

# EVALUATION SUMMARY

## Mellon Library/Faculty Fellowship for Undergraduate Research February 2008

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### BACKGROUND AND METHODOLOGY

The reputation of the University of California, Berkeley, like other major U.S. universities, has been built primarily on the pre-eminence of its research and graduate programs rather than on markers of excellence in teaching and undergraduate education. However, the higher education community has recently been devoting increased attention toward reinvigorating the experience of undergraduate students through activities that emphasize discovery and engagement. The Berkeley campus has viewed the challenge in terms of finding ways to leverage the research strength of its faculty and the quality of its library collections to improve undergraduate education in ways that would be workable given the culture and characteristics of a large research university.

Two grants from the Andrew W. Mellon Foundation during the years 2002 to 2007 provided the opportunity for the Berkeley campus to address this challenge by developing the Mellon Library/Faculty Fellows for Undergraduate Research initiative. The current four-year project brought together a community of faculty committed to exploring new approaches for research-based learning, especially in large-enrollment and gateway courses; it promoted the library as a center of learning and instruction expertise; and it enlisted the assistance of various academic support units to consult with faculty about course design and implementation. An ambitious agenda of activities was carried out in support of this initiative, including the organization of a Steering Committee to collaboratively develop the project, the recruitment and selection of Faculty Fellows and their supporting consultants from various academic units, the planning and execution of the four intensive summer faculty development institutes, the organization and preparation of implementation teams to assist faculty in carrying out their course innovations, and the implementation of a special project to develop models of assessment of student learning of research skills in the redesigned courses.

In the spring of 2006 the Mellon Fellows project enlisted an evaluation consultant to assist them in assessing the project's impacts on **individual faculty**, on **the campus culture of learning**, and on **student learning**. In order to document the various successes and challenges of the initiative, an evaluation framework was articulated that elaborated these three major groups of educational objectives in terms of questions to be answered by data from the evaluation (see Attachment 1).

A multifaceted evaluation process was then designed to collect different types of relevant data from various sources and participants. To assess the project's impact on individual

faculty members, 24 Faculty Fellows, sampled from each of four cohorts, were interviewed in depth. In addition, a short retrospective survey was sent to Faculty Fellows in all four cohorts in late spring of 2007.<sup>1</sup> In all, three-quarters of the total number of Faculty Fellows (36 of 48) contributed interview or retrospective survey data (or both). In-depth interviews with the members of the project's Steering Committee as well as with samples of staff from various support units who had consulted with Faculty Fellows (28 "Academic Partners" in all) provided additional information about the professional development and implementation support for Faculty Fellows as well as other aspects of the campus culture of learning impacted by the project. Supplementary information about impacts on departmental curriculum-focused interactions was obtained from nine surveys returned from a sample of colleagues of participating faculty.

Student impacts were assessed by analyzing surveys completed by 620 students in six newly revised courses taught during the last year of the project<sup>2</sup> and by reviewing survey data collected from eight Graduate Student Instructors in five of those six courses. Completed research assignments from a random sample of 25 students in each of these six classes were assembled but not analyzed for this report. The following overview summarizes findings from this comprehensive evaluation effort.

## **IMPACTS ON INDIVIDUAL UC BERKELEY FACULTY**

Questions concerning the success of various techniques for enlisting the participation of faculty, the relative motivational and educational effectiveness of the various experiences provided at the summer institutes, and the usefulness of the consultation by Academic Partners in supplying needed implementation support were embedded in the Faculty Fellows Interview and Retrospective Survey and in the interviews of staff involved in activities of the Mellon initiative. The role and support of Graduate Student Instructors in the implementation of research assignments was queried in the interviews of Faculty Fellows and Academic Partners and in the GSI Survey. (Attachments 2 and 3 contain the Faculty Fellow and Academic Partner Interview Protocols, Attachment 4 displays the Faculty Fellow Survey, and Attachment 5 contains the GSI Survey.) The following sections, organized according to project activities and phases, summarize some salient findings from these data sources that are relevant to the questions about impacts of this Mellon initiative on faculty.

### **Recruitment and Selection of Faculty Fellows**

1. Personal contacts and the support of departmental and University administrators greatly facilitated recruitment of Faculty Fellows. Although multiple strategies for recruitment and selection were employed across the four years of the Mellon project, a large number of Fellows specified personal contact with a department chair, the American Cultures Coordinator, a Mellon staff member, a librarian, or a former Mellon

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<sup>1</sup> Data collected by the Project Manager about faculty reactions to each of the summer Institutes were also available for review.

<sup>2</sup> Data on a pilot version of the student survey was also obtained and analyzed from an additional sample of 159 students.

Faculty Fellow as being the primary factor that sparked their interest and initiated further investigation into the program. In addition, the fact that an email invitation came from the Vice-Provost for Undergraduate Education also impressed many Fellows, communicating to them the importance of the program in the minds of high-level administrators.

2. Heterogeneity among Faculty Fellow cohorts (in terms of department affiliation and rank) was viewed as a positive feature by participants. Faculty Fellows were nearly unanimous in valuing the diversity of membership in their cohorts. For example, lecturers valued the opportunity of interacting and making connections with tenure-track faculty, noting that they didn't have many opportunities to integrate their professional lives with those of other instructors on campus. Junior faculty valued the opportunity of getting to know more experienced and well-known senior faculty. In addition, most Fellows talked about the relative insularity of departments on the campus and the opportunity that the Institute provided to learn about other departments and make connections across the campus. Fellows who stated that their home departments did not have a culture of sharing especially valued finding colleagues who had similar concerns and priorities and who were willing to exchange information, provide feedback, and collaborate in their thinking about their courses.

