



UC BERKELEY
EDUCATIONAL EFFECTIVENESS
REPORT



PREPARED BY THE
EDUCATIONAL EFFECTIVENESS
WORKING GROUPS

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TABLE OF CONTENTS

<i>Introduction: Educational Effectiveness Approach</i>	
The Berkeley Context	1
Approach to the Educational Effectiveness Review	2
 <i>Essay 1: Preparing Students for Successful Capstone Experiences</i>	
Contexts	4
The Undergraduate Research Trajectory	6
Case Examples.....	7
Campus-wide Integration and Support.....	13
Challenges.....	14
Recommendations	14
 <i>Essay 2: Reinventing Large-Enrollment Courses</i>	
Contexts	18
Core Values	20
Case Examples.....	20
Challenges.....	27
Recommendations	27
 <i>Essay 3: Enhancing the Culture of Teaching</i>	
Contexts	31
Core Values	31
Case Examples.....	32
Challenges.....	39
Recommendations	39
 <i>Essay 4: Improving Academic Program Review</i>	
Contexts	42
Core Values	43
Academic Program Review Pilot.....	43
Recommendations	46
 <i>Conclusion: Integrative Component</i>	
The Berkeley Campus Culture.....	47
Developing a Campus-wide Vision for Undergraduate Education	47
Optimizing Our Teaching Resources and Supporting Teaching Excellence.....	48
Emphasizing Student Learning at the Institutional Level.....	48
Institutionalizing Assessment of Undergraduate Education.....	48
Some Final Considerations.....	50
 <i>Appendix 1: List of Evidentiary Exhibits</i>	
	51
 <i>Appendix 2: List of References.....</i>	
	60
 <i>Appendix 3: Members of the Educational Effectiveness Working Groups.....</i>	
	63

Introduction: Educational Effectiveness Approach

The Berkeley Context

The history and tradition at UC Berkeley have long been to hire the very best faculty and nurture them to become preeminent in their chosen fields. The campus culture is built on two core strengths that distinguish us from many of our peer institutions. First, Berkeley has not historically used the “star system” approach in hiring faculty; we typically hire at the junior level and “grow our own” (Weinstein, 2002). For every new hire who meets the University’s standards for excellence, a tenured position is available. As a testament to the success of this culture, 80-85% of faculty who come up for tenure in a given year are awarded tenure. Second, Berkeley is known for its strong faculty governance and the crucial role the faculty Academic Senate plays in establishing educational policy and evaluating educational effectiveness. The Preparatory Review Visiting Team concurred with this view, identifying effective faculty leadership as one of the institution’s key strengths. In particular, the Academic Senate Budget Committee, which reviews and makes recommendations in all merit, tenure, and promotion cases, plays a central role in maintaining uniformly high standards of quality for the institution.

This culture of investing in individual faculty has historically served us well, as our reputation as the leading public university attests. In graduate program rankings, Berkeley ranks first nationally in the number of programs that place in the top ten in their fields. The faculty includes eight Nobel laureates, 19 MacArthur Fellows, 122 members of the National Academy of Sciences, 86 members of the National Academy of Engineering, and three Pulitzer Prize winners, in addition to recipients of other honors and awards. These markers of excellence in research and graduate training, however, overshadow indicators of excellence in teaching and undergraduate education—a common observation about major research universities (Boyer Commission, 1998).

The Berkeley tradition has also resulted in a highly decentralized and entrepreneurial campus culture, which affects many aspects of campus life, including governance, decision making, curriculum, requirements, and the services provided to students, faculty, and staff. Departments often play the most critical role in faculty hiring, teaching workload, and undergraduate curriculum. An advantage of this approach is that it recognizes and responds to the unique contexts of various disciplines. The disadvantages are a risk of unnecessary duplication and a lack of uniform metrics that would allow us to make comparisons across departments and to assess the educational effectiveness of the institution as a whole. The Preparatory Review Visiting Team observed the many “pockets of excellence” across the campus and the difficulty in “scaling up” to a more integrated University vision.

The challenge for the campus has been to respond effectively to the shortcomings of this decentralized culture, while preserving what is best about it. In recent years, the campus has begun to develop more centralized structures, which cross unit “silos,” in order to respond to campus priorities. An example is the e-Berkeley initiative, a centralized administrative mechanism for bringing the power of technology to campus administrative and academic operations. Such centralized approaches are particularly important now, at a time of shrinking resources and expanding enrollment, when the campus needs to develop a strategic vision for the future.

One aspect of this new vision is the Chancellor's decision to make undergraduate education a key campus priority. In 2001, a senior administrative position was created and charged with campus-wide oversight for undergraduate education. The new Vice Provost has established a strong partnership with the Academic Senate, particularly the Committee on Educational Policy (CEP), which is charged with review of undergraduate programs. In addition, the Vice Provost has created the Council of Undergraduate Deans (CUD), which consists of the senior administrator in charge of undergraduate education in each of the five colleges and in those professional schools with undergraduate programs. In response to its charge to play a central planning role for undergraduate education, CUD has drafted an initial statement of the outcomes that the campus wants its students to achieve during their Berkeley experience. These outcomes include the self-confidence to engage new bodies of knowledge and to develop new skills; the imagination to conceptualize and the self-discipline to follow through on a major complex project; the ability to encounter challenges and find creative solutions; and the capacity to cope with ambiguity, think flexibly and grow intellectually throughout life.

For the Educational Effectiveness Review, we have chosen undergraduate education as our major focus. We begin by identifying how we plan to achieve our goals for students, both in a new model for undergraduate research (the hallmark of a Berkeley education) and in new models for teaching the core lower-division curriculum. We also address how the campus is promoting a culture of excellence in teaching, as well as in research, and how all of these developments are being incorporated into the primary campus mechanism for accountability, the academic program review. We have used the self-study process to reflect candidly on obstacles and challenges facing us, as well as on our strengths, and to help establish campus priorities with regard to improving undergraduate education that will have benefits and uses beyond accreditation.

Approach to the Educational Effectiveness Review

The Educational Effectiveness Report was prepared in accordance with the Western Association of Schools and Colleges (WASC) 2001 Handbook of Accreditation and UC Berkeley's Institutional Proposal. In structuring the report, we chose the special themes model, which allows analysis of educational effectiveness in relation to several focused topics of investigation. The process of refining and focusing those essay topics to align them with campus priorities has been an integral component of this review process.

In our Institutional Proposal, we identified three broad areas for investigation in the Educational Effectiveness Review: (1) enhancing academic engagement at a large public research university; (2) rethinking the delivery of education; and (3) improving undergraduate program review. The Academic Engagement Working Group and the Delivery of Education Working Group were established to address the first two topics. These groups were chaired by faculty members and composed of faculty, students (graduate and undergraduate), and staff. For the third topic, Program Review, the campus made use of the existing Academic Program Review Working Group, a joint Academic Senate/administration committee that had been charged separately by the Executive Vice Chancellor and Provost, but whose work overlapped with the WASC self-study. The Steering Committee, consisting of the chairs of each of the Working Groups, members of the Academic Senate, and key administrators involved in the WASC process, oversaw the self-study process, and a Distinguished Advisory Group provided additional input.

The Working Groups were convened in January 2002. Over the next year and a half, the groups examined a wide range of potential topics for investigation under the broad rubrics laid out in the Institutional Proposal. Each of the Working Groups presented a series of proposals to the

Steering Committee for possible topics that would be worthy of more focused investigation. Each proposed topic was evaluated based on the following criteria. First, we considered its relationship to one or more of the objectives laid out in our institutional proposal. (These were (1) increasing opportunities for faculty-student interaction, especially for lower-division and transfer students; (2) increasing opportunities for capstone experiences; (3) optimizing teaching resources to enhance educational quality and student learning; and (4) helping instructors teach with excellence.) Second, we assessed whether it would allow us to leverage existing campus efforts already under way. Third, we asked whether the topic had campus-wide scope and would help bring a broad institutional perspective to bear on a challenge related to undergraduate education.

At the end of this process of review and selection, the Steering Committee approved four topics for inclusion in the final report:

- Preparing Students for Successful Capstone Experiences
- Reinventing Large-Enrollment Courses
- Enhancing the Culture of Teaching
- Improving Academic Program Review

In approaching these topics, each of the Working Groups considered the rationale for the importance of the topic; the specific goals and objectives the campus would like to achieve; the identification of several case examples that demonstrate educational effectiveness and, to the extent possible, have addressed learning outcomes; the identification of key challenges; and, finally, a set of core recommendations for the future. This proposed structure was vetted with the Preparatory Review Visiting Team in October 2002, and was adopted as the basic structure for the essays that follow. In addition, the Working Groups considered three questions raised by the Preparatory Review Visiting Team:

- How best can we bring greater coherence to existing efforts in the priority areas?
- What evidence are faculty and programs marshaling to evaluate their successes?
- How does the presence of diversity serve as an important resource for student learning?

In the next section, we include the four essays developed by the Working Groups, together with a set of exhibits designed to provide more detailed evidence of educational effectiveness organized around the chosen topics. In our conclusion, we consider some of the common cross-cutting issues that emerged in this investigation, discuss some of the areas for continued growth and development, and consider how the institution will move forward to sustain and extend the work undertaken to date.

Essay 1: Preparing Students for Successful Capstone Experiences

Contexts

Undergraduates who attend a research university such as Berkeley have the opportunity to engage with scholars who are internationally recognized for their contributions to the advancement of knowledge. Intellectual discovery shapes the undergraduate experience: in large-lecture classes that are informed by cutting-edge research; in small seminars that allow undergraduates to engage in inquiry under faculty mentorship; and in laboratories, in libraries, in the field, and in the studio, where undergraduates apprentice on faculty-directed research projects and, eventually, initiate their own projects, often as a senior-year capstone experience. Of graduating seniors responding to the UC Undergraduate Experience Survey (UCUES, Spring 2003), 95% rated developing research skills as an important educational goal. Of these, 44% reported having made considerable progress on this goal; 33% reported some progress; and 14% reported some, little, or no progress. The same survey asked students to rate the importance and frequency of various types of undergraduate research experiences. Eighty-five percent of graduating seniors cited taking a small research-oriented seminar as important, with 54% reporting having done so in the current academic year. They also considered important conducting their own research as part of a course (90%) or independent study (77%), with 82% and 44% respectively having done so. Eighty percent rated working on a faculty-mentored research project as important, with 43% having done so. Overall, the results show that students rate such experiences as important, and that by the senior year we are reaching a significant number of students with such opportunities. However, we still need to close the gap for seniors who want such experiences and have not yet had an opportunity to engage in them.

In Reinventing Undergraduate Education (Boyer Commission, 1998), the capstone experience is defined as follows: "All the skills of research developed in earlier work should be marshaled in a project that demands the framing of a significant question or set of questions, the research or creative exploration to find answers, and the communication skills to convey the results to audiences both expert and uninitiated in the subject matter." The report further suggests that students will be best prepared for the demands of the capstone experience when earlier coursework is inquiry based. At Berkeley, we define capstone experiences broadly to encompass projects relevant to a wide range of disciplines, including design, creative, or service-learning projects, as well as traditional research projects. In addition, we note that mentored student research can culminate in a variety of products, including capstone teaching experiences in which students develop and lead student-initiated courses. Capstone experiences are valuable not simply for the opportunity they afford the student to demonstrate mastery of skills and knowledge in a specific discipline. They represent the culminating expression of a broad liberal arts education and the outcomes that prepare students for future success in a wide range of personal, professional, and civic endeavors.

At the time we launched this self-study, we recognized that the campus did not have in place a reliable centralized mechanism for tracking participation in undergraduate research activity, in preparation for and including capstone experiences. Indicators from the Quality of Undergraduate Education Assessment Project (QUEAP) gave us some picture of current activity, but they also captured some activity that was not research and failed to capture other activity that was. To identify more reliable data on undergraduate research activity, we designed and conducted as part of the WASC self-study a Departmental Undergraduate

Education Survey in Fall 2001. This survey included a section on capstone experiences, using the above definition from the Boyer Report, and was designed to establish baseline data on availability of capstone opportunities at the departmental level. Results indicated that 75% of departments (N=56) offer capstone experiences to their honors students and 49% (N=37) to non-honors students, some required and others optional. Detailed results and analysis of this survey are available.

In parallel to this campus effort, the University of California, through the system-wide Council of Undergraduate Deans and Vice Provosts, began to explore a strategy for quantifying undergraduate research activity taken for credit as a first step to better understanding credit and non-credit opportunities for undergraduate research activity. Guidelines for identifying advanced and apprenticeship undergraduate research courses are currently under development. The campus and system-wide efforts to define and catalog undergraduate research activities have been mutually reinforcing and reciprocal.

System-wide and campus efforts to quantify undergraduate research activity have underscored the need for clear definitions of what is meant by undergraduate research. Such a conceptual framework enables

- undergraduates to set personal goals at the outset of their academic careers and plan ahead to take advantage of research opportunities;
- faculty and departments to become more explicit about their research-based student learning objectives, to develop specific ways to evaluate intended learning outcomes, and to partner with academic support units to promote the development of research competencies in their students;
- the administration to make informed decisions about allocating available resources to support these educational goals and objectives on both a unit- and campus-wide level; and
- the campus and University as a whole to bring greater visibility to the place of undergraduate research in the educational experience, to assess how well we are meeting our objectives for undergraduate participation in research, and to communicate goals and successes to various stakeholders.

The Working Group examined a broad range of evidence of curricular and co-curricular undergraduate research practices and activities from across the disciplines. It reviewed the quantitative data on capstone experiences from the Departmental Undergraduate Education Survey. It then conducted further qualitative investigation (e.g., review of departmental websites; informal interviews with department chairs, faculty, staff, and students; examination of course syllabi, assignments, student work, and other assessment materials when available) in a smaller subset of departments representing a range of variables (e.g., size, discipline). To supplement this material, the Working Group investigated key programs and units on campus that are supporting undergraduate research experiences in partnership with or as an adjunct to departmentally based experiences. In the remainder of the essay, we outline the resulting conceptual model, discuss the model in relationship to several case examples, and conclude with a series of recommendations that will enable us to continue to make progress as a campus in this area.

The Undergraduate Research Trajectory

The development of undergraduate research competencies leading to a capstone experience can be divided into three *stages*:

- Stage One: Exposure
- Stage Two: Experience
- Stage Three: Capstone

As students progress through these three stages, the sophistication and quality of the research they produce continually increase. The process for moving successfully through the stages begins with the engagement of students as intelligent consumers of research, that is, students who know how to find, read, critique, and judge the quality of research studies and reports. With these foundational research skills in place, students are ready to move towards the production of their own original research. To define the stages of undergraduate research development and the student learning objectives associated with each stage, we have identified three *dimensions* that we think are especially critical markers of students' engagement as producers of research:

- The extent to which answers to research/creative problems that students engage are known or unknown.
- The extent to which the research/creative process is directed by the faculty mentor or self-directed.
- The extent to which the research/creative product has a potential audience beyond the instructor and classroom.

Each of these dimensions represents a continuum. Progress along these dimensions may not proceed uniformly, and the stages may at times overlap or correspond to different class years for different students. In addition, multiple variables will affect actual student learning outcomes. These include (1) the culture and nature of the disciplines, (2) individual students' interests and inclinations, (3) individual students' skills and abilities, and (4) types of research activities conducted. Recognizing these variables, the campus has articulated the following goals for our students:

- To offer every student the opportunity to have a capstone experience if he or she so chooses.
- To maximize students' progress in relationship to all three dimensions of engagement so they are both more likely to choose a capstone experience and are better prepared to have a successful experience.

Stage One: Exposure

In stage one, students learn to recognize a good research question and are exposed to methods of approaching the problem, including identifying, gathering, evaluating, and synthesizing evidence, information, and ideas. In some cases, students may be engaging questions the answers to which are already known; however, learning experiences that actively engage them in the process of re-discovery help them gain a deeper understanding of the research process. In this stage, faculty members typically are fully responsible for structuring the research/creative problem and the approach used for investigation/creative exploration. Through engagement with exposure-level activities, students begin to gain an understanding of the process by which knowledge is created and the ability to distinguish important questions from unimportant questions in a given field of knowledge. Some students may seek exposure-level experiences in

several disciplines as part of the process of developing the focus and commitment required for entry into the upper division.

Stage Two: Experience

Students in this stage have typically committed to a major and are gaining discipline-appropriate tools and knowledge through coursework and co-curricular apprenticeships. Experience-level activities offer students practice formulating research questions and developing a plan for approaching research problems, the answers to which may be either known or unknown. Students in this stage acquire research skills such as conducting a literature review, coding data, or learning qualitative interviewing techniques, paleography, or laboratory bench skills. They may have opportunities to practice structuring a research/creative problem and plan for investigation/exploration, which they execute under close faculty supervision. Or they may contribute to the conceptual development, execution, and analysis of an ongoing research/creative project that a faculty member has defined. In either case, they continue to refine their ability to develop questions that have significance, to acquire skills in research and creative exploration to find answers, and to learn discipline-appropriate tools for presenting the results of inquiry to an audience beyond the faculty instructor.

Stage Three: Capstone

Students undertaking a capstone project marshal the skills needed to develop their own research or creative questions and to initiate investigations and explorations the outcome of which is largely unknown. The level of independence of the capstone phase will vary considerably: some disciplines are characterized by a high degree of autonomy and solo work; others typically generate knowledge in the context of teamwork or collaboration. Regardless, the work of this phase allows students to organize and synthesize knowledge and skills acquired in a wide array of settings and situations in the course of their undergraduate career under the guidance of a mentor. Capstone experiences also typically include an opportunity to present the results of inquiry or creative engagement to a larger audience. This audience may vary widely: a classroom symposium, publication in a student-run journal, participation at a professional conference, presentation as part of a student-initiated course. At the undergraduate level, the most important criterion is the opportunity to communicate with a broader rather than a specialized, professional community.

Case Examples

We have chosen four cases to illustrate several concrete ways the above model has been put into practice on the Berkeley campus. The cases represent a range of disciplines, numbers of majors/nonmajors served, and approaches to the capstone. The departments offer a variety of experiences incorporating research, artistic creation, and service-learning dimensions, as well as opportunities for public presentation in a variety of communication modalities. The Environmental Sciences Program and the Department of History are noteworthy because they require the capstone experience for all of their majors. The Department of Theater, Dance, and Performance Studies offers an optional senior thesis that can take a variety of forms including research and/or production, as well as options for capstone production experiences for many majors and nonmajors alike. The McNair Scholars Program, a nondepartmentally based undergraduate research program, is designed specifically to address issues of diversity in the learning environment.

