubric for grading
- Linking Business courses to English courses to help with writing quality
- Posting exemplary writing samples for other Business students to view