3. Despite commonalities among the faculty chosen to be Fellows, individual differences in the primary motivations of faculty applying to be participants affected their subsequent reactions to the content of the summer Institute and their collaboration with Academic Partners. Faculty Fellows differed considerably in the reasons they gave for participating in the initiative, in their expectations regarding the material that would be covered in the Institute, in the help they hoped would be provided after the Institute by Academic Partners, and in the interest they had in discussing broad educational issues.

As might be expected, the most frequent motivation cited by Faculty Fellows for participating in the Mellon initiative was an overall interest in improving undergraduate education or a desire to improve their own teaching, especially of large- enrollment, lower-division courses. In general, faculty who were most interested in improving their own teaching and creating more engaging experiences for undergraduates at Berkeley, were positive about most of the content presented at the Institute and about support given to them by members of their I-Team.

Faculty Fellow interviews revealed, however, that there were differences in goal emphasis of participants that were related to less positive evaluations of certain experiences during the Institute. For example, some Fellows who were especially oriented toward working on particular aspects of their own course said they would have preferred fewer presentations and general group discussions and more individual work time and feedback opportunities. In contrast, Fellows who were especially interested in philosophical or pedagogical issues were disappointed at the lack of depth and time allotted to discussion of, for example, the Boyer Commission report on reinventing undergraduate education, or the tension between the potential benefits and downsides of educational technology in higher education. Some faculty in each cohort were primarily

or especially interested in one particular topic, such as learning how to recruit, organize, or manage GSIs or learning more creative ways to use technology to facilitate communication with and among students. Fellows with more specialized interests like these were more likely to be critical of the coverage of those topics in the Institute since its length did not allow in-depth coverage of these areas. However, staff from academic support units who were assigned as their partners often were able to provide the desired individualized help in specialized areas after the Institute, assisting in the development of scoring rubrics and processes for GSIs, digitizing primary source material, providing assistance for the embedding of video into class lectures, and helping Faculty Fellows create course “wikis” for students to share primary and secondary source materials.

### **Structure, Content, and Facilitation of the Summer Faculty Development Institutes**

1. Overall, Faculty Fellows were positive about the selection of activities and topics for the Institute and the way the sessions were structured. The task of developing a product during the Institute—a research assignment for an undergraduate class—was useful in focusing discussions and bringing up relevant implementation issues. A number of sessions involving videos and presentations about library resources, new technology, and syllabi development were rated as very valuable immediately after the Institutes. At the end of the four years, the sessions that stood out most vividly in Fellows’ memories were: (1) the live demonstration of students trying to carry out a library research assignment, and (2) “the assignment incubator” in which participants shared drafts of their assignments and provided feedback to each other. These two sessions might be viewed as most clearly communicating to Faculty Fellows the need of undergraduates for information literacy skills, and alternative strategies that they might use to address those student needs. In their interviews, Faculty Fellows also mentioned as engaging and helpful the presentation of examples of other Fellows’ research assignments, especially those demonstrating ways the research process could be broken into stages with instruction and feedback provided on the various component activities.

Faculty Fellows appreciated the alternation between short presentations by staff, presentations by Faculty Fellows from earlier cohorts or other Berkeley colleagues, and discussions among themselves in Institute sessions. The size of the cohorts (from nine to fourteen faculty) and frequent breakout discussions with three or four faculty per group led to a feeling of group cohesion and built the trust necessary for faculty to try out new ideas or less than fully developed plans. Faculty Fellows also valued the fact that Institute facilitators were flexible in allowing them to expand or introduce discussions on topics of particular interest, as well as provide them with supplementary resource materials and information. This flexibility and responsiveness to input and feedback was mentioned by a number of faculty participants.

The one structural feature that was rarely appreciated and often felt to be a burden was the homework assigned to be done during the evenings or days between sessions. This was true even though it was not unusual for comments about a day’s activities to generate reactions and productive discussion by others on the following day. In addition, those

who completed the homework assignments resented the fact that other Fellows did not contribute in this way to the dialogue.

2. The shortened length of the Institute in the final two years was felt to be both more manageable for participants' and staff schedules and sufficient for covering the introduction of the most important content. The continuous review and evaluation of all aspects of the project was especially visible in the major reduction in the time allotted to the summer Institute (from nine and eight days over three weeks in Years 1 and 2 to six and then five days over two weeks in Years 3 and 4). Feedback from the Faculty Fellows in the first two cohorts and the Institute staff was taken into account both in the decision to shorten and streamline the Institute and in deciding which topics should be eliminated or curtailed in their coverage. Interviews with Faculty Fellows confirmed the wisdom of most of the choices made in connection with this decision. Faculty Fellows in the first two cohorts thought the Institute was too long and included sessions that were not that useful, while faculty in the last two cohorts thought the length of the Institute was “about right,” even though coverage of some topics was fairly brief and introductory.

3. For Institute staff, coming to terms with the need to limit Institute presentations was helped by the realization that major curriculum change is truly a long-term developmental process and that support staff assigned to each Fellow would continue to provide needed input. When the project began, both staff and Faculty Fellows hoped that research assignments (and course syllabi) would be “ready to go” by the end of the Institute. However, it was soon realized that even a three-week Institute was not sufficient to guarantee that Faculty Fellows could work through all the component tasks that were involved in course revision. In their interviews, many of the Fellows reported that they are still working on aspects of their course redesign that they could not carry out the first time they implemented the research assignment. For example, a number of Fellows who ended up doing most of the instruction and grading of the assignments themselves the first time around intend to involve their GSIs more in these tasks in the future. A number of other Faculty Fellows reported that they intend to or have just recently incorporated a final component where students can share and respond to each other's work.