Environmental Sciences

Overview: The Environmental Sciences Major is the only cross-college major at Berkeley. Students in either the College of Letters and Science or the College of Natural Resources can choose an emphasis in biological science, physical science, or social science. The Environmental Sciences major requires a two-semester senior thesis course (ES 196a and 196b, each with labs) for all majors, which gives students the opportunity to conduct independent research in settings such as a campus laboratory; a non-profit organization in the region; or a state or regional health, environmental, or planning governmental agency. Approximately 45 majors enroll in the two-semester course each year, and approximately the same number graduate each year.

Relation to the Model: The Environmental Sciences Program has taken specific steps to try to address differences in students' levels of preparation for the thesis. In the past, students undertaking the thesis worked in small groups with others pursuing similar topics. More recently, students have been grouped together according to similar stages of research progress. Students whose research is well under way receive information needed to publish work in undergraduate journals or peer-reviewed journals or otherwise disseminate results to the public, and students who are struggling with the early stages of research are provided with extra feedback and assistance. This attention to the progress of the learners enables the department to tailor instruction to specific learning needs, rather than to expect uniform performance and outcomes for all students (e.g., thesis published in a peer-reviewed journal).

To better prepare students for the capstone, the major has added a research component (ES 10L) to the Fall offering of its mandatory introductory course (ES 10). The course now provides an interactive, hands-on introduction to data collection and environmental problem solving. ES 10L, now in its third year, incorporates field and laboratory exercises based upon the Strawberry Creek watershed that runs through campus. Each activity requires that students gain specific field and laboratory skills needed for research. A weekend exercise is designed to allow students to integrate research skills in a role-playing exercise as environmental planning consultants. The field exercises are consistently cited in student evaluations as strong points of the course. The program plans to expand the laboratory component to the Spring semester to reach all students enrolling in ES 10.

The major also offers a research methods course (ES 100) in the spring of the junior year, as a mandatory prerequisite for the thesis seminar. The course, now in its fifth year, has also changed focus, from one that presented specific methodological tools and statistics to one that encourages students to become more active thinkers. The course brings in professionals from different fields to show how the process of research works in various disciplines and careers. In lieu of a final exam, students in the course produce a research proposal as a final project.

As an interdisciplinary, cross-college major, a key challenge for Environmental Sciences is its lack of permanent faculty FTE. Faculty who teach ES 10, for example, come from such departments as Environmental Science, Policy, and Management; Geology; Integrative Biology; and Landscape Architecture. The staffing challenge is particularly difficult in courses that are exclusively for majors (e.g., ES 100 and ES 196), which are not cross-listed and do not also serve students in the faculty members' home departments. The program relies on lecturers to staff the two-semester thesis sequence. To increase student interaction with ladder faculty as part of the capstone project, the program is working to help students find ladder faculty mentors from across the campus to supervise the laboratory component of the thesis course (ES 196L). The faculty instructor for ES 100 is considering how to restructure the junior-year course so that students will complete the course having identified and contacted a faculty research mentor and having completed a research proposal that will correspond to their thesis project. An additional challenge is to involve more faculty from the social sciences (e.g., resource

economics, urban and rural planning, environmental policy, environmental law) in mentoring students in the program.

Evidence of Effectiveness: The learning objectives for the thesis are detailed on the [ES 196 website](#), along with information about how to progress through the various stages of the research project. All students completing the thesis are expected to be able to (1) identify a testable question or problem, (2) design a protocol for gathering relevant information, (3) generate or locate the information specified in the protocol, (4) analyze the information and derive an objective conclusion, and (5) present results in a written thesis and as an oral report. Attainment of these objectives is determined by the faculty who teach the courses. In addition, all students present their findings in a public symposium at the end of the year, and their work is released in a CD, distributed to the students at graduation and available on the course website.

In 2003, Environmental Sciences was awarded the UC Berkeley campus [Educational Initiatives Award](#). This award is presented annually by the Academic Senate's Committee on Teaching to a department, unit, or group of faculty for an outstanding undergraduate education program or initiative that can serve as a workable model for others on campus. Among other distinctions, the major was recognized for its efforts to prepare students for successful capstone experiences. [Supplementary evidence](#) of Environmental Sciences' success in preparing students to conduct research successfully throughout the trajectory of their development is attached.

History

Overview: History is one of the largest campus departments that require a senior thesis project for all degree candidates. The department graduates approximately 250 students per year. The thesis course (History 101) is taken in the student's field of concentration and preceded by a required proseminar (History 103). The department expects that most students will take the 103 in their fields of concentration, and it is working towards more linkages between the 103 and the 101 courses. More recently, the department has instituted a new elective lower-division course (History R1), which is designed to expose intended majors to basic undergraduate research competencies in the discipline and help them develop a broad appreciation of the field. As part of the redesign of the curriculum currently under way, the department is eliminating the separate honors thesis course (History 195). Under the new curriculum, honors will be awarded to a subset of students completing the mandatory capstone who have demonstrated exceptional performance.

Relation to the Model: In the lower division, intended History majors are exposed to the discipline through the experimental History R1: The Practice of History. The objectives of this new course are to help students understand (1) what constitutes a piece of primary source evidence; (2) where evidence can be located and how it is validated; (3) how evidence is placed into context, what questions can be asked of it, and what interpretations are possible as a result of such interrogation; and (4) how master historians have used evidence and written history in the past. In addition, the course is designed to help students develop formal citation skills and understand established protocols for academic honesty. The course includes guided individual research essays ([sample assignment](#)) involving one of the campus library collections (e.g., the Bancroft Library, the East Asian Library, the Emma Goldman Papers). In Spring 2001, the first semester in which the course was offered, a total of 48 students enrolled in all sections. In Spring 2003, that number had grown to 149. It is still too soon to tell what percentage of students enrolling in the course will eventually complete degree requirements in History and whether the course will eventually become an established gateway into the major.

The History 103 series is designed to develop historiographical or methodological skills necessary to complete the required senior thesis. The course is required for the major, and

enrollment in all sections of the course averages 250 students annually. Recent undergraduate seminars have introduced students to qualitative interviewing and the use of oral sources to augment understanding of the past, reading of popular culture, and interpretation of material culture in relation to visual art and literary documents. Courses designated 103R give extra attention to research methods and techniques. One such course, "American Lives, American History: Oral History and the Understanding of Social Change," is taught by the faculty director of the Regional Oral History Office in collaboration with professional oral historians and researchers. This section offers a model for how campus mentoring resources beyond ladder faculty can be effectively leveraged. The interviews that students conduct as part of the course become part of the permanent Bancroft Library collections.

After taking the mandatory preparatory seminar, students enroll in History 101, the required thesis course, where they work on closely related topics and develop 30-50 page papers based on original research. Most 101 sections are organized around themes, times, and places, similar to the 103. An innovative section, called "Writers' Group," is open to students who wish to pursue independent research not represented in course offerings. The department also administers a research fund that enables students to get small grants to conduct field and archival research as part of their projects.

Staffing remains one of the key challenges of providing a capstone experience to all majors. The new History R1 course is taught entirely by ladder faculty, as are almost all sections of History 39, the sophomore seminar. As a tradeoff to maximizing student-faculty contact in key lower-division courses, the department relies heavily on Graduate Student Instructors (GSIs) to staff the capstone sequence, with only 47% of 103s and 23% of 101s taught by ladder faculty. Proposed changes to the departmental curriculum, including a reduction from two required 103s to one required 103 for majors, are designed in part to lead to a more effective utilization of ladder faculty and GSIs. Although the department will continue to rely on GSIs to staff its thesis sequence, under the new curricular requirements it will be able to reserve those slots for advanced GSIs who already have an established teaching record.

Evidence of Effectiveness: To assure consistency across the multiple sections of History 103 and 101, the instructors meet twice a year with the History undergraduate curriculum committee. During these meetings, the committee assesses how well the sections are meeting the department's overall learning objectives for its students. Students' research projects are disseminated in a variety of ways. All papers are stored in the departmental library, and an index system allows students to access papers related to their own topics. Students are also encouraged to make an oral presentation at a departmental end-of-term colloquium, attended by faculty and students. Phi Alpha Theta, the Undergraduate History Honors Society, also publishes a student-run journal called Clio's Scroll, which enables students to share their research projects with a broader audience.

Theater, Dance, and Performance Studies

Overview: The Theater, Dance, and Performance Studies Department offers to all its majors an optional capstone experience, which can take a variety of forms: (1) students can take a two-term course in which they prepare a written senior thesis based on original research in the history, literature, and/or theory of theater and/or dance; (2) students can propose a year-long thesis project in which they write a thesis in the Fall and then direct a play or choreograph a dance work in the Spring based on the thesis; (3) individual students can apply to direct/choreograph a non-thesis production, which is mentored by a faculty member, designed (sets, costumes, and lights) and stage-managed by students (who may also use this as a capstone experience), and given departmental staff and budgetary support; and (4) students in the lighting, scenic, and costume design fields are often given the opportunity to design for

professionally directed theater and dance productions in the department's mainstage season. The department does not have an M.F.A. program, and undergraduates participate in capstone experiences that would usually be reserved for graduate students at other universities. Acting, stagecraft, and production opportunities are not restricted to majors, as they are in many drama departments, so the department plays a major service role to nonmajors. More than 40 students per year are cast in departmental theater productions, more than 30 students perform in dance concerts, 60 students crew in theater, 10 crew in dance. Productions are close collaborations involving students with ladder faculty, instructors who are professionals in their fields, and professional technical staff, who all contribute to the work of mentoring.

Relation to the Model: The department emphasizes opportunities to develop both research and production competencies leading to a capstone experience. It has recently redesigned its major to strengthen the emphasis on literature, history, and performance theory in addition to production. The department now requires two courses in performance studies at the lower-division level and four courses at the upper-division for its majors, which prepare students who choose the traditional research thesis option. Each year the department sponsors two or three undergraduate theses on the written-thesis-only model. In addition, a small number of students choose the combined research thesis/production option. For example, in Fall 2001 an undergraduate wrote her thesis on Edward Bond, then in Spring 2002 she directed a play by Bond as one of the department's student productions.

The department has developed a sequence of courses for its production students. Theater 60: Stagecraft provides a lower-division introduction to set, costume, and lighting design and stage management. It involves a laboratory component, where students work backstage in technical areas on departmental productions. Production students in the upper division can then specialize in either the preparatory directing sequence (162, 163, 164) leading to a directing capstone (196) or the preparatory two-course track in scenic, costume, or lighting design (173A&B, 174A&B, 175A&B) leading to a supervised capstone in lighting (176) or scenic and costume design (179). The directing capstone is limited to departmental majors; however, the design and stage management capstone is open to nonmajors, attracting students from such majors as Physics and Architecture. To participate in productions as designers, students must have taken two courses in the appropriate area (directing, lighting, set or costume design), so they come into the production process with a minimum of a year's training in the area.

Dance students, including nonmajors, are each required to take one semester of choreography, and their work is shown each Fall semester in the choreography workshop (146A). Advanced students take 146B, and their work is given a small-scale production in the Spring semester; in addition, choreography students may apply for the 196 option to have a separate production of their work, or for the thesis option. Students can also participate in the Bay Area Repertory Dance Company (149).

The department's commitment to providing advanced research/creative experiences for nonmajors sometimes comes at the expense of majors, and is of some concern to the faculty. All of the department's research faculty have been hired in the last three years, and the department anticipates these new hires will result in more opportunities for traditional senior theses, as well as more theses that are accompanied by a directing project. Another area for continued development is the ongoing commitment to representing diversity onstage and in the classroom. The most recent hires specialize in Asian cinema and performance, African American theater, Asian theater, and race theory and performance. Several of these faculty members are also experienced directors, and while the casting of department productions and the choice of repertory already reflect the campus's diverse student population, the department anticipates that new faculty teaching in both research and production fields will contribute directly to this goal.

Evidence of Effectiveness: The production process involves close interaction between ladder faculty, instructors, and professional staff in the department to evaluate students. Every year, faculty and technical staff assess all students participating in departmental programs. In annual departmental meetings to select the upcoming season's productions, faculty and staff evaluate the strengths and weaknesses of students coming through the program. Plays are selected in part to fulfill curricular goals (e.g., to provide the opportunity to teach a classical or period acting style; to work with comedy of manners; to engage questions of race and performance in an African American classic), and in part to develop the skills of the students currently in the program. The department holds open auditions for all productions. Assignment to a production as designer or stage manager is made by the department's production manager, in consultation with the appropriate faculty supervisor. For example, each year 18 students take the costume design sequence. Of those, four to six will design costumes for a departmental production before they graduate.

The department has a strong placement record for students who are accepted into top M.F.A. programs. The department also offers a regular course on auditioning for professional acting work and for graduate programs in acting, directing, and design. Every year eight to ten Berkeley graduates go on to programs like Juilliard, Tisch School of Performing Arts, American Conservatory Theater, American Repertory Theater, and Trinity Repertory Theater. Students who have focused on stagecraft have a record of moving into professional positions immediately after graduating.

McNair Scholars Program

Overview: The McNair Scholars Program prepares a minimum of 20 new students annually for graduate study at the doctoral level through an intensive undergraduate research experience, typically taking place in the junior year (a subsection of those students requiring more preparation to complete their work continue for a second year in the program). The program's specific aim is to increase the numbers of students that enroll in doctoral education who are low-income and first-generation students. (At least two-thirds of McNair Scholars are first-generation college attendees from low-income families, and up to one-third are underrepresented minorities who are not low-income, first-generation students.) The program teaches students a set of skills that are critical to success in advanced doctoral work and equips students with those skills through an intensive undergraduate research experience. This national program is funded through the United States Department of Education. Under the federal grant, the program develops a partnership agreement with explicit measurable objectives, including numbers of students who will have a research experience, graduate with a B.A., and go on to doctoral programs.

Relation to the Model: McNair Scholars participate in a structured program for academic credit (Education 198) that helps them prepare for undertaking capstone experiences. Students receive individual advising and attend a weekly two-hour seminar during the spring semester that provides structure for the development of the research project and learning outcomes. The learning community provided by the program helps facilitate students' social integration into the larger institution. Students receive additional support for applying to graduate school, including application fee waivers. Mentoring is provided by the Scholar's faculty research mentor, GSIs, and program staff. Faculty mentors have primary responsibility for evaluating and grading the intellectual content of the work. An area of challenge in the program is the coordination of these different mentors.

The McNair Scholars Program demystifies the research process for groups underrepresented in advanced doctoral study. It also offers an interesting model for a learning community where

multiple mentors work together to support students: faculty provide specialized intellectual guidance on the research project; GSIs provide broader disciplinary guidance; and program staff teach less specialized, broadly applicable skills related to navigating the research environment. Together, this community of mentors helps maximize students' development along all three dimensions of engagement identified as part of our model research trajectory. Finding ways to export this model to departments that want to be more responsive to diversity in the learning environment is an important challenge and potential future direction for development.

Evidence of Effectiveness: Stated learning objectives for the program include (1) learning how to approach a faculty mentor, (2) understanding what constitutes a research question, (3) identifying key literature in a given field, and (4) understanding ethical issues related to research. Learning objectives for individual projects vary and are determined and evaluated by the faculty research mentors. The program maintains extensive quantitative and qualitative summative data on how well objectives in the partnership agreement are being met. Beyond that, evidence of student learning outcomes includes (1) student work presented to external audiences such as the legislature and the Regents, (2) student work presented at the annual McNair Symposium, and (3) student work published in the annual peer-reviewed *Berkeley McNair Journal*. A review of students' research topics, especially in the humanities and social sciences, provides evidence of how the presence of diversity transforms the pursuit of knowledge in the disciplines. McNair Scholars gain experience undertaking a sustained and original research experience, typically in the junior year, with many going on to complete a departmental senior capstone project. Reports for 2000-01 and 1999-2001 provide additional effectiveness data.

Campus-wide Integration and Support

The case studies above present several locally developed models. We also recognize the need for institutional structures that can bridge these local efforts. In 1997, the campus established the Office of Undergraduate Research (OUR) to "direct students to existing opportunities, network established programs, and assist in the development of new campus opportunities for research." The Office houses the Undergraduate Research Apprentice Program (URAP), which pairs faculty with undergraduates who apprentice on cutting-edge research projects, as well as a number of newer programs, including the Haas Scholars Program, the Summer Undergraduate Research Fellowship Program, and the Travel Grants for Undergraduate Research. OUR oversees two campus-sponsored undergraduate journals, Berkeley Undergraduate Journal and Berkeley Scientific Journal, and provides additional support for other independent student journals.

OUR also provides resources and forums designed to provide more coordination among the many campus programs that support undergraduate research, while still maintaining the autonomy of these programs in their respective units. These include an Undergraduate Research @ Berkeley web portal that links students to undergraduate research opportunities and resources on campus and beyond; a campus-wide undergraduate research calendar; a roundtable of directors of undergraduate research programs, the Berkeley Undergraduate Research Consortium (BURC), which meets to coordinate undergraduate research activities on the campus; and a series of workshops and print- and web-based resources designed to assist undergraduates in reaching certain learning objectives (e.g., developing proposal writing skills) and to maximize their participation in research while at Berkeley. In 2002-03, nearly 900 students enrolled in research programs directly administered by OUR; more than 1,500 attended focused information sessions, forums, and workshops run by OUR staff. Many more found affiliated programs through the OUR website, listserv, and publications. OUR's programs and services are designed to partner with academic departments and units, providing

funds, resources, and advising that facilitate students' development along the research trajectory. In its six years of existence, OUR has realized many, but not all, of the objectives outlined in its initial budget request. A future goal is to develop more effective assessment procedures to better understand the impact of OUR on student learning.

Challenges

Many innovative opportunities are available to our undergraduates. However, we have also identified some key obstacles:

- A high student-faculty ratio relative to our peer comparison private institutions, leading to challenges in providing one-on-one faculty-student mentoring.
- The tendency for undergraduate research innovations to be isolated and the result of individual faculty entrepreneurs rather than coordinated efforts to promote innovative curricular and co-curricular change at the departmental, college, or campus level.
- A lack of infrastructure for faculty to share pedagogical strategies and practices in working with undergraduates on research activities.
- A lack of a well-developed incentive/reward system for faculty that communicates the value and importance of undergraduate research mentoring.
- Insufficient research and writing skills in students entering the capstone experience and a diversity of levels of preparation leading to disparate levels of student success.
- A lack of assessment mechanisms to help us track both participation in and learning effectiveness of undergraduate research on both a local and campus-wide level.

To continue to expand and strengthen the campus's commitment to providing research-based learning opportunities leading to the capstone experience, we offer the following specific recommendations.