4. The topic of assessment turned out to be a particularly difficult one to cover satisfactorily at the Institute. The time devoted to this subject was reduced significantly after the first Institute but not eliminated (despite negative feedback from faculty participants). Coverage of this topic was maintained because Institute staff remained convinced of its importance in clarifying objectives for the research assignment and of assisting faculty to determine whether desired learning outcomes were being met. A new approach to providing input on assessment was begun the second year. However, there were still a number of Faculty Fellows each year that said they were put off by what they considered educational jargon and meaningless distinctions in the Institute presentations on assessment. This seemed to be especially true for those less sophisticated about pedagogy. In fact, when interviewed, many Fellows admitted they had received little or no training in graduate school about how to teach undergraduates or evaluate their learning. In the 3<sup>rd</sup> and 4<sup>th</sup> summer Institutes, faculty appreciated the presented examples of assessment strategies carried out in the courses of faculty from earlier cohorts.

However, judging from the generally positive feedback from faculty who participated in the assessment project, it appears that the topic of assessment may be most effectively communicated individually in relation to faculty members' particular assignments.

5. Collaboration between Faculty Fellows and their Implementation Teams was facilitated by introduction of support staff into activities at the Institute. In the interviews, faculty in the last three cohorts expressed appreciation for the time allotted during the Institute for them to get acquainted and begin consulting with staff from educational support units designated as their Implementation Team. In this regard, it is interesting to note that the first cohort of Fellows (who were not assigned an I-Team with representatives from various support units, or given time to interact with their Library Partners during the Institute) gave relatively lower ratings for the retrospective survey item, "I made personal connections with staff from [the various named units]."

Academic Partners who were on I-Teams during Years 2–4 also were quite positive about their experience attending the summer Institute and consulting with their assigned Faculty Fellow. Although a number of these I-Team members mentioned that their observer status during the Institute's group sessions seemed awkward, all understood the various priorities that were being juggled in the structuring of the sessions (e.g., the goal of collaboration among faculty and support staff and the goal of facilitating discussion and sharing among the faculty).

This collaborative feature of later summer Institutes, as well as other successful characteristics mentioned earlier, were highlighted in the ratings of benefits of the Mellon initiative on the faculty retrospective surveys. In evaluating the extent to which various aspects of the project were felt to be beneficial, Faculty Fellows, overall, gave the highest ratings to (a) stimulating conversations with other faculty about teaching, (b) gaining inspiration for improving my own undergraduate teaching, and (c) making personal connections with staff from the various support units. The ratings for items having to do with gaining insights about working with GSIs, gaining knowledge about integrating technology, and learning how to assess student learning of research skills were lower on average.

## **Implementation and Support of Course Innovations**

1. Additional time after the Institute was important in enabling Faculty Fellows to successfully implement research assignments in their revised courses. Not only did Fellows need to work out and sometimes revise details of assignment design, but they needed to work on tasks such as the drafting of specific instructions for each part of the assignment, preparation of concrete examples of completed assignments and information literacy processes, collection of library resources, working out the scheduling of library presentations and due dates for assignment stages, orientation and assigning of roles to GSIs, and making decisions regarding assessment, grading, and feedback to students. This preparation process was more time-consuming for Fellows with totally new or

multi-stage projects or assignments that required development or identification of a set of resources (such as a primary source collection or video archive).

2. Most Faculty Fellows found the support and involvement of an Implementation-Team extremely useful in their preparation for implementation, even though these consultations also demanded time, preparation, and scheduling. In their interviews a number of Faculty Fellows from Cohorts 2–4 commented on their new appreciation for the skills and knowledge of members of their I-Team and the degree to which partners from the Library, Educational Technology Services, The GSI Teaching and Resource Center, and the Student Learning Center could be of assistance in successful course development and the implementation of research assignments. This individualization of support and feedback was also important to serve the varied needs and preferences of the various Faculty Fellows. The roles and tasks assumed by supporting Academic Partners in all four years was also somewhat determined by their own interests, strengths, experience, and personalities.

3. Changes in the structuring of the implementation support component across the four years of the project were significant. The emphasis in the first year was on the involvement and inclusion of a large cadre of Library staff, several for each Faculty Fellow, who could sustain collaboration with faculty in the future. In contrast, the emphasis in later years was more on the selection and preparation of a smaller number of Library, Educational Technology Services, and Graduate Student Instructor Center representatives as specialists in course development and faculty consultation. In these later years each Fellow was assigned a team of partners from each of the academic support units to consult with (an Implementation-Team), and input and feedback from these partners began during the summer Institute. As noted earlier, I-Team members during Years 3 and 4 were invited to attend summer Institute sessions as observers to become more familiar with the material and issues being discussed by Faculty Fellows and were also encouraged to meet with their assigned Faculty Fellows during breaks and to respond to on-line postings of questions and assignment drafts. Library Fellows also met periodically together during the academic year to share challenges and best practices for consulting with faculty. These changes in the way I-Teams were constituted and prepared for their individualized and intensive consultation work with Faculty Fellows after the Institute appear to have resulted in more productive and collaborative relationships.

4. The role, preparation, and number of Graduate Student Instructors are crucial factors in the successful implementation of research assignments in large-enrollment courses. Faculty Fellows who attempted to implement research assignments in large-enrollment classes without GSIs found it extremely taxing. A number of them reported that they would not continue to implement research assignments unassisted in these particular courses again. Data from surveys indicated that GSIs also felt that they could not work with large numbers of undergraduates if they were expected to provide adequate clarification, support, and feedback to students about their work on research assignments. This was especially the case if they were expected to support the development of higher order research skills such as analysis and synthesis of library material as well as to review

large amounts of course lecture and reading materials. There was unanimity of thought from both sources, then, that sufficient GSI resources are needed to ensure successful implementation of research-based learning in large-enrollment classes, at least as these assignments have been conceptualized by Faculty Fellows over the past four years.

The utilization of Graduate Student Instructors was discussed in the summer Institutes but no GSIs who had assisted previous Mellon courses were involved in these presentations and discussions. And, although Graduate Student Instructors usually played a key role in the implementation of research assignments in Mellon courses, they were not often included or consulted during the planning and preparation stage by Faculty Fellows and their I-Teams. There are difficulties in involving GSIs in this type of activity. For example, GSIs are not assigned at the point faculty are doing advance planning for the course. However, some Faculty Fellows and the Assessment Consultant did describe examples of ways GSIs had been involved in course planning and decision-making that might be profitably shared, discussed, and expanded on with other faculty.

In their surveys some GSIs suggested that mechanisms for providing individual assistance to some students (such as freshmen and students with English as a second language) were needed to scaffold learning in courses with research assignments. They also thought that providing demonstrations of research processes and examples of research products would be helpful to many underclassmen. Although GSIs favored the strategy of breaking research assignments into stages, some commented that evaluating and providing feedback for multiple research assignments as well as grading exams for large numbers of students consumed an enormous amount of time. Finding strategies for ensuring the equitable grading of research assignments across the sections was another challenge that both Faculty Fellows and GSIs encountered.

5. Three other challenges were among those frequently faced by Faculty Fellows and their I-Teams in designing and implementing research-based learning in undergraduate courses: 1) Managing the different needs and preferences of heterogeneous groups of students; 2) Providing authentic contexts for sharing and collaboration and for receiving and benefiting from feedback; and 3) Balancing clarity, structure, and manageability of research assignments with provision of opportunities for choice and creativity. Although these issues were raised during the summer Institutes, they may have become more salient to faculty once they actually experienced the problems first-hand. Faculty Fellows and Academic Partners suggested that collections of specific examples of design strategies might give faculty ideas for ways to meet these implementation challenges. Thought needs to be given to ways to provide such input to faculty and engage them in further discussion of these problems once they have experienced them in the context of their own courses.

The courses taught by Faculty Fellows enrolled both underclassmen and upperclassmen, students who differed in their previous experience with libraries and research assignments, and had majors in various subject matter disciplines. These differences among students made planning and implementing meaningful and motivating research assignments very challenging. On the student surveys, juniors and seniors taking these

courses were much more likely to report they had previously taken courses where research assignments, projects, or papers were assigned and where instruction on the use of the Library was a component of the class. Ratings and comments from the surveys suggest that these upperclassmen were less likely to be positive about what they learned from the assignment, especially if they felt that the assignment was focused on library research tools they felt they already had acquired or was insufficiently connected to the subject matter of the course. A number of Faculty Fellows have suggested that introductions to these assignments should place less emphasis on the goals of having students learn how to use the library or do research and more on the goal of making learning experiences in the course more exciting.

Some Faculty Fellows structured their assignments to be done by groups of students to facilitate collaboration and enjoyment, reduce the research burden, and develop students' presentation skills. Some Fellows also wanted to develop a way that students could receive and benefit from feedback, both from instructors and from peers. However, team projects presented challenges and difficulties of their own. Among the difficulties mentioned were: the coordination and scheduling of group meetings, the uneven sharing of tasks and responsibilities among group members, and the time required for group presentations in sections or lectures. Grading of these projects was also a challenge. Many of the Fellows who attempted such projects reported that they intended to shift to individual projects in the future, although some other Fellows said that they might implement either a website or poster presentation format so that students could share the products of their research and benefit from others' feedback.

A third challenge encountered by Fellows and their Implementation-Teams was deciding how much flexibility should be built into the research assignments, especially regarding the topics being researched by students. On the one hand, many students enjoyed being able to investigate a question that intrigued them and that they felt was worth the investment of their time. Yet other students, given a great deal of flexibility, had difficulty coming up with a research topic or finding relevant sources of information. Providing more structure and less choice often made the research assignment more manageable because faculty could ensure that relevant resources would be available, instructions could be made more specific, and GSIs could have the background necessary to give assistance and feedback. But some undergraduates felt such research assignments were too restrictive. A number of strategies were developed by Fellows to balance these two alternatives, such as developing a limited menu of topics that students could choose among, or selecting a problem that had many different aspects or specific examples that could be researched.

## IMPACTS ON THE CAMPUS CULTURE OF LEARNING

Questions relevant to assessing the impacts on the broader campus learning culture concerned:

- (1) The immediate instructional effects and accomplishments of the Mellon project,
- (2) The way that interactions within and among departments, across campus academic support and administrative units, and between Berkeley and the broader academic community have been affected so far,
- (3) How course redesign might be more effectively supported in the future.

These questions were addressed by reviewing project and University records, Faculty Fellow and Academic Partner interviews, GSI surveys, and surveys from a sample of faculty colleagues of Mellon Fellows. (Attachment 6 contains The Faculty Colleague Survey.)

### **Immediate Instructional Accomplishments of the Mellon Initiative**

1. Forty-eight faculty members at U.C., Berkeley, 20 women and 28 men from 32 different departments and representing all ranks from lecturer to full professor, participated in the Mellon Initiative as Faculty Fellows during the four years of the project. These Fellows represent 3% of the 1585 Berkeley ladder faculty and lecturers that are involved in undergraduate education. Although this is a small percentage of Berkeley's undergraduate instructional faculty, research (e.g., Garet, Porter, Desimone, Birman, & Yoon, 2001) suggests that, if professional development is to be effective in fostering changes in teaching, the emphasis should be on providing high-quality experiences of some duration rather than on simply trying to involve large numbers of faculty.