Recommendations

1. Provide incentives and resources to support departments to develop undergraduate research opportunities leading up to and including capstone experiences.

Many of the innovations occurring on campus are spearheaded by individual faculty. Incentives and resources could be designated to institutionalize change at the departmental/college level, fostering undergraduate research trajectories that are transparent to students.

Current Efforts: The Educational Initiatives Award, begun in 1993, recognizes outstanding undergraduate education initiatives undertaken at the department (rather than individual faculty) level that have the potential to serve as campus models.

2. Remove obstacles to undergraduate engagement with interdisciplinary research and promote inter-departmental and inter-unit collaborations.

As research becomes increasingly interdisciplinary, we need to ensure that students can engage problems in a cross-disciplinary context. The campus could encourage partnerships not only between departments, but also with other units (e.g., library collections, organized research units).

Current Efforts: The Townsend Center for the Humanities has received new funding to develop interdisciplinary research programs, which will provide undergraduates with opportunities to participate in individual and faculty research through interdisciplinary

courses, one-on-one apprenticeships, and team-research projects in areas that link the humanities to the environment, human rights, new media, biotechnology, health, and medicine.

3. Develop new ways to support faculty wishing to redesign existing or create new courses with research-based components and create more venues for faculty to exchange information about innovative teaching practices.

Strategies could be found to encourage sharing of best practices in promoting undergraduate research activity, through faculty forums, web-based exchanges, and other venues.

Current Efforts: The pilot Mellon Faculty Institute on Undergraduate Research supports faculty creating innovative research-based courses and serves as a forum for faculty from diverse disciplines to engage in pedagogical inquiry and dialogue.

4. Help students reflect on their own development as researchers across their undergraduate careers.

The campus could explore options such as e-portfolios for encouraging students to reflect on the development of their research competencies across multiple courses and co-curricular experiences.

Current Efforts: The Library Prize for Undergraduate Research asks students to submit a 500-750 word reflective essay describing their research strategies and use of library tools and resources as part of their applications.

5. Reward faculty who engage in effective research mentoring of undergraduates through the merit/tenure process and other meaningful forms of recognition.

The Working Group endorsed the addition of criteria related to undergraduate research mentoring as part of the latest revision of the faculty bio-bibliography, used in the campus's merit, promotion, and tenure process, and recommended that such contributions (both curricular and co-curricular) carry weight in the overall evaluation process. The development of other forms of recognition is also encouraged.

Current Efforts: The Letters and Science Awards for the Distinguished Research Mentoring of Undergraduates are examples of meaningful recognition.

6. Leverage mentoring resources for students engaged in undergraduate research by fostering communities that creatively engage faculty, post-docs, graduate students, advanced peers, librarians, and other professional staff in the mentoring process.

Expanding the availability of quality mentored research experiences will depend on creatively leveraging all of the campus's mentoring resources. Collaborative communities that complement faculty mentorship have long been the norm in the laboratory-based disciplines and are becoming more common in other disciplines. The campus's extensive library collections, museums, organized research units, and centers could serve as sources of professional research mentors, not simply of research materials.

Current Efforts: The participation of undergraduates in the Regional Oral History Office is one example of such a collaborative model.

7. Focus on developing communications competencies as part of preparation for and execution of the capstone experience.

The adequacy of written, oral, visual, and graphical communications skills in undergraduate students remains a perennial issue. Capstone courses provide appropriate vehicles to focus on discipline-specific communications skills at the upper-division level. All departments could be encouraged to build such opportunities into all of the research trajectory stages, so that graduating students have mastered not only content but also presentation of that content in forms suitable to their disciplines.

Current Efforts: Many campus departments are adding opportunities for public presentation of the capstone and other research in symposia, poster sessions, and web- and print-publications (see Departmental Undergraduate Education Survey results). As a result, 25% of seniors responding to the Spring 2003 Undergraduate Experience Survey (UCUES) reported having presented research findings at a conference or symposium during the current academic year. During Undergraduate Research Month in April, the campus publishes a calendar of undergraduate research poster sessions, presentations, symposia, and related public events.

8. Continue to coordinate and expand central academic student services supporting undergraduate research.

The campus could continue to expand support for coordinated student services designed to partner with departments to promote undergraduate research. Such support includes funding for student research and travel to conferences / field-study; tracking of campus-wide data on research participation; staffing for academic support functions such as helping students find research mentors and teaching proposal writing skills; and encouraging, publicizing, and coordinating individual departmental efforts to increase campus-wide visibility.

Current Efforts: The Undergraduate Research @ Berkeley website is a virtual gateway to student support services for undergraduate research campus-wide.

9. Evaluate how well departments help students develop research skills as part of regular academic program review.

The program review process could examine how well departments maximize student engagement with the three stages and three dimensions of research.

Current Efforts: Under the Academic Program Review Interim Guidelines, the self study to be submitted by academic units undergoing review includes a new section on undergraduate participation in research. To strengthen this effort, the campus could develop improved assessment tools to enable them to conduct such a self-evaluation.

10. Improve campus-wide mechanisms for tracking participation in undergraduate research, assessing how well we are meeting our objectives for students, and evaluating the impact of such experiences on student learning.

In addition to program reviews that happen infrequently, we need better mechanisms for ongoing evaluation and assessment.

Current Efforts: The Departmental Undergraduate Education Survey conducted in Fall 2001 included a set of questions on undergraduate research and capstone experiences. In addition, the UC System is developing a more effective method for measuring participation in advanced and apprentice undergraduate research courses. Both of these efforts can inform the institutionalization of campus measures to document our progress; however, we need to develop more systematic procedures to assess the impact of capstone courses on student learning.

Essay 2: Reinventing Large-Enrollment Courses

Contexts

Much of the teaching at Berkeley, particularly in the lower division, takes place and will continue to take place in the large-enrollment context. Large courses, enrolling 200 students or more, serve as gateway courses for the major, function as prerequisites for courses in other majors, and include many first-year and transfer students. In 2001-02, 172 courses enrolling 200 students or more were offered, representing three to four percent of all undergraduate primary courses. Seventy-six percent of those courses were taught by ladder-rank faculty, followed by lecturers/instructors (17%), visiting/adjunct faculty (3%), recall/emmeriti faculty (2%), and other (2%). Although the percentage of large-enrollment courses relative to the total number of courses offered is small, the impact on students, particularly first-time students, is significant. In 2001-02, 98% of the entering freshmen class and 72% of entering transfer students took at least one large-enrollment course. On average in their first year, new freshmen took 4.3 and new transfers took 2.7 large enrollment courses. There are as many approaches to teaching such courses as there are Berkeley faculty; however, the vast majority have historically been taught using the lecture format. The traditional lecture will continue to be an important tool for the transmission of information; at the same time, many faculty are exploring alternatives and enhancements to the traditional delivery of instruction. A number of trends are currently prompting a rethinking of large-enrollment courses: institutional and demographic shifts; a body of scholarship on recasting such courses based on what we know about student learning (Gibbs, 1982; Gibbs & Jenkins, 1992; MacGregor et al., 2000; Weimer, 1987); and the availability of new technological tools that can serve pedagogical aims.

Throughout this decade, the University of California is facing significantly increasing enrollment—dubbed Tidal Wave II—in a context of budgetary shortfalls. The UC System is increasing enrollments by 63,000 over the period 1998-2011, with Berkeley being asked to accept 4,000 new FTE. Although the actual campus student-faculty ratio remains relatively stable at 16:1, the budgeted student-faculty ratio for the UC system was raised in the 1990s from 17.6:1 to 18.7:1. The budget climate in California has already resulted in discussions at the state level to increase the ratio further, which would only exacerbate the existing disparities between the campus and peer comparison private universities such as Yale, Princeton, and Stanford that have significantly lower ratios. As undergraduate enrollments expand, the number of qualified Graduate Student Instructors (GSIs) who lead sections of large-enrollment courses is declining, due in part to an increased availability of nonteaching support to keep Berkeley competitive with other institutions. The current ratio of graduate students to undergraduates is 27% to 73%. In comparison, in 2001-02, UCLA had a ratio of 32% to 68%, while Harvard, Stanford, and MIT had significantly higher ratios of approximately 60% to 40%. Faculty have reported difficulty recruiting and retaining highly qualified GSIs, who staff over 2,000 sections each semester. As a result of these factors, accommodating expanded student enrollment will require creativity, resourcefulness, and innovation in the deployment of teaching resources.

In traditional lecture formats, instructors transmit knowledge and students receive information. Research indicates that this model may not always be the most effective way to promote student learning (Gibbs, 1982; Ramsden, 1992). Nationwide, a shift in pedagogy is under way towards what is variously characterized as active or participatory learning or learner-centered education (Weimer, 2002), which has been shown to be more effective in fostering critical thinking, collaborative work, and other key skills. Students who work in groups learn more,

retain knowledge longer, and express greater levels of satisfaction than students working on their own (Bosworth & Hamilton, 1994; Goodsell et al., 1992; Johnson et al., 1991; Millis & Cottell, 1998). An increased emphasis on measuring student learning outcomes, triggered in part by an increased state and national demand for accountability, has accompanied this shift and has also led to increased dialogue and scholarship on the topic of assessment as evidenced by the American Association of Higher Education's annual conference on assessment and work on classroom assessment (Angelo & Cross, 1993) and classroom research (Cross & Steadman, 1996).

The composition of Berkeley's student body has also undergone change. Despite the impact of Proposition 209 on our numbers of underrepresented students, Berkeley's students are becoming more diverse across a variety of dimensions, including cultural backgrounds, socioeconomic level, immigrant status, native language, and background, including preparation for Berkeley. Of Spring 2003 Undergraduate Experience Survey (UCUES) respondents, about two thirds had at least one parent who was born outside the United States, and about half first learned either another language than English or learned English with another language. About a third had combined parental incomes of under \$50,000. High schools and community colleges vary widely in their ability to prepare students for the rigors of the Berkeley academic experience. Many new students are on their own for the first time, and the large-enrollment format that students encounter in a majority of their first-year classes may exacerbate their feelings of isolation. For example, 61% of freshmen surveyed, as compared with 33% of graduating seniors, reported that during the current academic year they had "never" or "rarely" been in a class where the professor knew their name. Similarly, 61% of freshmen, as compared with 34% of graduating seniors, had "never" or "rarely" met with a faculty member in person, such as during office hours. It should be noted that the Freshman Seminar Program, which offers about 100 seminars per semester, is designed explicitly to counteract this isolation by giving small groups of freshmen an opportunity to interact closely with a faculty member. However, large-enrollment courses will continue to be a significant part of the first-year experience.

Improvements in large-enrollment courses may rest on creative uses of technology. Recognizing both the opportunities and the challenges inherent in using technology to enhance pedagogy, the campus initiated an innovative campus-wide dialogue on this topic. The e-Berkeley Symposium: Rethinking Large-Enrollment Courses, New Ideas for Teaching and Learning, which took place in Spring 2003, attracted 120 participants (half of whom were faculty; the rest were staff, administrators, GSIs, and undergraduates). It addressed such issues as developing new course models to build learning communities, assessing student learning, and using technology to minimize the administrative burden of large courses. The success of the symposium (which was featured on the system-wide UC Teaching, Learning, and Technology Center website) has led to calls for future dialogues on other teaching issues. As an outcome of the symposium, participants helped develop a set of recommendations, which informed this essay.

To understand how Berkeley faculty are recasting large-enrollment courses in response to the above trends, the Working Group identified a subset of courses for further investigation. These included courses that had received campus course improvement grants or other campus awards, and courses identified through an informal survey of department chairs conducted as part of the preparation for the e-Berkeley Symposium. In the remainder of this essay, we identify a set of core values derived from these investigations that can inform the delivery of large-enrollment courses, discuss several case examples that exemplify these values, and outline a set of challenges and recommendations that can help us reinvent the way large-enrollment courses are delivered in the future.

Core Values

The Working Group identified the following core values:

- Creating learning communities based on collaborative instruction, active pedagogies, or group projects and assignments.
- Promoting greater instructor-student and student-student interaction, both in the classroom and through the use of online enhancements to the learning environment.
- Increasing students' information literacy, including the ability to recognize when information is needed and to acquire, evaluate, organize, maintain, interpret, and communicate the needed information.
- Encouraging multidisciplinary learning and engaging students in complex problems that draw on multiple fields.
- Developing research competencies that help students build transferable skills in inquiry and critical thinking that will prepare them for capstone experiences.
- Identifying learning objectives and incorporating into courses effective mechanisms for assessing student learning.
- Leveraging technology to increase the effectiveness of large-enrollment courses.
- Recasting the traditional role of the Graduate Student Instructor to improve pedagogical outcomes for undergraduates, strengthen mentorship of GSIs by faculty, and enhance GSI professional development.

Case Examples

We have identified four lower-division gateway courses to serve as case examples. The examples were selected to represent a range of disciplines and because they exemplify several of the campus's core values, as illustrated in Table 1. They demonstrate a range of pedagogical models, including the traditional lecture format, which can be applied to enhance student learning.

Table 1: How case examples reflect our core values for innovative large-enrollment courses

Value	Anthropology 2	Computer Science 3	History 7B	Physics 8A
Learning communities	X	X		X
Instructor-student interaction	X	X	X (GSIs)	X (GSIs)
Information literacy	X		X	
Multidisciplinary learning	X			X
Research competencies	X		X	X
Assessment of student learning	X	X	X	X
Use of technology	X	X		X
New roles for GSIs	X	X		X

Anthropology 2

Overview: Anthropology 2: Introduction to Archaeology combines inquiry-based and participatory learning with a shift in course content and the judicious use of technology to improve student learning of introductory concepts in archaeology. The course, required for

Anthropology majors, explores the ways in which archaeologists work, how they make inferences about past human life, current issues in archaeological interpretation, and the place of ethics and cultural heritage in contemporary archaeology. The course enrolls about 200 students each semester and has an average of 18 discussion sections. The teaching of this course rotates among eight faculty; instructors have the flexibility to select their texts and to design their format, including the use of the weekly sections.

Impetus for Change: For a number of years, some of the faculty teaching Anthropology 2 had expressed dissatisfaction with the traditional lecture format and its passive transmission of knowledge. They wanted to focus the course on in-depth inquiry within the broader context of the field rather than to teach it as a large-scale survey, and they wanted to experiment with making a large lecture course seem small. Since first being offered in its new format in Fall 2001, the course has been the subject of ongoing critique and revision by multiple instructors.

Key Innovations: The traditional section model, 15 students working individually on a variety of exercises, was replaced with a weekly section that serves as a research and production team engaged in inquiry and collaboration about a specific archaeological site. The site chosen is one that reflects the GSI's and/or instructor's research program. The underlying premise is that better learning may be accomplished by in-depth inquiry of a limited knowledge base than by superficial exposure to a broader knowledge base. Course materials and lecture notes are often put on the course website in advance of the lecture, so that the lecture time is used for discussion, rather than presentation, of the material. Each section produces a final group project on its archaeological site, to be presented to the large-enrollment class. Often the sections' production teams work as a group in the large-enrollment setting to respond to issues raised in the web-based lecture materials. The format promotes critical thinking, problem solving, and oral communication because the students' diverse voices, interpretations, and ideas are integral to the project. Because archaeology is an inherently multidisciplinary and collaborative enterprise, the classroom practice provides real exposure to the nature of the practice and production of archaeological knowledge and research.

The model employs innovations related to technology and the use of GSIs. Beginning in Fall 2003, all sections of the course will use multimedia tools (currently about one half do) to support the production teams, drawing on the resources of the Multimedia Authoring Center for Teaching in Anthropology. MACTiA has been recognized through an Educational Initiatives Award in 2001 for its innovative contribution to learning. The GSI is trained to be a coach; students interact closely with their GSIs, who facilitate the work of the production teams and give each team a group grade. The training of GSIs to function in this different role and to grade for group efforts requires more consultation between the faculty member and GSIs. At the same time, administrative workload is reduced. Much section work is now part of the entire class, and the grading of lab exercises, which formerly required a great deal of oversight to ensure consistency across sections, is now replaced by the work of grading the production teams in each section.

Evidence of Effectiveness: Learning objectives for the course include (1) developing the skills to work together collaboratively as a team to solve a problem and produce knowledge; (2) understanding key concepts in anthropology and archaeology; (3) gaining experience in working with primary documents; (4) being able to evaluate research materials in the field of archaeology; and (5) integrating research, visuals and multimedia, and narrative into a coherent presentation that conveys substantive archaeological content and can be shared effectively with others. Students are assessed on the objectives through a midterm, final exam, and several short section assignments at the beginning of the semester and through the team project, which receives a group grade. Examples of student projects are available as CDs, which become part of the course materials for future Anthropology 2 students. The course and instructor are

evaluated at the end of the semester through two forms: the standard departmental evaluation, and a form designed specifically to evaluate the production teams and group presentations.

In the Fall 2001 pilot course, all 197 enrolled students responded to a questionnaire on the newly structured section format. All but one of the respondents thought that the final project worked well and enhanced their understanding of basic concepts and issues. Faculty and GSIs teaching the revised Anthropology 2 have reported that they enjoy teaching this format. In fact, GSIs indicate that the new format saves them time in grading repetitive weekly assignments.

Sustainability/Portability: Direct and indirect resources to revamp this course were provided by the campus, the Anthropology library, MACTiA, and the Class of 1960 Endowed Chair. The department plans to continue the course indefinitely, and it has been further developed during the Summer 2003 Mellon Faculty Institute on Undergraduate Research. Course features that could be adapted for use in other large-enrollment courses include turning sections into group project or collaborative production teams, delivering web-based resources and materials in advance, and using lectures for discussion. Challenges include training GSIs to be effective in the new model and a lack of technology readiness in some classrooms. To ensure high quality of instruction across the sections, faculty meet with GSIs in advance to help them develop a set of resources for each project. A workshop on lesson plans and on different learning styles was also effective in making GSIs aware of pedagogical practices.

Computer Science 3

Overview: Computer Science 3: Introduction to Symbolic Programming uses synchronous laboratory-based technology to increase student-instructor contact and peer-based learning in a class in which computers are integral to the subject matter. A service course, CS 3 introduces students to computer programming, emphasizing symbolic computation and functional programming style, using the Scheme programming language. The course comprises one hour of lecture, one hour of discussion, and five hours of interactive laboratory each week. It typically enrolls 200-300 students each semester.