2. Faculty Fellows participating in the Mellon Library/Faculty Fellows for Undergraduate Research initiative between 2003 and 2007 redesigned 44 lower-division and upper-division courses, providing research experiences involving library resources to 12,576 distinct undergraduate students at the University of California, Berkeley. Thirty of the 44 courses were taught more than once during this period. Four redesigned courses have not yet been offered as of December 2007. Twenty-nine of the Mellon courses were lower division offerings and 59 courses were taught with enrollments of more than 100 students.

In addition to these courses that were explicitly designed for the Mellon initiative, quite a few Faculty Fellows described how they have included similar research assignments or used similar library resources or technological strategies in other courses they have taught or intend to teach. Mellon Fellows have been involved as judges in the Library Prize for Undergraduate Research and five of them have mentored students who have been recognized in the competition. Thus, the number of courses and students affected directly or indirectly by the work of the Mellon Fellows is even greater than the figures cited above suggest.

For future evaluations of the direct effects and implications of this project, it would be interesting to assess how many of the 48 Faculty Fellows are still employing research assignments in large enrollment lower-division undergraduate courses versus other undergraduate courses, what types of research assignments have been sustained in lower-division, high-enrollment undergraduate courses, what types of additional modifications to courses and assignments have been implemented, how many resources developed for these assignments are still being employed, and how many of the support staff have continued to be called on to assist these or other courses taught by these faculty members.

3. More than 80 University staff members from the Library, the Educational Technology Services, the Graduate Student Instructor Teaching and Learning Center, the Student Learning Center, the American Cultures Center, and the Division of Undergraduate Education have volunteered for, collaborated in, and contributed to the Mellon initiative as Academic Partners or members of the Steering Committee. Staff from these units assumed various roles in the Mellon project based on their positions, experience, and subject specialties. Directors, assistant directors, or managers in these units contributed to the decision-making and guidance of the project through their work on the Steering Committee and to the development and presentation of the summer Institute curriculum. Other staff from these units with specialties that matched the needs of Faculty Fellows (e.g., knowledge of resources in particular subject matter areas, primary documents, media, e-learning, instructional design, GSI training, etc.) served on the I-Teams supporting the Faculty Fellows.

4. A considerable number of Graduate Student Instructors have received orientation and experience in assisting the implementation of a research component in undergraduate courses. So far, the Mellon project has identified 108 GSIs who have assisted in the revised courses of a subset of Faculty Fellows.

### **Departmental/Interdepartmental Conversations about Curriculum and Teaching**

1. Many Mellon Faculty Fellows, especially from the early cohorts, have participated in and made important contributions to inter- and intra-departmental conversations about ideas for implementing research-based learning in undergraduate courses and strategies for overcoming challenges to this type of teaching.

A number of strategies employed by project staff have facilitated this type of communication. For example:

- One Mellon Principal Investigator and the Project Director met with various Deans and Department Chairs to encourage participation of faculty in the project and subsequent departmental discussions about research-based learning in undergraduate courses.
- Faculty Fellows, especially in the first cohort, were reminded that they were expected to share information about the initiative and their own teaching innovations with their department.
- Mellon Innovation Funds were made available to Fellows for the development of cross-departmental curriculum innovation projects.

- Fellows were invited to participate in University-wide events such as the e-Berkeley Symposia.
- Fellows from the first cohorts were invited to assume responsibility for organizing and leading discussions at the Mellon “Salons,” cross-cohort social and information-sharing gatherings of Fellows.

2. Interviews with Faculty Fellows and surveys from nine colleagues of Faculty Fellows suggest that most departmental faculty still know very little about the Mellon initiative and its particular activities. Some department faculty who were surveyed understood the general goal of the Mellon initiative and some reported that they knew a few faculty members who had participated. This lack of specific knowledge about the Mellon Initiative is not too surprising given the decentralized entrepreneurial culture at Berkeley with faculty being focused primarily on their own activities and not those of other faculty, other departments, or the University in general.

However, many Mellon Faculty Fellows and Faculty Colleagues indicated that there had been either formal or informal conversations in their departments about research-based learning in relation to reforming the undergraduate curriculum. Thus, the Mellon initiative may have indirectly affected the profile of this reform issue at UC Berkeley, without faculty being aware of this particular source of the increased attention.

The extent to which these conversations have produced changes in the teaching of other faculty will be considered at the end of this section. But, it should be noted that a few of the Faculty Fellows who are on their department’s curriculum committee or who are the head of programs within their department had much more interest in finding ways to coordinate courses within their department to eliminate overlap and create a progressive building of research skills in their undergraduate majors. Even though faculty members in these positions change over the years, enlisting the participation of more such departmental leaders might foster changes in curriculum.

3. According to data from the Faculty Fellow interviews, the Mellon initiative was effective in changing the perceptions of many faculty members about ways librarians and staff from other support units might collaborate with them to change their courses. Many participating faculty said that, in the future, they would not hesitate to contact their former I-Team members to solicit assistance on course innovations or to recommend that their colleagues take advantage of these helpful resources. Some Faculty Fellows stated that, although they had not called upon some members of their I-Team for their first implementation effort, they thought they might do so in the future.

### **Broader Efforts to Promote the Reform of Undergraduate Education**

1. During the past four years, the Mellon Library/Faculty Fellowship for Undergraduate Research initiative has played a role in facilitating Berkeley’s consideration of ways to improve undergraduate education through its contribution to and influence on a number of campus-wide initiatives. For example:

- Mellon Academic Partners and Faculty Fellows have contributed ideas, experiences, and examples to the Educational Effectiveness Review focused on enhancing

undergraduate education at Berkeley that was part of the most recent WASC accreditation process.

- Materials developed for the Mellon summer Institutes have influenced discussions in the American Cultures Center programs, the GSI Center workshops and publications, and the Presidential Chairs Program run by the Office of Educational Development.
- Eleven Mellon Faculty Fellows and most of the Mellon Steering Committee have participated as speakers or panelists in two e-Berkeley Symposia, one on “Teaching and Critical Thinking in the Point-and-Click Age” and one on “Rethinking Large Enrollment Courses: New Ideas for Teaching and Learning.”
- Members of the Mellon Steering Committee and Mellon Faculty Fellows have been involved in discussions about proposed initiatives to introduce new faculty to academic support services and to create an “Introduction to the Research University” orientation for incoming freshman.
- Members of the Mellon Steering Committee and one of the Principal Investigators are playing key roles in a new campus-wide project launched in Fall 2007 to support academic departments in establishing educational goals and evaluation procedures for all undergraduate programs (The Undergraduate Student Learning Initiative).

2. Key partners in the Mellon Library/Faculty Fellowship for Undergraduate Research initiative have continued to meet and work together collaboratively to integrate their services and resources to improve undergraduate teaching and learning. For example, The Library and Educational Technology Services have worked together to integrate library services and collections into ETS’s implementation of the Berkeley campus’ open-source learning environment and course management system. They have also collaborated in sharing of ideas and expertise and contributed to the activities sponsored by the Council of Academic Partners (such as the e-Berkeley symposia described above).

3. Mellon initiative Academic Partners and Faculty Fellows have shared information about the project with faculty, library professionals, and administrators and staff from other universities at local, regional, national, and international conferences and workshops. For example, Mellon partners and Faculty Fellows have shared insights and experiences from the project with library staff, faculty, and administrators from Cornell University. A culminating part of this consultation will occur in March 2008, when Mellon project facilitators and a subset of Mellon Faculty Fellows will present a sample professional development institute to a delegation from Cornell. Over three days, information, materials, advice, and examples of work done in connection with the Mellon initiative at Berkeley will be drawn on to help Cornell representatives gain the motivation, background, and ideas to start a similar initiative on their campus.

4. A great strength of the Mellon Library/Faculty Fellowship for Undergraduate Research initiative has been the extensive and constantly updated documentation of the project on its website. Not only are activities of the project described, but profiles of participants, examples of course syllabi and research assignments, and different types of resources for faculty and support staff have been made available. Even media products such as brochures and illustrative video clips have been made available for download.

Both Faculty Fellows and the sample of Berkeley faculty colleagues mentioned that when they heard about the Mellon project and wanted to know more about it, they went to the project website to obtain additional information. Some of the Cornell group also were impressed with the richness of this resource. As is often the case, the chief challenge to making the project website more effective is finding ways to make it visible to a greater number of faculty and staff at Berkeley and on other campuses. Another future challenge may involve finding the means to maintain, update, and support its expansion.

With regard to future updates and new functions for the website, an online publication series featuring, for example, articles written by Faculty Fellows and their I-Teams about their course revisions might be a useful addition. This idea, suggested by one of the Faculty Fellows, would enable faculty not only to share insights and offer concrete examples of course research assignments but would provide a valued professional reward to participating faculty and staff.

### **Institutional Support for Course Redesign**

According to both the research and the best practice literature, professional development without support and follow-up has little impact (cf. Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Little, 1993). The Mellon Library/Faculty Fellowship for Undergraduate Research initiative was structured to provide both immediate and extended support for Faculty Fellows for their course redesign.

1. Key UC Berkeley support units not only collaborated with one another to create change in curriculum and instruction through the planning of the Mellon initiative in the Steering Committee, but also worked together to support faculty by facilitating summer Institute sessions and consulting with individual faculty during the following year.

The principal units involved and the types of support they provided were as follows:

- **The University Library:** The Library has a collection that includes over 10 million volumes, 81,000 current serial titles, and access to more than 300 electronic databases and 9,000 e-journals. Archival and special collections, in both original and digital formats, include some 500,000 volumes, 60,000 linear feet of manuscript materials, and five million pictorial materials. The Library includes a main and undergraduate library complex, and more than twenty-one subject specialty libraries. These resources are central to the implementation of research-based learning in undergraduate courses. In addition, the Library assigns librarians with specific knowledge of library collections in the various subject matter areas or with specialized expertise (for example, in accessing media or primary resource materials) to assist faculty in instructional uses of these resources. Online information is also available to faculty about how to design effective assignments using library and Internet resources. For the Mellon project, more in-depth and personalized support was offered. Librarians were assigned to act as consultants to all Faculty Fellows. They helped course implementation through activities such as providing input about constructing the assignments, collecting resources or references for the assignment, delivering library instructional sessions tailored to the assignment, or providing online tutorials or instructional materials on course websites. One

librarian served as the Assessment Consultant for the Mellon project, providing background on student assessment to Fellows during the summer Institute and working intensively with a subset of Fellows each year on articulating learning goals for students and developing formative and summative assessment techniques to evaluate achievement of those goals. The Mellon project and its participants also benefited from the strong administrative support of the Library because the University Librarian was a Principal Investigator and the Project Directors and Manager were key Library staff.