Impetus for Change: CS 3 had historically been taught in a traditional format with two hours of lecture, one hour of discussion, and two hours of lab per week. A confluence of factors led to the shift to a revised format: Computer Sciences instructors wanted to improve the effectiveness of the course by integrating more active learning and hands-on practice into the course; the department is engaged in a large-scale project to create a database of assignments, exercises, and other materials that instructors at Berkeley and elsewhere can use as raw materials to build computer science courses; and the CITRIS (Center for Information Technology Research for Improving Society) project funded the development of a lab-based CS 3 course that would be exportable to UC Merced when it opens in Fall 2004.

A pilot section of CS 3 that was entirely laboratory based was offered in Summer 2002 with 60 students in three lab sections (Clancy et al., 2003); in Fall 2002, one section of 25 students was offered in the same format as summer with the remainder of students taking the class in the traditional format. In Spring 2003, all students in CS 3 took the new laboratory-based format.

Key Innovations: The interactive laboratory work forms a substantial part of the course. The Graduate Student Instructor serves as a tutor who monitors students' online work synchronously using a system called UC-WISE (Web-based Inquiry Science Environment). This web-based system, developed by the Graduate School of Education and augmented with Learning Management System technology through CITRIS funding, incorporates all the material in the traditional lecture/discussion/lab version of CS 3 while promoting collaborative learning and problem solving. Students engage in the lab work in one physical location at regularly

scheduled times (as opposed to distance learning). They often work collaboratively on web-based activities in pairs or small groups. Activities include online discussions, programming exercises, journal entries, and gated collaborations (opportunities for students to critique peer responses on a seed topic). Lab sessions typically start with a quiz about the previous day's material, and then computer-based exercises lead the students step by step through material. The course has resulted in a higher proportion of supervised online activity, constant monitoring of students with timely tutoring, and a wider variety of activities including collaborations.

The GSI in charge of each lab section interacts daily with individuals and small groups of students, through online responses, in-person consultations, and mini-lectures on topics that a majority of the students are having difficulties with. Instructors receive immediate feedback about how well students understand the material. This course is ideally suited for the web-based format in part because it is computer-intensive and requires a large amount of problem-solving as part of the content of the course.

Evidence of Effectiveness: The course is structured so that students clearly understand the concepts and knowledge they are expected to learn and the tasks they will need to accomplish. Students in the lab sections are evaluated by online activities, quizzes, and tests, and their performance on tasks is monitored in real time by the instructor. As part of the assessment of the pilot study, students who took the final exam in Summer 2002 averaged 32.9 out of 60, as compared to a comparable exam given in an earlier semester in which students averaged 25.8 out of 60. On items that were duplicated between these exams, students in the UC-WISE course did almost 0.5 standard deviations better, on average. Course evaluation ratings for the pilot class were extremely high, and students found the course enjoyable; the majority recommended continuing this format. Students in the current format are doing as well or better than students in the traditional format.

Instructors generally like the revised course, though some faculty feel more comfortable with the lecture format, and some GSIs leading lab sections have been found to need additional training to function effectively in the interactive format. Also, the success of the course depends to a large extent on students learning the material at approximately the same pace, so the instructor needs to work hard to help students who are falling behind, and students who want to go faster may feel frustrated.

Sustainability/Portability: This course is institutionalized in the Computer Science division; the primary obstacle to its continuance is the availability of lab seats when enrollments grow. As an extension of the model, a UC-WISE-based curriculum is being planned for CS 61B: Data Structures, the second course in the lower-division sequence for CS majors, and the Chemistry department has submitted a National Science Foundation proposal to support the use of UC-WISE for one of its courses. Lower-division CS courses are being exported to UC Merced in Fall 2004, supported by the CITRIS project, and in Spring 2003 a version of CS 3 was run through Merced Community College to prepare potential UC Merced transfer students. Efforts are also under way to expand this instructional system to UC Irvine and UC San Diego. This pedagogical approach is potentially applicable to any course with a significant lab component (i.e., most engineering and science courses) or freshman and sophomore mathematics courses that do not use a lab currently but would benefit from online activities. The major challenges for a curriculum author are to break each topic into fine-grained components and to match topics with the various online activities provided in the UC-WISE authoring environment. CS 3 designers have developed substantial experience in these areas and expect to be able to provide assistance to prospective curriculum designers.

History 7B

Overview: History 7B: American Society, 1865 to the Present demonstrates how a large-enrollment course taught in a traditional lecture approach can incorporate innovative research-building skills in collaboration with the Library. This course fulfills the campus American Cultures requirement. One of the most popular courses in the History department, it typically enrolls between 600-725 students each semester, the majority of whom are undeclared majors in Letters and Science. As part of their coursework, students attend a two-hour library instruction session to identify and locate primary resources on a topic of their choice, covering American history from post-Civil War to the present. Each of the 30 sections of the class, led by a GSI, focuses on a different research area, for example, Labor in the Gilded Age, the Red Scare 1870s-1980s, or Berkeley in the 1960s. Library staff provide course-integrated library instruction to most of the sections of History 7B.

Impetus for Change: This course is most closely identified with a single faculty member who has been teaching it since the mid-1960s. He developed its current framework of using primary source research assignments as a key goal of the course to increase students' understanding of how historical knowledge is created and to foster student engagement. The collaboration between the Library and the professor has been ongoing for the past decade.

Key Innovations: One of the primary goals for History 7B is to introduce students to the use of primary source materials early in their academic careers. Students write eight- to ten-page papers based on primary sources, which they have located in one of the campus library collections. In conjunction with course assignments, a series of library course-integrated research worksheets (worksheet one, worksheet two, worksheet three) are designed to help students build necessary library research skills related to the development of their topic. The Library has also developed a special Introduction to Library Research website for History 7B students. Instructional guides about finding Primary Sources and Primary Sources on the Web are also available.

The assignment prepares students to conduct original research by introducing them to the distinction between primary and secondary sources, and showing them how to use special collections libraries, locate primary sources, develop context for primary sources, and then read sources in relation to efforts to interpret the past found in course lectures and assigned readings. In most cases, students will not arrive at original conclusions, but they have been introduced to how historical argument begins with analysis of primary sources. Although many of the students will not go on to become History majors, they have learned valuable research skills and concepts that will be applicable in a wide variety of disciplines and contexts.

Evidence of Effectiveness: While the course and student learning are evaluated using traditional assessment techniques such as exams, the library assignments have been specially evaluated. Some of the learning outcomes for the three library assignments include the ability to (1) differentiate between primary and secondary source materials; (2) differentiate between catalogs, journal article databases, and web search engines and select the appropriate tool for the task; (3) identify and locate appropriate reference sources to obtain background and contextual information for the topic; and (4) translate the topic into constructive strategies for database searching. The effectiveness of the library sessions for student learning has been documented. The Library has conducted pre- and post-tests; for example, in Spring 1999, "[w]hile 51% of History 7B students received passing grades on the library skills pre-test, 90% received passing grades on the post-test, following two hours of library instruction."

The impact of library class sessions is most evident in the product of the student work. The activity drives the learning and is specifically designed for students to demonstrate proficiency in specific learning outcomes. Students have expressed enthusiasm for working with primary sources, as documented in a recent [library newsletter](#). Some important future directions for continuing to improve the library component of the course include integrating assignments better into overall course grade/assessment; working with section instructors as they develop course websites; identifying learning outcomes, including information competencies; and developing and implementing better assessment of the impact of library class sessions on student learning. History 7B students were also among the recipients of the [Library Prize for Undergraduate Research](#) in its inaugural year.

Sustainability/Portability: This course is fully institutionalized. Although the library course-integrated instruction is dependent on the interest of the professor teaching the class for its continuance, it is likely that any instructor taking over such a well-established and longstanding course would continue the format. The materials and expertise developed by the Library for course-integrated instruction in History 7B are often adapted and re-used in other courses and in other disciplines requiring research with primary source materials, in response to individual faculty requests for customized library instruction (e.g., History 101, [History 100AC](#), Women's Studies 100AC). The primary obstacles to extending the model on the scale of History 7B are (1) the availability of staffing in the Library, (2) faculty interest in partnering with the Library, and (3) whether or not targeted courses have sections, which allow for more effective small-group instruction formats.

Physics 8A

Overview: [Physics 8A: Introductory Physics](#) demonstrates how GSIs can become more effective in a skills-based course using active learning and technology. An introduction to forces, kinetics, equilibria, fluids, waves, and heat, this course presents concepts and methodologies for understanding physical phenomena, and is particularly useful preparation for upper-division study in biology and architecture. Eighty percent of students who take Physics 8A are biological science majors or pre-meds and 15% are architecture majors. It enrolls 250-350 students in each of two lecture classes. On average, 18 instructors teach 24 laboratory/discussion sections each semester. As of Spring 2003, all 8A sections were taught in the integrated lab/discussion format described below.

Impetus for Change: Physicists are increasingly recognizing the deficiency of traditional instruction in helping students develop an overall conceptual understanding of physics. Physics 8A has been redesigned to transform it from a fact-based course to a skills-based course, the result of an [evaluation process](#) begun in Fall 2000. A special student survey indicated dissatisfaction with the course, and follow-up focus groups yielded more detailed feedback on course shortcomings. A pilot integrated discussion/laboratory section began in Spring 2001. The redesign of Physics 8A leverages the three years of knowledge and experience the department gained previously when redesigning Physics 7A, 7B, and 7C, introductory Physics courses for engineering and physical science undergraduates. The new version of Physics 8A is designed to help students achieve a stronger mastery of a smaller set of material than the previous version of the course.

Key Innovations: Key to the success of this course is its emphasis on training GSIs to be more effective. In the redesigned Physics 8A, the Physics department devotes more time to teaching GSIs about sound pedagogical practices. GSIs have three training sessions before the beginning of the semester and meet one and one-half hours each week to discuss pedagogy as well as the usual logistical preparation of most GSI meetings. All first-time Physics 8A GSIs are now required to take Physics 300 to teach them the skills and content to serve as GSIs.

The course is composed of three hours of lecture and four hours of active learning activities per week, as opposed to the old version, which had three hours of lecture and one hour of discussion section per week and three hours of lab every other week. While GSIs formerly spent discussion section time working out examples of homework problems on the blackboard for students, the new integrated discussion/lab sections emphasize the importance of students engaging in active learning exercises. Students work in groups of three or four under the guidance of a GSI on assigned exercises. The course's active-learning format helps students work collaboratively to solve problems and increases student engagement. By focusing on skills development rather than the acquisition of facts, Physics 8A improves students' critical thinking and research skills that they will use as they continue in their majors. The new discussion worksheets and lab exercises are designed to encourage students to make connections between the disciplines of physics and biology and to think in interdisciplinary terms. Students also use the CyberTutor web-based system to submit their assignments. The system tells students if the answers to particular problems are incorrect and provides step-by-step guidance until they arrive at correct answers, providing immediate feedback on performance.

Evidence of Effectiveness: In light of the previous course offerings in the new format, learning objectives for Physics 8A are currently under revision to improve student understanding. Students are currently evaluated through the Force Concept Inventory (FCI), a standardized test administered pre- and post-instruction to assess students' gain in conceptual understanding of mechanics, and through departmental exams on which grades are based. Students taking the revised version of Physics 8A have demonstrated a stronger mastery of the course material compared to their predecessors completing the previous version of the course.

In an evaluation of the four Fall 2001 pilot integrated discussion/lab sections, students rated the labs at 5.3 and the discussions at 5.4 in a seven-point scale, compared with 4.8 and 4.0 respectively in the traditional sections. When asked, "How well did lab reports and homework evaluate your learning?" students in the integrated sections reported a mean of 5.1 while students in regular sections reported a mean of 4.5. The final exam grades of students in the integrated section had a mean of 68.2%, which is higher than the mean of 62.7% for the traditional sections. Learning was also evaluated through pre- and post-testing students on the FCI. The mean score increased from 40% to 59% between the testing dates. To better understand the impact of this course on student learning, a more comprehensive evaluation of Physics 8A is under way employing the FCI, a new web-based student survey, and focus groups. While most students have responded positively to the new format, approximately a third of the students in the course report some hesitance to participate in the group-learning exercises, perhaps because they are accustomed to achieving academic success through individual work. A challenge is to develop new ways of engaging reluctant students in these new learning methods.

Sustainability/Portability: Physics 8A is fully institutionalized, and can be taught by any instructor. The primary impediment for this model is inappropriate classroom space in the 1924 physics building. Enormous lab rooms originally designed for classes of 80 are shared by three or four sections meeting simultaneously, and the long fixed tables do not encourage group collaboration. Next, the Physics department will redesign Physics 8B which is an introduction to electricity, magnetism, electromagnetic waves, optics, and modern physics. A redesigned section of the course will be offered for the first time in Fall 2003. In Fall 2004, all students enrolling in Physics 8B will take the revised version of the course. In addition, Physics faculty are discussing the possible use of this model with the College of Chemistry.

Challenges

While each of the case studies reveals unique obstacles, there are some overarching challenges that work against rethinking the large-enrollment course:

- Faculty have limited time to make innovations in their courses, may not have knowledge about options, and may lack both awareness of and access to adequate pedagogical and technological support resources.
- Instructional technology is underutilized by faculty who may be unfamiliar with what is available or may be wary that it will minimize faculty-student contact.
- The traditional lecture / section format is firmly embedded in campus culture, and many faculty link their ability as teachers with their ability to deliver good lectures.
- A reliance on student course evaluations in assessing teaching contributions may work to penalize innovation and experimentation, since faculty who take risks with new methods may be reluctant to do so if one possible outcome is poor student ratings.
- Faculty like to design their own courses, so course innovations can be difficult to sustain over time when teaching assignments for key courses change.
- GSIs need preparation for the new and expanded roles required of them, resulting in a need for more time-consuming mentoring and training.
- Innovations, particularly technology enhancements, may require substantial startup time and significant financial investments.
- We lack campus-wide data about which courses should be targeted for improvement, and we have not developed adequate campus-wide assessment procedures to determine whether revised courses are successful in meeting our overall educational objectives.
- Large-enrollment courses do not always lend themselves to academic skills development, such as research and information literacy skills, needed for more advanced coursework.
- Classrooms are not appropriately configured to support new technologies and pedagogies.

Recommendations

1. Provide incentives and recognition for instructors who experiment with new approaches to teaching large-enrollment courses.

Strategies could include different approaches to measuring teaching workload; course improvement resources and incentives for faculty and departments; teaching awards for innovation and creativity in teaching large-enrollment courses; and recognition of teaching effectiveness and pedagogical innovation in the hiring, tenure, and promotion process.

Current Efforts: Psychology is one department that currently uses a point system for assessing faculty workload: large-enrollment courses are worth more points than seminars.

2. Improve instructor development efforts targeted to large-enrollment courses.

Approaches could include special ongoing workshops and forums for faculty, GSIs, and other instructors teaching large-enrollment courses; a website on large-enrollment courses with access to resources and information about effective practices; creation of mentoring and team-teaching relationships between seasoned and new faculty; better publicity and coordination of existing instructor development efforts; opportunities for peer observation and feedback; and the development of networks for instructors to communicate about pedagogy both within and across disciplines.

Current Efforts: The online resource [Tools for Teaching](#) includes tips on teaching large-enrollment courses. Educational Technology Services' [Profiles](#) website disseminates faculty best practices and features the following model large-enrollment courses: [Digital Chem 1A: Introductory Chemistry](#), [IDS 110: Introduction to Computers](#); and [WS 10: Introduction to Women's Studies](#).

3. Promote GSI development and effectiveness.

Large-enrollment courses could be strengthened by enhancing the professional development of GSIs who teach sections through pedagogical training and mentoring that foster close working relationships with faculty and peers.

Current Efforts: The [GSI Teaching and Resource Center](#) offers an annual three-week Faculty Seminar on Teaching with GSIs and leads workshops for faculty on how to work effectively with GSIs addressing such topics as how to conduct a classroom observation, assisting GSIs in developing a teaching portfolio, and effective grading. The Center also sponsors the Faculty Award for Outstanding Mentorship of GSIs.

4. Foster the creation of learning communities in large-enrollment courses.

Strategies could include office hours that allow for small-group interaction, roles for undergraduates as teaching assistants and peer tutors, moderated chat rooms and listservs, opportunities for peer review of student work, and oral presentations and group work within large class settings.

Current Efforts: The [Astronomy Learning Center](#) is a large, collaborative office hour where students work on their homework assignments in an informal, group setting with GSIs and peers.

5. Institutionalize curricular strategies.

Departments could be encouraged to seek consensus on the content and learning objectives of large gateway courses, as well as the articulation between lower- and upper-division courses, so investments of time and resources in redesigning courses result in long-term payoffs. Wherever possible, course innovations and online instructional resources (learning modules, resources, images, archives) developed by individual faculty could be shared on an institution-wide basis and made accessible to other instructors as appropriate. Opportunities for team teaching and collaboration within and across departments could also be encouraged to foster knowledge transfer and new skill development.

Current Efforts: The [Mathematics Department](#) uses a shared syllabus for Mathematics 1A, 1B, 53, and 54. Lectures delivered by multiple instructors are similar in content. A faculty committee meets periodically to revise course material, often in response to other departments' requests.

6. Improve the acquisition of information literacy and research skills in large-enrollment courses.

The campus could continue to promote instructional materials and assignments that incorporate library research skills (including web-based products), the integration of library research assignments into gateway courses with complementary library instruction, and the assessment of the impact of library class sessions on student learning.

Current Efforts: Library Services for Classroom Instructors is currently available through the Teaching Library.

7. Increase the use of instructional technology and provide appropriate technological support in large-enrollment courses.

Strategies could include making technology tools (e.g., course websites, PowerPoint, and webcasting) more visible and accessible to faculty; providing adequate training; and demonstrating how such tools can improve student engagement, lead to more effective faculty/student/GSI contact, and decrease repetitive tasks such as grading. On-site technical support could be enhanced to assist with on-the-spot troubleshooting in large-enrollment courses, once faculty adopt technological innovations.

Current Efforts: Educational Technology Services offers a range of learning management systems and resources including CourseWeb and Webcast.Berkeley.

8. Streamline systems and reduce administrative burdens.

The campus could identify systems barriers and repetitive, time-consuming administrative functions performed by faculty and GSIs and develop strategies to address these, if appropriate, by using technology, so instructors can spend more time on pedagogy and working with students. These could include online assignments, quizzes, exams, grade books, and other forms of online assessment and course evaluations. Another area to explore is enhancing the capability of the Registrar's systems to reflect the complexity of managing course enrollments, especially during the first few weeks of class.

Current Efforts: The campus is working towards establishing an online grade book as part of CourseWeb. In addition, discussions will be held with the appropriate policy committees to explore ways to better manage course enrollments during the first weeks of class.

9. Continue to improve classroom facilities and technological/physical infrastructure.

The campus needs to upgrade more classrooms to reflect current pedagogical strategies, for example by adding moveable chairs, installing state-of-the-art presentation technologies in some classrooms, and ensuring an appropriate level of instructional technology in all general assignment classrooms.

Current Efforts: The campus has engaged in a long-term, comprehensive effort to improve its 240 general assignment classrooms and equip them with current classroom technology. The Classroom Renovation Program (1994) and the recommendations of the Task Force on Classroom Technology Development (1996) guide the campus's efforts in this area. The Classroom Renovation Program was re-approved in 2001, with a new set of projects approved for 2001-08, and the Technology plan is under discussion and slated for an update. The campus classroom standard now calls for installation of basic instructional technology when new classrooms come online or when there is a major renovation. In the context of severe cuts to the campus's classroom renovation budget, current efforts include attempting to prevent severe deterioration of classrooms during the budget crisis and developing new proposals for funding. Improving the learning environment is one of the priority areas targeted in the current Undergraduate Education Fundraising Initiative.

10. Integrate assessment/evaluation at the course level and institutional level.

On the course level, instructors need to be encouraged to develop student learning objectives and to conduct both formative and summative evaluation of learning outcomes. Learning in sections could be improved by having faculty and GSIs discuss the purpose and function of discussion sections, their relationship to the overall course objectives, and ways to identify and assess desired learning outcomes. On the institutional level, we need to continue to develop criteria to help us evaluate our large-enrollment courses, to identify which ones would benefit from improvement, to determine the effectiveness of changes undertaken, and to decide on the scale of change the campus can support.

Current Efforts: The Department of Chemistry received a National Science Foundation grant in 2001 to develop systematic criterion-referenced assessment for introductory chemistry classes in conjunction with the BEARS project (Berkeley Evaluation and Assessment Research Center) affiliated with the Graduate School of Education. This project, ChemQuery, is designed to carefully measure students' progress based on multiple criteria that are standard, use meaningful numerical expressions, and describe accurately what is happening at a particular point in time.

Essay 3: Enhancing the Culture of Teaching

Contexts

A common conception is that research universities care more about research than they do about teaching. Consequently, it is assumed that undergraduates at such institutions are dissatisfied with the poor quality of instruction that they receive. Contrary to this stereotype, surveys conducted by the campus Office of Student Research over the past two decades have found that Berkeley students consistently rate highly the quality of faculty instruction. The most recent ratings from the Spring 2003 Undergraduate Experience Survey (UCUES) show that 83% of freshmen and 87% of graduating seniors are satisfied or very satisfied with the quality of faculty instruction, and 79% of both groups are satisfied or very satisfied with the quality of GSI instruction. Strikingly, for both freshmen and graduating seniors only two percent and four percent respectively are **very** dissatisfied with the quality of faculty and GSI instruction.

However, the kernel of truth in the common conception may be the extent to which the university actively embraces teaching as a core institutional value and promotes a positive culture of teaching. Such an optimal teaching culture would include supportive institutional policies; opportunities for instruction in pedagogy; ongoing formative and summative evaluation of teaching and teaching programs; assessment of student learning; and a coherent infrastructure that supports teaching, preserves Berkeley's tradition of entrepreneurship, and builds community through collaboration. The culture of teaching is shaped by what happens at the level of each individual instructor, by the climate in departments and colleges, and by the tone and leadership at the institutional level.

In this essay, the Working Group focused on institutional efforts affecting the culture of teaching, because such efforts are more systematic and more likely to have long-term impact, and because they address the spectrum of instructors (from GSIs to ladder-rank faculty). Thus, the Working Group reviewed the many programs on campus that focus on teaching and developed a list of Services, Programs, and Activities to Support and Improve Teaching. The Working Group also compiled Assessing Student Learning: An Informal Inventory of Current Berkeley Practices of strategies, techniques, and approaches currently being used to assess student learning at the course, departmental, and institutional level.

Core Values

Examining the campus's current activities in the context of what it means to teach well and drawing upon the research literature (Bransford et. al., 1999; Brookfield, 1995; Cross, 1990; Hutchings & Shulman, 1999; Schoen, 1983), the Working Group developed a list of core values that guide good teaching at Berkeley, with the goal that these values, once widely disseminated, might in turn shape future efforts to provide a more supportive environment for teaching:

- Teaching and research are not antithetical, but mutually enhancing, forming one of Berkeley's key strengths.
- Teaching and learning are broader than what occurs in the classroom; teaching and learning extend across campus and out into the community.

- Teaching should be responsive to contexts (discipline, subject, class). Some teaching strategies transfer from one discipline to another; other teaching strategies are better developed within a specific discipline.
- Learning to teach is a continuous process of development, including experimentation, ongoing practice, reflection, peer conversations, and assessment; to take place effectively, this process needs to be supported by appropriate programs and an infrastructure of communication and collaboration across departments, colleges, and programs throughout the campus.
- Learning is multidirectional and reciprocal; students learn from their teachers, from their peers, from course materials, and academic support services.
- Teaching requires multiple forms and levels of evaluation (including assessing the teacher's teaching and the students' learning).
- Teaching is strengthened by peer collaboration and review, collegial exchange, and communities of discourse.
- Berkeley's decentralized, entrepreneurial teaching culture, in which programs can be developed to meet specific needs, is important, but so is stable support, ongoing communication, and enhanced visibility so that the campus community knows about and can learn from the array of programs, policies, and services.
- Teaching is enriched by Berkeley's diversity of perspectives, approaches, ideas, and experiences, enhancing the intellectual vitality of the campus.

Case Examples

Berkeley's entrepreneurial culture has resulted in many noteworthy initiatives. These programs vary in terms of audience, range, scope, intensity, and impact in improving teaching and the climate for teaching. Collectively, these hubs of excellence show that a variety of efforts, rather than a single centralized approach, can best meet the needs of a large and complex institution. The Working Group believes that Berkeley's decentralized, entrepreneurial teaching culture is appropriate as long as there are systematic *horizontal* connections (communication across the hubs) and a solid *vertical* anchor (a supportive infrastructure and common principles that encourage and enhance the varied hubs). The campus has made strides in the past decade in developing a culture that encourages teaching with excellence.

To illustrate the effectiveness of Berkeley's approaches to improving teaching, the Working Group selected four programs to serve as case studies. These programs were selected because they

- exemplify many of our core values;
- have been in place for about a decade and so represent mature programs for which evaluation data are available;
- represent Berkeley's varied approaches to instructional development, each showing a unique aspect of pedagogy;
- affect large numbers of students; and
- serve as models that have been replicated either on campus or at other universities.

These case studies are the Berkeley Language Center, the Center for the Teaching and Study of American Cultures, the Graduate Student Instructor (GSI) Teaching and Resource Center, and the Service-Learning Research and Development Center.

The Berkeley Language Center

Overview: The Berkeley Language Center (BLC) is a comprehensive discipline-specific program that fosters the intellectual and professional development of instructors teaching foreign languages. Established in 1994 to improve and strengthen foreign language instruction on campus, it supports all language teachers by disseminating information on language instruction and related topics, facilitating the use of technology for language instruction, and assisting lecturers and GSIs to develop their foreign language teaching skills. Its particular focus is on Unit 18 lecturers; the BLC has promoted the effectiveness and professional development of this group of instructors, and has enhanced communication across all levels of instructors teaching foreign languages.

Programs: The BLC supports quality teaching in foreign languages through a lecture series in which prominent scholars in applied linguistics and second-language acquisition speak on various topics; a fellowship program in which lecturers and graduate students develop research projects to enhance language teaching on campus; teaching portfolio development workshops; a monthly language coordinators forum to discuss pedagogical issues and recent second-language acquisition scholarship; funding for lecturers to attend conferences on teaching; a newsletter; a professional library; and other initiatives. Many of these programs were developed as a direct result of a 1997 survey (Van Deusen-Scholl et al., 1999) of language-teaching lecturers, and the BLC has continued to adapt its programs to improve its educational effectiveness as the needs of departments, instructors, and students change.

Number of Participants: The BLC is open to all ladder-rank faculty, lecturers, and GSIs involved in language instruction on campus, with lecturers as the specific target audience. About 60-70 participants attend each lecture in the series; in Spring 2003, six lectures and one daylong conference were offered. About 15 language faculty regularly participate in the monthly forums for coordinators. The portfolio workshops have attracted about four to five participants per session. In all, the BLC reaches about 95% of the approximately 60 language lecturers on campus through one or more of its services and programs. Since the BLC began, 44 lecturers and GSIs have participated in the fellowship program (resulting in 47 publications), and 53 lecturers have received funding to present at and attend approximately 45 professional meetings of language instructors.

Evidence of Effectiveness: The BLC assesses its effectiveness through a variety of strategies. Workshops are evaluated by the participants, and the lecture series' ongoing high attendance indicates a successful program. Instructors receiving fellowships present the results of their research projects to the foreign language community at the end of each semester and write a report for the BLC newsletter; conference attendees who do not give a paper write a report on the conference for the newsletter. Periodically, all foreign language instructors are surveyed and the data are used to assess the effectiveness of BLC programs and to identify preferences for future activities. The most recent survey, administered in 1997, indicates that the BLC has increased lecturer engagement and has fostered a sense of community among peers. All BLC fellows are asked to respond to a survey which seeks feedback on their fellowship experience and the impact on the department and their professional development.

Student learning is assessed by each individual instructor and by the foreign language department as a whole. Final exams typically include both a written and oral component. Beyond individual student self-reports, several departments make use of proficiency exams. As a result of the Conference on the Oral Proficiency Interview and individual BLC Fellowships, a number of departments have implemented programs to assess student learning across the undergraduate curriculum. For example, the Russian program requires students to take standardized reading, listening, and grammar/lexicon tests of Russian each of the first four

semesters, and work is being done to extend this to upper-division courses. Other departments have begun assessing student progress (Italian, Arabic, French). Sixteen foreign language departments have a common exam for multiple sections. None of the foreign language departments administers a standardized test to graduating seniors.

Relation to Core Values: The BLC is an example of how a program can evolve from the bottom up (von Hoene & Van Deusen-Scholl, 2001) to meet common needs identified across departments programs. The Center reflects and encourages Berkeley's diversity of perspectives by bringing together scholars in the field of applied linguistics, social linguistics, and language pedagogy, fields of research that have no formal administrative presence on campus, yet which are crucial for an understanding of how language is acquired, and therefore, how language should be taught. BLC Fellowships encourage lecturers and graduate students to carry on research on language teaching and learning, which may include teaching materials development, curricular development, and theory.

Impact of the Model: The BLC has had an intellectual and pedagogical impact on foreign language instruction. For example, as a result of BLC activities, the German department has revised its curriculum, and the French, Russian, and Asian language departments have developed new strategies for assessing student proficiency. The BLC has collaborated with other UC campuses in the development of the UC Consortium on Foreign Language Teaching, thus strengthening foreign language teaching system-wide.

Future Directions: The BLC intends to work on improving communication among language coordinators by creating a listserv for sharing ideas and problems, and by inviting all lecturers to some of the monthly meetings of coordinators. In addition, to improve coordination with academic departments, the BLC Director is planning to have more informal meetings with department chairs to inform and solicit feedback on BLC activities. The BLC also intends to increase efforts at external fundraising to supplement its technology budget.

The Center for the Teaching and Study of American Cultures

Overview: The Center for the Teaching and Study of American Cultures is an interdisciplinary effort that integrates teaching and research. It was established in 1989 when the Academic Senate adopted the American Cultures breadth requirement for all undergraduates, effective Fall 1991. The requirement stipulates that all Berkeley undergraduates pass a class that covers the complexities of racial, ethnic, and cultural pluralism as they have shaped the United States. The Center's purpose is to support ladder-rank faculty, lecturers, and GSIs to develop and teach American Cultures courses, which are approved by a Faculty Senate Committee. The Center was a recipient of the 1994 Theodore M. Hesburgh Faculty Development Award (Honorable Mention) and the 1996 Educational Initiatives Award.

Programs: The primary activity of the Center is an intensive summer seminar for which instructors receive fellowships. During the summer seminars, faculty design, discuss, and present their American Cultures courses. A Teaching Librarian works closely with the fellows. As a follow-up to the summer seminar, participants teaching American Cultures classes meet twice each semester (near the beginning and near the end) to discuss their teaching experiences—pedagogy, assignments, classroom environment, sensitive topics, and the like. In addition, regular luncheon meetings are held throughout the year for American Cultures summer seminar fellows (and other interested parties) to hear guest speakers and/or to present their research and teaching results. These activities offer an opportunity for faculty to participate in interdisciplinary and pedagogical discussions. The Center also offers a Community College Summer Seminar so that community college instructors can develop American Cultures courses

transferable to Berkeley. The American Cultures website lists all American Cultures courses on campus each semester as a resource to students.

Number of Participants: In 2002-03, the campus offered 113 American Cultures courses enrolling 9,668 students. Forty-one percent of the instructors for those courses have attended an American Cultures summer seminar. About 15-20 faculty a year participate in the summer seminar; since the program began in 1990, 188 faculty from 49 departments or programs have attended a summer seminar. Since Fall 1991, graduates of the summer seminar have taught 613 courses, enrolling 58,526 students (57% of the total American Cultures enrollment).

Evidence of Effectiveness: The summer seminar is regularly evaluated by the participants through an open-ended questionnaire. Data from 2002 show that participants valued their experiences and developed detailed content knowledge and new pedagogical skills. In Fall 2002, all past participants still on campus were surveyed to identify the long-term effects of the summer seminar (N=139). Response rates were low: surveys were returned by 30 faculty for a 22% response rate. Over 90% of the respondents found the Center to be helpful or very helpful in helping them prepare and teach their class; about 87% would teach an American Cultures class again; 50% felt that their participation in the summer seminar or experiences teaching an American Cultures course significantly or very significantly affected their pedagogy in other courses; and 52% felt that their department had been significantly or very significantly affected by their teaching an American Cultures course. In terms of student learning, the Center has collected evaluations (totaling about 25,000) from students taking American Cultures classes since 1991; these data are currently being analyzed.

Relation to Core Values: The Center is an example of the interrelationship of research and teaching. The Center both studies and exemplifies diversity (of perspective, discipline, culture). It becomes a nexus for developing teaching skills contextually as well as critical thinking about the boundaries of disciplines and shapes of cultural assumptions. Finally, the Center's teaching extends throughout the university and out to community colleges.

Impact of the Model: The model of the Center's summer seminar has been used to develop the new Mellon Faculty Institute on Undergraduate Research, which was piloted in Summer 2003.

Future Directions: The Center must continue to increase the aggregate number of seats in American Cultures courses in proportion to growing undergraduate enrollment. This will require attracting and recruiting new faculty members to teach American Cultures courses, and more importantly, institutionalizing such courses within undergraduate major programs. The campus needs to both consolidate its base of American Cultures courses in the humanities and social sciences, and also to find ways to expand such offerings in the science and engineering disciplines and professional schools. It also needs better assessment mechanisms to evaluate the educational impact of the American Cultures requirement on students' understanding of race and ethnicity in American history, society, or culture and on their liberal arts education at Berkeley. In 2002-03, the Center was evaluated as part of the regular review of the units of the Division of Undergraduate Education. The report outlines recommendations for the future. In June 2003, the campus convened a Faculty Roundtable on the Future of the American Cultures Requirement. The group was charged to examine strategies for expanding the presence of American Cultures in the sciences, the possible redefinition of qualifying minority categories in light of developments in scholarship, and the possibility of building an international dimension into the requirement.

The Graduate Student Instructor (GSI) Teaching and Resource Center

Overview: The Graduate Student Instructor (GSI) Teaching and Resource Center prepares GSIs for the teaching they will do at Berkeley and in their future careers. The Center was established in 1989 at a time when research universities in the United States were beginning to focus on the training of teaching assistants and the preparation of future faculty. Through a variety of programs, the Center works with graduate students, faculty who teach with GSIs, and departments in their development of discipline-specific pedagogical seminars for GSIs.

Programs: The Center offers a full spectrum of professional development programs that include fall and spring orientation conferences; a series of pedagogical workshops throughout the semester; a four-part workshop series specifically devoted to the development of teaching portfolios; semester-long working groups on specific pedagogical topics such as the scholarship of teaching, the impact of discussion sections on student engagement, and the integration of research into undergraduate teaching; a three-afternoon seminar for faculty on providing mentorship to GSIs; classroom videotaping and observation; grants and consultation for departments to develop discipline-specific pedagogy seminars for GSIs; and award programs for GSIs and faculty mentors of GSIs. The Center is also taking the lead in the Summer Institute for Academic and Professional Development, which will prepare future faculty and create a network of communication among Bay Area institutions of higher education across the Carnegie classifications.

Number of Participants: About 1,600 graduate students serve as GSIs each semester. Training is offered centrally through the Center and through departmental 300-level seminars. About half of the 1,000 new GSIs each year participate in the fall or spring orientation before their first semester teaching, 250 take part in the workshop series, 15 receive course improvement grants, and 15 participate each semester in the Center's working groups. The Center has assisted half of the departments on campus in setting up 300-level seminars (sample syllabus) and provides grants and consultation to faculty who teach those seminars. Each year approximately 200 GSIs receive the Center's Outstanding GSI Award upon nomination by their department. Since 1992, 177 GSIs have been recognized for their teaching effectiveness through the Center's Teaching Effectiveness Award program, which generates essays that are shared with the campus community describing best practices by GSIs. The Center offers a three-afternoon seminar for 10-15 faculty each year on how to work effectively with GSIs. Since 1994, 165 faculty have participated in the seminar, including those who teach some of the largest gateway courses on campus (e.g., History 7, Biology 1B, Mathematics 1A/1B, Chemistry 1 and 3, Physics 7, Nutritional Sciences 10).

Evidence of Effectiveness: All of the Center's programs are evaluated by the participants, and the data are used to make programmatic adjustments. For the orientations, GSIs report feeling more prepared to teach as a result of discussing specific teaching techniques and exchanging ideas with other GSIs. The portfolio workshops are especially valued for providing GSIs with the opportunity to reflect critically on their teaching—what they do well and what they need to improve—as well as to prepare for the academic job market. Student evaluations of 300-level pedagogy seminars attest to their effectiveness: in Integrative Biology 303, for example, the students rated most highly the value of this course “in developing a peer network to support you in future teaching endeavors,” “in introducing new ideas and/or teaching methods,” and “in providing information about resources available to you as a teacher (both practical and pedagogical).”