- **Educational Technology Services:** ETS promotes and supports the effective integration of technology in teaching, learning and communication at Berkeley. It is the central campus resource providing course web sites, classroom technology support and installation, webcasting, multimedia production, teleconferencing, video and audio, and technology support for University events. ETS also provides consulting and training to faculty on how to use these tools for effective teaching, learning and communication. It has a “how to” library of information and resources about bSpace, Berkeley’s online collaboration and learning environment. For the Mellon project, besides providing an orientation to bSpace and other ETS resources at the summer Institute, an ETS staff member joined each Faculty Fellow’s I-Team in years 2–4. Mellon Faculty Fellows in the final three cohorts requested assistance from the ETS member on their team in activities such as setting up an on-line drop-box for assignments, creating digitized materials related to the research assignment, training students to develop presentations in PowerPoint, and creating a wiki to support group contributions to a research project.

- **The Graduate Student Instructor Teaching and Resource Center:** The GSI Center provides pedagogical support and guidance for graduate student instructors at Berkeley through orientation conferences, workshops, individual consultations, a newsletter, an online teaching guide, and a library of books, articles, videos, and other reference materials on teaching. It also works with faculty who teach with GSIs and departments that are developing discipline-specific pedagogical seminars for their GSIs. The GSI Center conducts a three-session seminar series for faculty and maintains an extensive collection of resources for faculty on its website to assist them in working with their GSIs. During the Mellon summer Institute, staff of the GSI Center described the way that Berkeley orients and mentors GSIs and answered Fellows’ questions about possible roles for GSIs in the implementation of the research assignments. During the last three years of the project, a GSI Center staff member was assigned to assist each Faculty Fellow in completing their plans for implementing their revised course, specifically with regard to preparing their GSIs for the tasks they would perform.

- **The Division of Undergraduate Education:** The Division provides campus-wide leadership for undergraduate education and administers faculty and student programs that support and assess excellence in teaching and learning. The Vice Provost for Undergraduate Education who heads the Division was one of the Principal Investigators for the Mellon initiative. The Assistant Vice Provost and the Principal Analyst in the Division both served on the Mellon Steering Committee. This strong and supportive infrastructure in the Mellon project provided not only administrative connections among key partners in the project but also assured a thorough knowledge of campus policy, planning, and programs. In addition, these leaders of the Division took part in presentations and discussions during the summer Institutes. As a number of Faculty

Fellows remarked, the high-level institutional support for the project signaled by the participation of these administrators in recruitment efforts was a factor in bringing the project to their attention and in helping them decide to participate.

- **The Office of Educational Development:** The Office of Educational Development (OED) supports, enhances, and publicizes the teaching efforts of faculty at Berkeley. Its services include individual consultation with faculty on all aspects of their teaching, classroom observation and videotaping, and awards and grants. OED works closely with and provides support for the Committee on Teaching of the Berkeley Division of the Academic Senate. OED maintains an online library of materials on various teaching topics and a downloadable video library of discussions and demonstrations about teaching practices by recipients of Berkeley's Distinguished Teaching Award. It also sponsors informal get-togethers for new faculty and a campus-wide forum each semester on a topic of current interest to faculty. The Director of the OED was a principal facilitator of the Mellon summer Institutes and was available for consultation throughout the implementation phase of each Faculty Fellows' revised course.

- **The American Cultures Center:** The campus-wide American Cultures requirement at Berkeley introduces undergraduate students to the diverse cultures of the United States through a comparative framework. Courses are offered in more than forty departments in many different disciplines at both the lower and upper division level. The American Cultures Center provides support for the requirement and for faculty developing and teaching those courses. The AC program sponsors informative presentations, roundtables, and panel discussions for faculty, GSIs, and current or prospective students and also offers an intensive summer seminar for faculty that is followed up during the following year with meetings where faculty can discuss their AC teaching experiences. During the second year of the Mellon initiative, when the focus shifted toward enlisting the participation of faculty who were teaching high impact, large enrollment or gateway courses, recruitment efforts centered especially on faculty who were teaching American Cultures courses. The American Cultures coordinator joined the Mellon Steering Committee in that year and was involved not only in recruiting AC faculty but also in presenting content especially relevant to those courses at the 2<sup>nd</sup> Mellon summer Institute. During the 3<sup>rd</sup> and 4<sup>th</sup> year of the project, the American Cultures coordinator and librarian served primarily as ad hoc consultants to Faculty Fellows developing new AC courses.

2. There were wide individual differences in the types and amount of support actually utilized by Faculty Fellows and in the way I-Teams worked to assist the implementation of research-based learning in these revised courses. The flexible approach of the Mellon project and its staff during both the summer Institute and during the subsequent implementation phase enabled the project to meet the needs, goals, preferences, and styles of the various participating faculty, yielded a diversity of ideas and approaches to course redesign, and was at least partially responsible for the generally positive reactions of faculty to their overall experience.

As detailed in the preceding sections, the Mellon project was designed to provide coordinated and varied types of support to assist Faculty Fellows in designing and implementing undergraduate course revisions that contained research assignments. The

intensive summer Institutes provided Faculty Fellows with an introduction to the resources and functions of the various support units and to key staff from those units. The Institute sessions also provided participating faculty with opportunities to share knowledge and ideas and to collectively solve problems of practice with other faculty colleagues. However, Faculty Fellows left these Institutes with their plans for their courses at different stages of development, partly because some were planning only minor changes to existing assignments while others wanted to implement much more major changes in their courses or were developing entirely new ideas while there.

After the summer Institute concluded, many Faculty Fellows conferred with members of their I-Teams and, sometimes, with other Mellon project consultants. Some Fellows appear to have asked for no assistance from their I-Teams or only limited support such as requesting a presentation on library resources for their students. A few Faculty Fellows said that they planned to consult with a member of their I-Team about additional modifications of their assignment during the coming year.