The Faculty Seminar on Teaching with GSIs program has been particularly effective. An in-depth survey (von Hoene & Mintz, 2000) of a sample of faculty (N=31) who had attended the seminars since their inception in 1994 indicated that, as a result of their participation, 66% had

made “significant changes in the content of their weekly meetings with GSIs”; 39% stated that “the frequency of meetings [with GSIs] had increased”; about 50% stated that they had “become more involved in issues of GSI assessment”; 42% stated that they “now welcome greater collaboration in course design.”

In terms of student learning, GSIs who participate in the Center's programs routinely undertake formative mid-term assessments and administer an end-of-course questionnaire to their students. Results from the Center's 2001-02 working group on the impact of discussion sections on student engagement and motivation indicated that the learning environment in GSI-taught sections had been enhanced through ongoing classroom research and the creation of reflective feedback loops using classroom assessment techniques.

Relation to Core Values: The Center addresses specific needs of GSIs at different stages of development. To foster this development, the Center's programs provide the opportunity for graduate students and faculty from across the campus to learn from one another by examining the assumptions and practices that characterize teaching and learning in their respective disciplines. The programs of the Center view both research and teaching as sites of critical inquiry, assessment, and revision.

Impact of the Model: Some of the Center's techniques have been adapted for use with undergraduate facilitators for student-initiated courses. In response to recommendations by the Special Studies Working Group on the oversight and teaching of undergraduate student-initiated courses, workshops on effective teaching are offered by the Student Learning Center, and a credit-bearing course began in January 2003. The Center's teaching portfolio workshop series has also been adapted for use by the Berkeley Language Center.

Future Directions: In July 2002, a Task Force on Graduate Student Instructor Training and Mentoring was charged to review relevant policies and practices and make recommendations for changes needed to develop more consistent campus-wide standards for oversight, mentoring, and training of GSIs. This work resulted in a revised Policy on Appointments and Mentorship of Graduate Student Instructors that will require each department to offer a 300-level pedagogy seminar for new GSIs. The Center will play a key role in implementing this policy, offering workshops on developing these courses and bringing faculty from across disciplines together to share best practices. The Center is also developing a short online course on professional standards and ethics that is required for all new GSIs under the new policy.

The Service-Learning Research and Development Center

Overview: The Service-Learning Research and Development Center was established in 1994 to promote community service opportunities within discipline-specific academic coursework. Service-learning allows students to apply theories to practical situations, thereby increasing their understanding of the academic material, as well as enabling students to provide service to the local community. The Center houses both a development unit, which advances service-learning courses on the Berkeley campus, and a research unit that has completed more than 30 national, state, and local investigations on a variety of issues related to service-learning activities in higher education, teacher education, and K-12 education.

Programs: The Center's development unit offers a variety of services and information to encourage and assist faculty in integrating service-learning into their courses. Programs include (1) the Junior Faculty Mentorship Program, (2) the service-learning faculty development workshop series, (3) instructional mini-grants to help faculty develop service-learning courses, (4) the Chancellor's Faculty Award for Service-Learning, (5) the Community Speakers Fund for community agency representatives who work directly with an academic service-learning course,

and (6) service-learning curriculum development and student assessment assistance. The Center's website lists for students all courses incorporating service-learning on campus, and provides resources, evaluation tools, and names of publications to assist faculty.

Number of Participants: Since its establishment in 1994, the Center has documented the growth and development of service-learning on campus. From 1994 through 1999, the number of service-learning courses rose substantially from 14 courses during the 1994-95 academic year to 141 courses offered during the 1998-99 academic year. Since 1999, the number of service-learning courses has remained steady at approximately 140 courses per year. These courses encompass the three distinct forms of service-learning (service-based internship, co-curricular service-learning, and academic service-learning) defined by the Faculty Policy Committee on Service-Learning in 2002. On average, the 140 service-learning courses offered each year involve approximately 100 ladder-rank faculty members from 40 departments who develop a variety of community-based service-learning experiences for about 2,200 students. The most current data reveal that in Spring 2003, 79 undergraduate service-learning courses were offered in 17 departments enrolling about 1,300 students.

Evidence of Effectiveness: Each year, the research staff at the Center works with faculty to develop assessment tools that meet the needs of individual courses and collect and analyze data about the outcomes of service-learning on students, faculty, and the community. Data are collected from attitudinal survey questionnaires, portfolio assessments, and focus group interviews. Data from a battery of surveys (1995-2001) of service-learning students' (N=2,805) attitudes towards academic content, self, the community, and community service reveal that students who participate in service-learning activities have statistically significant ($p=.05$) more positive attitudes towards their course content, themselves, and the community than students (N=1,682) who elected not to participate in the service-learning component of the courses. Student attitudes towards performing community service have shown differences between service-learning and non-service-learning students. Most of the data currently available are based primarily on student self-reports, although faculty, through anecdotes and in formal interviews, generally report higher content learning among service-learning students. Overall, more comprehensive data are needed from service-learning and non-service-learning participants to draw firmer conclusions about the effectiveness of the campus's service-learning activities. Efforts are under way to develop a systematic approach to studying the effectiveness of service-learning on the campus.

Relation to Core Principles: The Center works to integrate academic coursework at Berkeley with the larger community, benefiting undergraduate learning by helping students draw connections between their classes and the society around them. The Center also works to advance the civic purposes of the campus by integrating community service and public outreach, typically separate functions of the academy, into the teaching function of the university. It promotes research on the benefits of instructors using service-learning in their classes, provides a stable support structure that crosses departmental lines, and assists instructors throughout their development as teachers.

Impact of the Model: The Center is unusual among campus-based service-learning centers, which typically are housed in student affairs units rather than academic units. The Center is the nation's first university-based research center to focus its research exclusively on service-learning, and today it remains the nation's only university-based center to focus its research on service-learning across all sectors of education (K-12 education, teacher education, and higher education). In 2001, the Center inaugurated and served as host to the First Annual International Conference on Service-Learning Research.

Future Directions: The major challenge facing the Center is to further its institutionalization within the Berkeley campus. The Center is currently funded through a combination of extramural grant funding and in-kind support from the Graduate School of Education. The development unit of the Service-Learning Center is guided by the Faculty Policy Committee on Service-Learning, an ad hoc committee that reports to the Chancellor; however, the unit currently does not receive central campus support for its development efforts. The Committee is currently exploring alternative organizational structures that could permit the Center to continue and to expand its efforts.

Challenges

These case studies demonstrate how successful teaching support programs can evolve within Berkeley's decentralized culture. However, they have yet to reach their full potential, and to engage the majority of instructors rather than the minority. In addition to trying to determine ways to engage larger numbers of faculty in instructional improvement efforts, the Working Group identified the following challenges facing Berkeley:

- While we have a variety of programs devoted to supporting and enhancing teaching, they are disparate, not well-publicized, and don't successfully counter the impression that the campus does not do much to promote good teaching.
- Communication across programs that address teaching is often lacking. Sometimes programs don't know other efforts exist, making it difficult to learn from one another. An additional drawback in such decentralization is the possibility of duplication of effort.
- There are no systematic incentives, mechanisms, or strategies to encourage collaborations across programs.
- Assessment of student learning is not widespread.
- Without comprehensive or common evaluation procedures across programs, it is difficult to make global statements about the overall nature of the teaching culture or the overall impact of programs on teaching effectiveness and student learning.

Recommendations

To address the challenges listed above, the campus has several initiatives under consideration or development, a few of which are summarized below. Here the Working Group identifies recommendations to help move the campus to the optimal culture of teaching.

1. Improve overall communication among programs and strengthen the infrastructure.

We want to continue to draw horizontal connections among existing hubs of teaching excellence and enhance our infrastructure, which forms the vertical anchor that supports a culture of teaching with excellence.

Current Efforts: One promising effort to address this recommendation is the formation of the Council of Academic Partners, a consortium of campus units that encourage, support, and enhance excellence in teaching and collaborate on joint projects.

2. Increase the visibility of programs that promote good teaching and faculty's innovative teaching practices.

The campus has traditionally disseminated information about new research findings based on faculty work. We want to give similar attention to teaching accomplishments.

Current Efforts: The Teaching Resources page on the Berkeley home page has been newly revised to help faculty and other instructors locate the full range of campus-wide teaching resources available to them. Efforts are also under way to highlight teaching innovation through the Berkeley NewsCenter and campus faculty / staff newspaper The Berkeleyan. Some noteworthy articles from Spring 2003 include a feature on a popular physics course for nonmajors, Physics for Future Presidents, and a profile of efforts to improve student learning in the large-enrollment course Psychology 1 undertaken by the seventh faculty Presidential Chair in Undergraduate Education.

3. Continue supportive policy changes.

Policy changes strengthen Berkeley's ability to support teaching and reinforce its importance on campus.

Current Efforts: Recent policy changes include the revised Policy on Appointments and Mentoring of Graduate Student Instructors and the Academic Senate's modification of the bio-bibliography—in which faculty annually report their teaching, research, publication, and service accomplishments for use in tenure, merit, and promotion review—to give greater prominence to teaching.

4. Make the assessment of student learning more central to the culture of teaching.

The campus has little systematic data on student learning outcomes, and we are looking at ways to assess student learning better, building on the research literature (Astin, 1993; Pascarella & Terenzini, 1991) and taking the Berkeley context into account.

Current Efforts: The Academic Senate Committee on Teaching is currently reviewing all course evaluation forms campus-wide as a first step towards a more systematic examination of how teaching and learning are assessed. Also, we have initiated discussions about student learning outcomes and assessment with two major faculty groups: the recipients of the Distinguished Teaching Award and instructors of large-enrollment courses.

5. Improve record keeping, data collection, and evaluation procedures across programs.

Gathering descriptive statistics (how many people participate in which kinds of programs) has been difficult. We also need to improve and to better coordinate Berkeley's many institutional data systems to bring about better and more consistent evaluation procedures.

Current Efforts: The campus is developing an improved data system for reporting course and instructor activities.

6. Seek and make more prominent extramural grant funding for teaching and learning.

While the campus has received grants for improving instruction, these typically are not as well publicized as grants for research. A central site such as a website featuring grants on teaching, improved communication among faculty developing and writing grant proposals to improve teaching and learning, and publicity on instructors who have received these grants could encourage more faculty to seek extramural opportunities.

Current Efforts: Discussions are under way to highlight extramural teaching and learning grants on the NewsCenter web page, to work with the Sponsored Projects Office to make faculty more aware of extramural grants for teaching and learning, and to develop ways to bring together faculty across disciplines to seek extramural funds. As an example of the campus's efforts to actively seek more grants in this area, in Spring 2003 Berkeley received a

Hewlett Packard Applied Mobile Technology Solutions in Learning Environments grant, which provides funds and equipment to demonstrate how nearly ubiquitous connectivity affects student use of online course resources and collaboration tools. The grant expands wireless internet access to most of the campus and targets new pedagogies developed for students in Anthropology 2, Chemistry 1A, and Statistics 21, which enroll over 5,000 students annually.

7. Target new faculty for teaching improvement efforts.

We want to introduce our new faculty to Berkeley's teaching culture and make sure they have the resources and support they need to develop a firm foundation of teaching excellence.

Current Efforts: The Distinguished Teacher Mentorship Program, begun Spring 2003, pairs new assistant professors with recipients of the Distinguished Teaching Award. A newly launched President's Chair Fellowship Program offers ladder-rank Senate faculty an opportunity to participate in a one-year series of workshops and seminars focused on teaching and learning, and new faculty have been especially encouraged to apply. Thirteen faculty have been selected to participate in 2003-04.

Essay 4: Improving Academic Program Review

Contexts

One of the most important institutional mechanisms for assessing progress at the departmental level is the academic program review process. This is a faculty-driven process, in which the Academic Senate's Graduate Council has taken the lead role, with administrative support from the Graduate Division, while the Committee on Educational Policy has had a more minor role. This structural framework has produced a primary focus on departmental research and graduate programs, with less attention to undergraduate education and teaching. At the time we launched our accreditation self-study, a re-examination of this program review process was already under way. As described in the Program Review Essay in the Preparatory Review Report, the campus had identified two key areas requiring attention: (1) a need to develop clearer guidelines for the review of undergraduate programs and to create more integration between undergraduate and graduate program review; and (2) a need to remedy the protracted and burdensome timeline and administrative structure for academic program review and to provide improved support for departments undergoing review, especially around the delivery and analysis of data. The campus recognized that the accreditation self-study effort could help further these objectives, particularly with regard to the development of new criteria for evaluating undergraduate programs.

Since the submission of our first self-study report, the campus has made progress in addressing these issues. In Fall 2002, an Academic Program Review Working Group with administration and Academic Senate representation was convened. It was charged to develop a new, more centralized organizational structure and protocol for conducting academic program reviews in accordance with principles put forward by the Academic Senate. Until the Academic Program Review Working Group completes its work and new procedures are established, reviewed, and endorsed by the Academic Senate, Interim Guidelines are in effect. Under the interim process, several changes were instituted to bring the review process into better alignment with the Academic Senate Principles for Revising the Academic Program Review Process issued in Spring 2002. These changes included (1) eliminating the dual external/internal review committee structure, (2) adding an Academic Senate representative to the external review committee, and (3) making the Academic Senate discussion meetings optional.

In conjunction with the development of an interim process, new criteria were established for evaluating undergraduate programs in such areas as advising, academic enrichment opportunities, and integration of transfer students, which had not been explicitly addressed as part of the old review process. These new criteria were based on practices at peer institutions and the research literature on program review (Conrad & Wilson, 2000; Fox & Hackerman, 2003; Kuh, 1999; Wergin & Swingen, 2000). The new criteria asked departments to examine their discipline-specific learning objectives and learning outcomes for their students as part of their self-study process. To better support departments in evaluating their undergraduate programs, relevant statistical data were also provided. A significant new data element was the development of an undergraduate survey instrument, which was piloted with the Women's Studies department as described below. Two reviews were begun in 2002-03 under the interim process, and have already had their external site visits—one is a department with both a graduate and undergraduate program (Physics) and one is a department with an undergraduate program only (Women's Studies). Four more reviews have been launched under this interim

process and will have site visits in 2003-04. In addition, four reviews were completed in 2002-03 under the old process.

In the remainder of this essay, we describe the core values that inform the restructuring of the academic program review process; a pilot undergraduate program review conducted under Interim Guidelines; and the recommendations of the Academic Program Review Working Group for institutionalizing permanent changes to the academic program review process.

Core Values

The Academic Program Review Working Group has agreed on the following overarching goals to inform the development of permanent procedures:

- Maintaining a review process that is faculty-driven.
- Developing the potential of the program review process to promote key campus objectives within a decentralized organizational culture.
- Creating a structure for the departmental self-study that is flexible and responsive to the individual needs of the department undertaking self-investigation.
- Reaffirming the importance of statistical data in developing unit self-studies and providing better centralized support to departments in preparation and interpretation of such data.
- Assuring that units address student learning outcomes in discipline-specific ways.
- Creating better integration between external and internal reviews.
- Maintaining a program review process that is distinct from professional or specialized accreditation.
- Making the Dean's role in program review more prominent, especially as a means of promoting departmental follow-up and accountability.

In the case study that follows, we examine the pilot academic program review of the Women's Studies Department, which was conducted under Interim Guidelines and was designed to help finalize procedures and criteria that could be applied subsequently to all academic program reviews.

Academic Program Review Pilot

Women's Studies Review Process

Overview: The pilot process was designed to lead to a more meaningful and productive self-study and review process. Specifically, it was designed to (1) develop a more useful set of questions and criteria for evaluating undergraduate education to guide both the departmental self-study and the committee's charge; (2) get better information and data analyses to both the department and the review committee to help them evaluate undergraduate education, including survey data from undergraduates; and (3) create a more effective joint structure for internal and external program review. Women's Studies is the only department on campus without a full-scale graduate program, and it had not been formally reviewed since its establishment.

Evaluation Criteria: The Academic Senate Committee on Educational Policy and the Vice Provost for Undergraduate Education worked jointly to develop a new set of criteria for the evaluation of undergraduate programs. The resulting criteria were incorporated into the department's self-study outline, the review committee charge letter, and issues to the committee. The departmental self-study outline was designed to be flexible to maximize the opportunity

for the departmental review to produce meaningful and productive results. However, the new outline did provide a structured format for the department to address a number of issues deemed critical to the evaluation of the undergraduate program, including (1) the department's learning objectives and outcomes for majors, (2) curricular and co-curricular enhancements to the undergraduate curriculum, and (3) evaluation of the quality of teaching and advising. The charge letter to the committee also highlighted the special nature of the review and the focus on student learning.

Data Appendices: To help ensure the success of the pilot process, data were provided centrally to decrease department workload associated with the development of the self-study. The data set included information on faculty, staff, and departmental resources; the undergraduate program (e.g., data on undergraduate majors, gender and ethnicity, freshmen vs. transfers, the proportion of double majors, trends for declared majors, time to degree data, and career destination survey data); the curriculum (e.g., course enrollment information by course type and majors vs. nonmajors); and faculty workload. The data package was prefaced by a summary analysis that highlighted areas of potential interest and key trends for the department and review committee to consider. In addition, a pilot survey of majors and prospective majors was designed, administered, and analyzed as part of the review. The survey instrument included questions on how students decided to become majors; academic engagement indicators; and ratings of departmental practices and policies, the quality of the curriculum, self progress in key areas, and satisfaction with the major. All of these data components were included in a set of appendices provided to the department to support the preparation of its self-study and to the academic program review committee to aid in the development of its final report.

Joint External/Internal Review Committee: The Women's Studies review also provided an opportunity to pilot a more effective joint structure for conducting academic program reviews. Under the old process, a campus review committee and an external review committee conducted separate meetings and submitted two separate reports. For the Women's Studies pilot review, the campus convened a single academic program review committee, with two external members and an internal member appointed by the Academic Senate.

Women's Studies Review Effectiveness

Overview: The site visit for the review took place on April 9-11, 2003. We are able to make some preliminary observations about the effectiveness of the review process, which is not yet complete. These observations are based on (1) a review of the content of the departmental self-study, (2) the review committee's comments at the exit interview, (3) a review of the final report of the review committee, and (4) an e-mail survey of both campus and external review participants requesting feedback on the review process.

Productiveness of Review Process: Overall, the review process appears to have yielded productive and meaningful results. The review committee was able to gain a good understanding of the department by reading the self-study, examining the data appendices, and conducting on-campus interviews. Its final report made a series of recommendations designed to capitalize on the department's existing strengths and to help it realize its vision. The department also found the review process to be worthwhile. The department chair praised the "extraordinarily helpful report" which "will help us take and keep our bearings for many years." The incoming chair for 2003-04 wrote: "Thanks . . . for helping us—finally! move on with the external review of [Women's Studies]. What a shot in the arm! With our new faculty coming in and a vision . . . we've now got very high morale and forward momentum."

Evaluation of the Undergraduate Curriculum: As part of the pilot process, assessment of the undergraduate program was intended to be a major focus. In practice, the results were mixed.

The departmental self-study underlined the importance of undertaking a review of the undergraduate curriculum, noting that “courses for this major have not been changed in the last decade.” However, because of a combination of sabbatical leaves and new faculty hires not yet in residence, the department argued that “the process of reviewing the curriculum and making recommendations for its alteration cannot take place during this time or through this vehicle [of the program review self-study].” The review committee devoted a significant portion of its final report to the undergraduate major. It concurred with the department that the curriculum is in need of “restructuring and revitalization in order to realize the mission the self-study articulates” but urged that “curricular reform” be a “major departmental priority next year.” In the fall, the Committee on Educational Policy will take the lead for the Senate to evaluate whether Women’s Studies has made sufficient progress in revamping its undergraduate program and to recommend action steps.

Data Utilization: The new data elements were an effective addition to the review process. The departmental self-study cited extensively the data provided by the Office of Planning and Analysis and also provided contextual interpretations and factual corrections as needed, indicating that the data and summary analysis were “very helpful to our review.” In the exit interview, the review committee praised the usefulness of the data provided. The pilot undergraduate survey, administered by the Office of Student Research, was a particularly effective addition to the review process, yielding a 72% response rate. In its final report, the review committee drew on both survey data and site visit follow-up interviews with five Women’s Studies majors to make very specific recommendations in response to direct student input, an element that had been lacking in previous campus academic program reviews.

Student Learning: Both the department and the review committee were asked to address student learning as part of the pilot process. To aid in this investigation, the undergraduate survey asked students to rate progress on a variety of student learning outcomes, including learning to write more clearly and fluently, developing research skills, developing analytical and critical thinking skills, and developing a greater understanding of culturally diverse viewpoints. Despite the availability of these new data elements, the departmental self-study did not adequately reflect on this dimension of the data. They did indicate that a future curriculum review would need to include discussion and agreement on the “goals of an undergraduate education in Women’s Studies,” and by extension an assessment of student learning. The review committee found that “courses are appropriately concerned with developing student skills and competencies rather than specialized forms of expertise.” However, it observed that “better means could be devised for assessing majors’ experiences,” such as the use of student portfolios. While the pilot was successful in introducing a discussion of student learning where none had existed, the campus will need to continue to find ways to strengthen this focus.

Internal/External Review Structure: At the exit interview, one of the external reviewers indicated she had initially been skeptical of the combined committee structure, but came to appreciate the advantages of having both an insider and outsider perspective jointly represented in the report. The review committee worked extremely collaboratively, with the internal reviewer taking the lead on providing historical context and perspective afforded by her “broad familiarity with the history of the department,” and the two external reviewers focusing on future directions for the department’s scholarship and curricular contributions.

Next Steps: As the campus moves forward to conclude this particular program review, we have identified a need to establish an ongoing mechanism for accountability. The review lays a solid foundation for rethinking the future directions of the Women’s Studies department, but it is also missing some key elements. In particular, the success of this review depends on the successful completion of the curricular review recommended by the review committee. Next steps in the review process to be undertaken are (1) request for written responses to the review committee

report from departmental faculty and undergraduates; (2) written comments from designated Senate committees, the cognizant Dean, and the College of Letters and Science Executive Committee; and (3) a wrap-up meeting and a summary letter that will document the expected unit response and provide a timeline for any recommended actions, which will be the basis for follow-up and accountability.

Recommendations

The Academic Program Review Working Group has the following recommendations for revamping the current academic program review process:

- Create a permanent joint Academic Senate/ administration committee, with appropriate staff support, to oversee the academic program review process.
- Identify an institutional home for the academic program review process to be centrally coordinated within a single administrative unit.
- Incorporate the criteria for evaluating departmental efforts in undergraduate education (developed as part of the Women's Studies review) into the criteria for all academic program reviews, including a focus on student learning outcomes.
- Convene a single external review committee with an internal Academic Senate liaison.
- Require surveys of undergraduate majors and graduate students for all program reviews.
- Provide sufficient resources to ensure timely periodic reviews of academic units every seven years as recommended by the Academic Senate.
- Streamline the process that occurs after an academic program review has taken place, clarifying who needs to read and comment on the report and in what timeframe.
- Assure that the relevant Deans are involved in follow-up actions as a result of the academic program review report.
- Create a mechanism for regular follow-up that will enable the campus to evaluate progress and outcomes resulting from recommended actions.

Due to the current budget situation, funding is not available to create this new organizational structure for program review in the 2003-04 academic year. We will continue to operate under the Interim Guidelines with a scaled-back number of reviews, with the goal of operationalizing the new structure when the economic climate improves.

Conclusion: Integrative Component

The Berkeley Campus Culture

The decentralized campus culture at Berkeley means that initiatives frequently develop from the bottom up to meet the needs of students, programs, departments, and the campus overall. The advantage to this entrepreneurial culture is that campus faculty, administrators, and staff have the freedom and flexibility to create excellent courses, offerings, and programs that meet specific needs. As a result, Berkeley has developed many outstanding initiatives that reflect the diversity, innovation, and creativity that is characteristic of the campus. Collectively, the efforts described in this report demonstrate that a variety of efforts rather than a single centralized approach can best meet the needs of such a large and complex institution.

Diversity is a hallmark of the campus culture, and we recognize it as one of our overarching strengths. It is noteworthy that the single curricular requirement that the Academic Senate has mandated for all undergraduates is an American Cultures course, with its comparative focus on cultural diversity. In the Chancellor's Response to the Strategic Academic Plan, the Chancellor pointed to diversity as "essential to the greatness of Berkeley." He reiterated a commitment to preserving diversity in its traditional sense of preserving access for underrepresented groups, but he also called for a broadening of the dialogue about diversity to encompass "how religious and cultural differences, international influences, immigration, and growing economic disparities alter considerations of diversity" and "how our curricular and extra-curricular programs can embrace these broader definitions." The Chancellor has charged the Campus Community Initiative with launching this new dialogue in 2003-04. This commitment to diversity is also reflected in the campus's parallel effort to identify new areas for research and teaching that span traditional disciplinary boundaries. The New Ideas Initiative, an outgrowth of the Strategic Academic Plan, is designed to nurture and foster interdisciplinarity outside of traditional departmental structures. As part of this process, the campus will also need to develop new administrative structures at a campus-wide level that will support the development of these new ideas.

The challenge for the campus is to preserve the diversity and entrepreneurial energy that are our strengths and at the same time to identify when more coordination and integration in our organizational and administrative structures are needed to allow us to further our institutional goals. We list below these areas where we have identified gaps and discuss some of the emerging structures we are putting in place that we expect can help us sustain and extend our progress in teaching, learning, and undergraduate education in the next ten years.

Developing a Campus-wide Vision for Undergraduate Education

Our investigations reveal that while individual faculty members and departments and programs may have developed learning objectives and expected outcomes for their students, the campus has not yet fully articulated and embraced a shared vision of what we expect our undergraduates to take away from a Berkeley education. As noted in the introduction, the Vice Provost for Undergraduate Education and the Council of Undergraduate Deans have taken an important step in that direction by drafting an initial statement of desired outcomes for students. This statement is based on recommendations emerging from the Commission on Undergraduate Education Final Report, the Strategic Academic Plan, and the Campus

Accreditation Process. This draft statement will need to be more fully articulated and vetted with faculty, students, staff, administration, and alumni. Once established as the campus vision for undergraduate education, it will provide the conceptual structure to integrate the many pieces of the undergraduate experience, identify gaps and shortcomings, guide new initiatives, and provide the basis for evaluation of student outcomes. As we move forward, the Vice Provost, together with the Academic Senate and the Council of Undergraduate Deans, will continue to oversee the continuing progress of the campus in undergraduate education.

Optimizing Our Teaching Resources and Supporting Teaching Excellence

To help students meet the learning objectives we identify for them, we need to consider how instruction is delivered, find ways to optimize our teaching resources, and support teaching excellence for all who participate in the teaching enterprise. Many of the recommendations in this report speak to specific strategies for leveraging teaching resources, rethinking the faculty reward system, improving instructor development, and building our physical, technological, and administrative infrastructure. To help us continue to move forward in these areas, it will be important to identify key organizational structures that can coordinate efforts across the multiple academic units and support units that play a role in instruction. The Council of Academic Partners, a consortium of academic support units that is an advisory group to the Vice Provost for Undergraduate Education, is working to coordinate instructor development efforts on the Berkeley campus. The Academic Senate Committee on Teaching (COT) also has been taking a more proactive role in providing leadership in relationship to the culture of teaching on campus. Through the Council of Academic Partners and the Academic Senate, the recommendations related to teaching will be pursued.

Emphasizing Student Learning at the Institutional Level

Student learning is most often assessed at the course level; with the suggested improvements for academic program review described in this report, it will begin to be addressed systematically at the departmental level as well. To fully embed student learning into the fabric of the institution, however, will require a shift in the teaching-learning perspective: away from a focus on teaching and the delivery of instruction towards a greater emphasis on the conditions that foster student learning. This means, for example, making decisions about new initiatives in terms of how they will promote student learning, using data on student learning in making programmatic decisions, infusing a learning perspective into institutional documents and policies, and forging a sense of collective responsibility for student learning among the different segments of the Berkeley community. While such a shift may not be easy to achieve, we have noted throughout this report both subtle and significant changes in this direction that are already under way, and we expect to make continued progress in this area.

Institutionalizing Assessment of Undergraduate Education

The final area we want to highlight is assessment. The Preparatory Review Visiting Team focused attention on the need to continue to improve campus coordination of data collection, analysis, and dissemination. To know how well we are meeting our educational objectives, we need to continue institutionalizing campus-wide mechanisms for assessment. Academic program review serves as a critical lever for promoting change at the institutional level, and the academic program review process that we described in the preceding essay will be an important way in which we can incorporate evaluation of how well Berkeley is meeting the campus-wide learning objectives we establish for our students. However, the academic program review

process alone is not sufficient to monitor educational effectiveness. Even with a review cycle that allows departments to be evaluated once every seven years, there is still a need for more frequent institutional mechanisms for assessing effectiveness.

The campus currently has in place a variety of tools for assessing undergraduate education, including the Quality of Undergraduate Education Assessment Project (QUEAP), the pilot Departmental Undergraduate Education Survey, the Career Destination Survey, the campus Performance Metrics project, the Institutional Data Gateway project, and the UC Undergraduate Experience Survey (UCUES). The latter instrument includes key indicators of student engagement and has advantages over the benchmark National Survey of Student Engagement (NSSE) instrument, against which it will be periodically cross-validated, of scale (the campus collected responses from more than ten thousand undergraduates in Spring 2003), flexibility (UCUES data are integrated into other student data systems, including longitudinal databases), and more in-depth coverage of areas of particular relevance (e.g., undergraduate research opportunities).

However, we also face a number of challenges in effectively using the extensive data we already do collect to inform decision making:

- Many of our undergraduate education assessment tools are labor intensive to utilize and do not take advantage of the most recent developments in campus web-based data integration systems such as Cal Profiles and Cal Profiles Plus.
- Data indicators are overseen by different control units, sometimes resulting in duplication of effort and a lack of coordinated oversight of the collection of education effectiveness data to further institutional goals.
- We have an abundance of indicators, and no clear way of prioritizing which indicators are most important for assessing how well we are meeting our educational objectives.
- We lack mechanisms for ensuring that data are disseminated to key decision makers and used consistently for institutional planning.

To address these challenges, the campus proposes to undertake a systematic catalog of the kinds of undergraduate education data we collect, to evaluate and prioritize those data, and to create a web-based undergraduate education annual report that will be issued by the Vice Provost for Undergraduate Education. The following principles will guide the development of this report. It will

- be integrated with current and future data collection systems on the campus, such as the student data warehouse, and will permit us to retire overly labor-intensive or less-standardized instruments and tools;
- prioritize the most meaningful indicators that will allow us to track performance over time;
- provide both a campus-wide snapshot of undergraduate education as well as disaggregated comparative data by department that can allow Deans, department chairs, and faculty to know how well they are meeting key objectives for undergraduate education;
- be coordinated with system-wide reporting requirements, including those still under development (e.g., the Annual Report to the Legislature on Undergraduate Education and the UC Office of the President undergraduate research data-gathering initiative);
- potentially serve as a mechanism to identify departments that are in more immediate need of an academic program review; and
- be publicized through an annual letter on the state of undergraduate education at Berkeley, which can serve as a way to recognize departments for positive

accomplishments and provide information to departments about resources that can help them achieve institutional goals.

Such a report will also enable us to track our successes in meeting the educational objectives put forth in this self-study and help us measure how far we are able to travel in the next decade towards meeting our goals.

Some Final Considerations

We submit this self-study within a budgetary context that is severely limited and is probably not going to improve in the near future. The extent to which we will be able to make progress in the identified areas will inevitably be shaped by these resource constraints. We recognize that some recommended changes can be implemented fairly easily, while others may be more challenging to implement in the current budget climate. Still other efforts already under way may be difficult to sustain without an infusion of additional resources. Nevertheless, this report represents a blueprint for change that can be implemented more fully when the budget climate improves. The campus is also committed to preserving existing resources and finding new resources for undergraduate education. The Chancellor has identified undergraduate education as one of his four key fundraising priorities. The featured objectives for the undergraduate education fundraising campaign also dovetail with the priorities established by this self-study process. They are

- Undergraduate Scholarship Support, including awards that will support financially needy students to engage in co-curricular and extra-curricular learning experiences;
- Teaching Excellence, including funds for teaching awards and rotating endowed chairs who will make significant contributions to undergraduate education, especially in large-enrollment courses;
- Enriching Faculty / Student Interaction, including funding for more small seminars and for undergraduate research opportunities; and
- Improving the Learning Environment, including support for classroom renovations and new instructional technologies.

Despite the difficult budget climate and the constraints that accompany it, we feel confident that we can continue to strengthen teaching, learning, and undergraduate education at Berkeley.

Appendix 1: List of Evidentiary Exhibits

Introduction: Educational Effectiveness Approach

Graduate program rankings. <http://www.berkeley.edu/about/honors/grad/>

Faculty honors and awards. <http://www.berkeley.edu/about/honors/>

e-Berkeley initiative. <http://eberkeley.berkeley.edu/>

Council of Undergraduate Deans. <http://education.berkeley.edu/colleges.htm>

Campus accreditation website. <http://education.berkeley.edu/accreditation>

Essay 1: Preparing Students for Successful Capstone Experiences

Undergraduate Experience Survey, Spring 2003 (UCUES). Office of Student Research. http://osr4.berkeley.edu/Public/Staffweb/TC/ucues2003/ucues2003_menu.html

Quality of Undergraduate Education Assessment Project (QUEAP). <http://osr.berkeley.edu/Public/STAFFWEB/DE/QUEAPREPORT.pdf>

Departmental Undergraduate Education Survey: Academic Year 2000-01 (April, 2002). Office of the Vice Provost for Undergraduate Education. Complete report available from vpue@uclink.berkeley.edu. http://education.berkeley.edu/accreditation/pdf/Dept_UG_Surv_Exec_Summ.pdf

Results of capstone experiences, Departmental Undergraduate Education Survey. http://education.berkeley.edu/accreditation/pdf/Dept_Survey_Capstone.pdf

Analysis of capstone experiences, Departmental Undergraduate Education Survey. http://education.berkeley.edu/accreditation/pdf/Capstone_Exp_Summary.pdf

UC Office of the President guidelines for identifying advanced undergraduate research courses. http://education.berkeley.edu/accreditation/pdf/UCOP_Adv_Res_Course.pdf

UC Office of the President guidelines for identifying apprenticeship undergraduate research courses. http://education.berkeley.edu/accreditation/pdf/UCOP_Res_App_Course.pdf

Environmental Sciences major website. <http://environmentalsciences.berkeley.edu/>

Environmental Sciences senior thesis course website (ES 196a and 196b). <http://socrates.berkeley.edu/~es196/index.html>

Environmental Sciences introductory course website (ES 10). <http://strawberrycreek.berkeley.edu/es10/index.html>

Environmental Sciences research methods course website (ES 100).
<http://learning.berkeley.edu/es100/>

Educational Initiatives Award 2003 (Environmental Sciences Major).
<http://teaching.berkeley.edu/dta03/eia03.html>

Environmental Sciences supplementary evidence.
http://education.berkeley.edu/accreditation/pdf/ES_Supp_Evidence.pdf

History department website. <http://history.berkeley.edu/>

History R1 syllabus.
http://education.berkeley.edu/accreditation/pdf/HistoryR1_Syllabus.pdf

Sample assignment of History R1 guided individual research essay.
http://education.berkeley.edu/accreditation/pdf/HistoryR1_Assignment.pdf

History 103 course website. <http://history.berkeley.edu/academ/undergrad/103courses.html>

Syllabus for History 103R: American Lives, American History: Oral History and the Understanding of Social Change.
http://education.berkeley.edu/accreditation/pdf/History103R_Syllabus.pdf

Regional Oral History Office. <http://bancroft.berkeley.edu/ROHO/education/>

History 101 course website. <http://history.berkeley.edu/academ/undergrad/101courses.html>

History 101 "Writers' Group" syllabus.
http://education.berkeley.edu/accreditation/pdf/History101_Writers.pdf

Clio's Scroll, Phi Alpha Theta (Undergraduate History Honors Society). Hard copy available from vpue@uclink.berkeley.edu.
<http://ishi.lib.berkeley.edu/history/PhiAlphaTheta/clioscroll.htm>

Theater, Dance, and Performance Studies Department. <http://ls.berkeley.edu/dept/theater/>

McNair Scholars Program. <http://www-mcnair.berkeley.edu/>

McNair seminar (Education 198) syllabus.
http://education.berkeley.edu/accreditation/pdf/McNair_Syllabus.pdf

Berkeley McNair Journal. <http://www-mcnair.berkeley.edu/journal.html>

McNair Program end-of-year report (2000-01).
http://education.berkeley.edu/accreditation/pdf/McNair_End_of_Year_Rep.pdf

McNair Program cumulative report (1999-2001).
http://education.berkeley.edu/accreditation/pdf/McNair_Prior_Exper_Summ.pdf

Office of Undergraduate Research (OUR).
http://education.berkeley.edu/accreditation/pdf/OUR_Summary.pdf

Undergraduate Research Apprentice Program (URAP).
<http://research.berkeley.edu/urap/index.html>

Haas Scholars Program. http://research.berkeley.edu/haas_scholars/index.html

Summer Undergraduate Research Fellowship Program.
<http://research.berkeley.edu/surf/index.html>

Travel Grants for Undergraduate Research. <http://research.berkeley.edu/travel/>

Berkeley Undergraduate Journal. <http://learning.berkeley.edu/buj/index.html>

Berkeley Scientific Journal. <http://www.OCF.Berkeley.EDU/~bsj/>

Undergraduate Research @ Berkeley web portal. <http://research.berkeley.edu/>

Educational Initiatives Award. <http://teaching.berkeley.edu/eia-guidelines.html>

Townsend Center for the Humanities. <http://ls.berkeley.edu/dept/townsend/>

Mellon Faculty Institute on Undergraduate Research.
<http://www.lib.berkeley.edu/MellonInstitute/>

Video: Lighting the Fire (requires RealOne Player to view).
http://teles.berkeley.edu:8080/ramgen/2002/special_events/lib/mellon.rm

Library Prize for Undergraduate Research. <http://www.lib.berkeley.edu/researchprize/>

Letters and Science Awards for the Distinguished Research Mentoring of Undergraduates.
<http://research.berkeley.edu/distinguished/>

Undergraduate Research Month. <http://research.berkeley.edu/urm/>

Academic Program Review Interim Guidelines.
<http://opa.vcbf.berkeley.edu/AcademicPrograms/Review.Index.cfm>

Essay 2: Reinventing Large-Enrollment Courses

Campus student-faculty ratio. <http://metrics.chance.berkeley.edu/>

Undergraduate Experience Survey, Spring 2003 (UCUES). Office of Student Research.
http://osr4.berkeley.edu/Public/Staffweb/TC/ucues2003/ucues2003_menu.html

Freshman Seminar Program. <http://fsp.berkeley.edu/>

e-Berkeley Symposium: Rethinking Large-enrollment Courses, New Ideas for Teaching and Learning (May 2, 2003). http://eberkeley.berkeley.edu/symposium_agendafrommain.html

UC Teaching, Learning, and Technology Center.
<http://www.ucltc.org/news/2003/05/berkeley.html>

Anthropology 2: Introduction to Archaeology.
<http://elearning.berkeley.edu:7000/public/anth2/>

Multimedia Authoring Center for Teaching in Anthropology (MACTiA).
<http://www.mactia.berkeley.edu/>

Educational Initiatives Award 2001 (MACTiA).
<http://teaching.berkeley.edu/dta01/eia01.html>

Anthropology 2 course evaluation form.
http://education.berkeley.edu/accreditation/pdf/Anthro2_Eval_Form.pdf

Mellon Faculty Institute on Undergraduate Research.
<http://www.lib.berkeley.edu/MellonInstitute/>

Computer Science 3: Introduction to Symbolic Programming. <http://summer03.ucwise.org/>

Clancy, M., Titterton, N., Ryan, C., Slotta, J., Linn, M. (2003). *New roles for students, instructors, and computers in a lab-based introductory programming course*. Paper presented at SIGCSE February 2003, Reno, NV.
http://education.berkeley.edu/accreditation/pdf/Clancy_et_al_2003.pdf

UC-WISE (Web-based Inquiry Science Environment). <http://wise.berkeley.edu/>

History 7B: American Society, 1865 to the Present.
<http://history.berkeley.edu/faculty/Visitor/Postel/H7/>

American Cultures website. <http://amercult.berkeley.edu/>

Library course-integrated research worksheets:
worksheet one: http://www.lib.berkeley.edu/TeachingLib/courses/7b/worksheet_one.pdf;
worksheet two: http://www.lib.berkeley.edu/TeachingLib/courses/7b/worksheet_two.pdf;
worksheet three: http://www.lib.berkeley.edu/TeachingLib/courses/7b/worksheet_three.pdf

Introduction to Library Research. <http://www.lib.berkeley.edu/TeachingLib/courses/7b/>

Primary Sources Instructional Guide.
<http://www.lib.berkeley.edu/TeachingLib/Guides/PrimarySources.html>

Primary Sources on the Web Instructional Guide.
<http://www.lib.berkeley.edu/TeachingLib/Guides/PrimarySourcesOnTheWeb.html>

Effectiveness of library sessions for student learning, CU News, UC Berkeley Library (July 15, 1999). http://lib.berkeley.edu/AboutLibrary/Staff/CUNews/cu_071599.html

Library newsletter: Bancroftiana, Newsletter of the Friends of the Bancroft Library (2002).
<http://bancroft.berkeley.edu/events/bancroftiana/119/history.html>

Library Prize for Undergraduate Research. <http://www.lib.berkeley.edu/researchprize/>

History 100AC course website. <http://www.lib.berkeley.edu/~cleeh/hist100ac.html>

Physics 8A: Introductory Physics. <http://eres.berkeley.edu/coursepage.asp?cid=156&page=01>

Physics 8 evaluation process (begun Fall 2000).
http://education.berkeley.edu/accreditation/pdf/Physics8_Impetus_for_Change.pdf

Physics 8A evaluation of integrated discussion/lab sections (2002).
http://education.berkeley.edu/accreditation/pdf/Physics8A_Fall01_Eval.pdf

Tools for Teaching. Barbara Gross Davis. San Francisco: Jossey-Bass, 1993.
<http://teaching.berkeley.edu/teaching.html>

Educational Technology Services Profiles. <http://media.berkeley.edu/profiles/index.html>

Digital Chem 1A: Introductory Chemistry. <http://media.berkeley.edu/profiles/chem1a.html>

IDS 110: Introduction to Computers. <http://media.berkeley.edu/profiles/azevedo.html>

Women's Studies 10: Introduction to Women's Studies.
<http://media.berkeley.edu/profiles/thorne.html>

Graduate Student Instructor (GSI) Teaching and Resource Center.
<http://www.grad.berkeley.edu/gsi/>

Astronomy Learning Center. <http://astron.berkeley.edu/talc/>

Mathematics Department. <http://math.berkeley.edu/>

Teaching Library. <http://www.lib.berkeley.edu/TeachingLib/>
Library Services for Classroom Instructors.
<http://www.lib.berkeley.edu/TeachingLib/ServicesForFaculty.html>

Educational Technology Services. <http://oms1.berkeley.edu/>
Learning management systems. <http://oms1.berkeley.edu/web/index.html>
CourseWeb. <http://media.berkeley.edu/web/courseweb.html>
Webcast.Berkeley. <http://webcast.berkeley.edu/>

General assignment classrooms. <http://uga.berkeley.edu/rooms/bybuilding.htx>

Classroom technology website (lists technology available in each classroom).
<http://media.berkeley.edu/db/room>

Classroom Renovation Program Report (1994). Hard copy available from
vpue@uclink.berkeley.edu.

Report of the Task Force on Classroom Technology Development (1996). Hard copy available
from vpue@uclink.berkeley.edu.

Classroom Renovation Program (re-approved 2001) new list of projects.
http://education.berkeley.edu/accreditation/pdf/Classrooms_New_Millennium_Plan

BEARS (Berkeley Evaluation and Assessment Research Center).
<http://www-gse.berkeley.edu/research/BEAR/>

Essay 3: Enhancing the Culture of Teaching

Undergraduate Experience Survey (UCUES), Spring 2003. Office of Student Research.
http://osr4.berkeley.edu/Public/Staffweb/TC/ucues2003/ucues2003_menu.html

Services, Programs, and Activities to Support and Improve Teaching.
<http://education.berkeley.edu/cap/improvingteaching.html>

Assessing Student Learning: An Informal Inventory of Current Berkeley Practices.
<http://education.berkeley.edu/cap/learninginventory>

Berkeley Language Center. <http://blc.berkeley.edu/>

Berkeley Language Center Newsletter. <http://blc.berkeley.edu/newsletter.html>

Van Deusen-Scholl, N., von Hoene, L., & Moeller-Irving, K. (1999). The professionalization of language teachers: A case study of the professional development needs of lecturers at the University of California, Berkeley. In L. K. Heilenman (Ed.), *Research issues and language program direction* (pp. 245-275). Boston: Heinle.
http://education.berkeley.edu/accreditation/pdf/Van_Deusen_et_al_1999.pdf

Survey of BLC Fellows.
http://education.berkeley.edu/accreditation/pdf/BLC_Fellows_Survey.pdf

von Hoene, L. & Van Deusen-Scholl, N. (2001). Creating a framework for the professional development of lecturers: The Berkeley model. In B. Johnston and S. Irujo (Eds.), *Research and practice in language teacher education: Voices from the field. Selected papers from the First International Conference on Language Teacher Education* (pp. 251-265). CARLA Working Paper Series 19. Minneapolis, MN: Center for Advanced Research on Language Acquisition, University of Minnesota.
http://education.berkeley.edu/accreditation/pdf/von_Hoene_Van_Deusen_2001.pdf

Center for the Teaching and Study of American Cultures. <http://amercult.berkeley.edu/>

Theodore M. Hesburgh Faculty Development Award.
<http://www.ntlf.com/html/grants/118501.htm>

Educational Initiatives Award 1996 (Center for the Teaching and Study of American Cultures).
<http://teaching.berkeley.edu/dta96/eia96.html>

Data from 2002: Assessments of the 2002 American Cultures Summer Seminar.
http://education.berkeley.edu/accreditation/pdf/AC_Summ_Sem_Eval_02.pdf

Survey of faculty: Report of the Committee to Review the Center for the Teaching and Study of American Cultures (May 29, 2003).
<http://amercult.berkeley.edu/ARCHIVE/REVIEW/AppB-FacSurvey.pdf>

Mellon Faculty Institute on Undergraduate Research.
<http://www.lib.berkeley.edu/MellonInstitute/>

American Cultures review report: Report of the Committee to Review the Center for the Teaching and Study of American Cultures (May 29, 2003).
<http://amercult.berkeley.edu/ARCHIVE/REVIEW/ReviewRpt.html>

Faculty Roundtable on the Future of the American Cultures Requirement.
http://education.berkeley.edu/accreditation/pdf/AC_Roundtable_Letter.pdf

Graduate Student Instructor (GSI) Teaching and Resource Center.
<http://www.grad.berkeley.edu/gsi/>

Summer Institute for Academic and Professional Development.
http://www.grad.berkeley.edu/gsi/pdf/summer_institute.pdf

Syllabus from Psychology 300 seminar.
<http://elearning.berkeley.edu:7000/public/psy300/index.html>

Teaching Effectiveness Award. http://www.grad.berkeley.edu/gsi/gsi_tea.shtml

von Hoene, L. & Mintz, J. (2000). Research on faculty as teaching mentors: Lessons learned from a study of participants in UC Berkeley's seminar for faculty who teach with Graduate Student Instructors. From *To Improve the Academy* 20: 77-93.
http://education.berkeley.edu/accreditation/pdf/von_Hoene_Mintz_2000.pdf

Special Studies Working Group. <http://education.berkeley.edu/specialstudies/>

Student Learning Center Undergraduate Student Instructor Training and Resources.
<http://slc.berkeley.edu/usitr/usitr.htm>

Task Force on Graduate Student Instructor Training and Mentoring.
<http://evcp.chance.berkeley.edu/cmtes/CmteChargeLettersPDF/GSITaskForceCharge.pdf>

Policy on Appointments and Mentorship of Graduate Student Instructors (Revised 2003).
<http://evcp.chance.berkeley.edu/cmtes/mentoringpolicyfinal31.pdf>

Service-Learning Research and Development Center. <http://gse.berkeley.edu/research/slc/>

Council of Academic Partners. <http://education.berkeley.edu/cap/>

Teaching Resources home page. <http://www.berkeley.edu/teaching/>

Berkeley NewsCenter. <http://newscenter.berkeley.edu/>

The Berkeleian (campus faculty/staff newspaper).
<http://www.berkeley.edu/news/berkeleian/>

Physics for Future Presidents (Berkeleian article).
http://www.berkeley.edu/news/berkeleian/2003/02/26_.shtml

Psychology 1 (Berkeleian article).
http://www.berkeley.edu/news/berkeleian/2003/03/05_cov.shtml

Presidential Chair in Undergraduate Education (Martin V. Covington).
<http://teaching.berkeley.edu/aboutpres.html>

Distinguished Teaching Award. <http://teaching.berkeley.edu/dta.html>

Instructors of large-enrollment courses: see e-Berkeley Symposium: Rethinking Large-enrollment Courses, New Ideas for Teaching and Learning (May 2, 2003).
http://eberkeley.berkeley.edu/symposium_agendafrommain.html

Sponsored Projects Office. <http://www.spo.berkeley.edu/>

Hewlett Packard Applied Mobile Technology Solutions in Learning Environments grant (2003).
http://education.berkeley.edu/specials/HP_Mobile_Tech.pdf

Distinguished Teacher Mentorship Program.
<http://teaching.berkeley.edu/distinguishedmentors.html>

President's Chair Fellowship Program.
http://education.berkeley.edu/accreditation/pdf/Pres_Chair_Fellows_Memo.pdf

Essay 4: Improving Academic Program Review

Academic Program Review Working Group.
<http://evcp.chance.berkeley.edu/cmtes/CmteChargeLettersPDF/AcademicReviewWorkingGroup.pdf>

Academic Program Review Interim Guidelines.
<http://opa.vcbf.berkeley.edu/AcademicPrograms/Review.Index.cfm>

Principles for Revising the Academic Program Review Process.
http://education.berkeley.edu/accreditation/pdf/Acad_Prog_Rev_Principles.pdf

Women's Studies Academic Program Review self study outline.
http://education.berkeley.edu/accreditation/pdf/WS_Selfstudy_Outline.pdf

Women's Studies Academic Program Review Review Committee charge letter.
http://education.berkeley.edu/accreditation/pdf/WS_Charge_Letter.pdf

Women's Studies Academic Program Review Issues to the Review Committee.
http://education.berkeley.edu/accreditation/pdf/WS_Issues.pdf

Women's Studies undergraduate survey instrument.
http://education.berkeley.edu/accreditation/pdf/WS_Survey_Questions.pdf

Conclusion: Integrative Component

American Cultures. <http://amercult.berkeley.edu/>

Chancellor's Response to the Strategic Academic Plan.
<http://www.berkeley.edu/news/media/releases/2003/05/sap/response.shtml>

Campus Community Initiative.
http://education.berkeley.edu/specials/Campus_Community.pdf

New Ideas Initiative. <http://spc.vcbf.berkeley.edu/document/NewIdeasReport.pdf>
Council of Undergraduate Deans. <http://education.berkeley.edu/colleges.htm>

Commission on Undergraduate Education Final Report.
http://learning.berkeley.edu/cue/final/CUE_Final.pdf

Strategic Academic Plan. <http://spc.vcbf.berkeley.edu/document/AcademicStrategicPlan.pdf>

Campus Accreditation Process. <http://education.berkeley.edu/accreditation>

Council of Academic Partners. <http://education.berkeley.edu/cap/>

Quality of Undergraduate Education Assessment Project (QUEAP).
<http://osr.berkeley.edu/Public/STAFFWEB/DE/QUEAPREPORT.pdf>

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http://education.berkeley.edu/accreditation/pdf/Dept_UG_Surv_Exec_Summ.pdf

Career Destination Survey. <http://career.berkeley.edu/CarDest/2001Campus.stm>

Performance Metrics project. <http://metrics.vcbf.berkeley.edu/>

Institutional Data Gateway project. <http://gateway.chance.berkeley.edu/>

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http://osr4.berkeley.edu/Public/Staffweb/TC/ucues2003/ucues2003_menu.html

National Survey of Student Engagement (NSSE). <http://www.indiana.edu/~nsse/>

Cal Profiles. <http://calprofiles.vcbf.berkeley.edu/>

Cal Profiles Plus. <http://calprofilesplus.vcbf.berkeley.edu/>

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http://education.berkeley.edu/accreditation/pdf/Clancy_et_al_2003.pdf
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Millis, B. J. & Cottell, P. G. (1998). *Cooperative learning for higher education faculty*. Phoenix, AZ: Oryx Press.

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Appendix 3: Members of the Educational Effectiveness Working Groups

Academic Engagement Working Group

Name	Title
Richard Cándida Smith (Chair)	Professor of History and Director, Regional Oral History Office
Nick Chatman	Undergraduate Student, Electrical Engineering and Computer Sciences
Seda A. Chavdarian	Lecturer, French
Martin V. Covington	Professor of Psychology
Robert J. Full	Professor of Integrative Biology
Ronald Gronsky	Professor of Materials Science and Mineral Engineering
Alix Schwartz	Director of Academic Planning, L&S Undergraduate Division
Cara Stanley	Director, Student Learning Center
Nic Voge	Graduate Student, Education
Caryl Waggett	Graduate Student, Environmental Science, Policy and Management
Cynthia Schrager (Staff)	Principal Analyst, Office of the Vice Provost for Undergraduate Education

Delivery of Education Working Group

Name	Title
Lewis J. Feldman (co-Chair)	Professor of Plant and Microbial Biology
Margaret W. Conkey (co-Chair)	Professor of Anthropology
Americ Azevedo	Lecturer, Interdisciplinary Studies, Engineering Dean's Office
Barbara Gross Davis	Assistant Vice Provost for Undergraduate Education
Patricia A. Iannuzzi	Associate University Librarian
Heather McCarty	Graduate Student, History
Carlin Rooke	Undergraduate Student, Chemistry
Linda von Hoene	Director, Graduate Student Instructor Teaching and Resource Center
Hertha Sweet Wong	Associate Professor of English
Jean Barker (Staff)	Senior Analyst, Office of the Assistant Vice Provost for Undergraduate Education
Jon Conhaim (Staff)	Director, E-Berkeley
Cynthia Schrager (Staff)	Principal Analyst, Office of the Vice Provost for Undergraduate Education

Academic Program Review Working Group

Name	Title
Jeffrey A. Reimer (Chair)	Associate Dean of the Graduate Division and Professor of Chemical Engineering
Lisa Alvarez-Cohen	Fred and Claire Sauer Professor of Environmental Engineering and Chair, Committee on Educational Policy
Dennis D. Hengstler	Executive Director, Planning and Analysis
Catherine P. Koshland	Chair of the Academic Senate and Professor of Environmental Health Sciences
Christina Maslach	Vice Provost for Undergraduate Education and Professor of Psychology
David Mowery	Milton W. Terrill Professor of Business and Chair, Graduate Council
Sandra L. Ellison (Staff)	Principal Analyst, Planning and Analysis
Jane Fink (Staff)	Review Coordinator, Graduate Division
Cynthia Schragger (Staff)	Principal Analyst, Office of the Vice Provost for Undergraduate Education