Some Fellows consulted individually with one or more members of their I-Team on specific problems, and some worked more collaboratively with their team, meeting either as a whole group or with subtask groups. In some Fellow/I-Team collaborations, faculty directed the topics and tasks being addressed; in others, an I-Team member organized the meetings and the discussion agenda. In the early years of the grant, not all library partners or I-Team members were confident enough or willing to take on a fully collaborative role in course development, although they enjoyed being involved and helping out in small ways. In the last two years when support staff had more experience assisting Faculty Fellows and access to examples of previous successful assignment implementation, I-Teams were more apt to play a substantial planning role. Thus the nature of I-Team interactions and consultations differed, although I-Teams involved in the assessment project had generally more extensive and collaborative exchanges.

These differences in the ways Faculty Fellows utilized support for course development and teaching innovations seem important to note for the future. For a large diverse campus like Berkeley, there are advantages to having multiple and alternative ways for faculty to obtain immediate and long-term input and support for course redesign that can accommodate individual differences in pedagogical sophistication, learning and interaction style, and readiness to try new ways of teaching.

3. Faculty Fellows most frequently suggested the following types of additional support as important for future implementation of research assignments in large enrollment courses:

- Greater GSI support,
- Enhanced visibility and rewards for teaching innovations, and
- Supportive institutional policies regarding evaluation of their teaching while trying out new instructional approaches and practices.

The importance of adequate GSI support has already been discussed in connection with the implementation and sustainability of course innovations by Mellon Faculty Fellows.

Faculty Fellows' colleagues also mentioned insufficient GSI support as a roadblock to the adoption of research-based learning in other large undergraduate courses. In addition, GSIs, themselves, pointed out they found it hard to adequately support and provide feedback to students about research assignments if they were assigned large sections or expected to thoroughly review lectures and readings for the course in sections. These data sources, then, all suggest that successful implementation of many types of research assignments in large enrollment undergraduate courses requires more GSI resources. Given the currently available funds for GSIs, the campus may want to consider targeting other types of courses as a more effective next strategy. Also, newer models of the roles and preparation of GSIs may need to be emphasized. During their interviews some Faculty Fellows described the positive effects of interacting with their GSIs in a more collaborative way around the planning and evaluation of the research assignments. Such ideas might be usefully shared and discussed with other faculty.

Faculty Fellows felt personally rewarded by their participation in the Mellon initiative in taking steps to become better teachers and in meeting other faculty with similar goals. Many of them (especially the lecturers and assistant professors) also appreciated the monetary stipend since it partially compensated them for the time they devoted to the project during the summer. However, a good many Fellows felt that the time and work they put into planning, structuring, and implementing these assignments was not given much visibility on campus, recognized by others in their department, or weighted much in tenure and promotion applications (despite recent campus policies to include more questions about teaching on the bio-bibliography forms).

Colleagues of these Fellows also echoed this sentiment about the meager professional rewards for such endeavors. Hopefully, the new Undergraduate Student Learning Initiative, which is encouraging academic departments to establish educational goals and evaluation procedures for undergraduate programs, will also consider ways to reward departmental faculty for efforts to meet those student learning goals. And the campus as a whole needs to continue to find multiple and varied ways to publicize faculty participation in teaching improvement efforts such as the Mellon initiative.

A third type of support that was mentioned as desirable by Faculty Fellows was formal recognition by departments of the fact that implementing teaching innovations is an experimental and developmental process and that novel approaches to undergraduate instruction may not always work the first time. The risk of poor student course evaluations was especially worrying to Faculty Fellows who were lecturers or untenured professors and who felt their positions might be threatened by such a result. Such concerns reinforce the importance of the campus developing additional and more contextualized ways of evaluating teaching excellence.

4. Plans for sustainability and expansion of the Mellon initiative may need to be revised, given the lessons that have been learned in various aspects of the project and given the current budgetary crisis in California.

The original plans for sustaining the Mellon initiative involved targeting instructors, especially those teaching American Cultures (AC) courses or those in positions of

influence who would function as change agents on campus. They would fulfill this role by leading discussions on campus; promoting the importance of library collections, undergraduate research, and information literacy to their colleagues; sharing materials and ideas with other faculty; and teaching courses that would be offered regularly by departments to fulfill the campus-wide AC requirement. After the Mellon funds were expended, it was hoped that the campus could continue to support the summer Institutes for other cohorts of faculty teaching AC courses (though without stipend). With an improvement in the state budget climate, the intention was to extend the program to faculty teaching gateway courses within departmental majors.

A second aspect of the plan for sustainability involved strengthening collaboration among key campus Academic Partners both for the Mellon Library/Faculty Fellowship for Undergraduate Research and for future initiatives. A third part of the sustainability effort involved preparing a substantial group of librarians and staff from other academic support units who would have expertise in working together to assist faculty in restructuring syllabi and developing assignments that incorporated undergraduate research. It was hoped that the individual support units would absorb some of the staff costs associated with continuing to provide support services to the successive cohorts of Faculty Fellows. A fourth part of the sustainability plan was to expand on-campus expertise in student learning assessment that could be utilized by Fellows to help promote effective implementation of research-based learning. The intention was to make the assessment of student learning part of the job assignment of the Library staff member who had acquired expertise in that area.

The following challenges confronted by the Mellon project may require modifications in this four-part plan to achieve sustainability:

- With regard to creating a critical mass of faculty “change agents,” the plan was for the campus to continue to support the summer Institutes for other cohorts of faculty teaching AC courses or gateway courses within departmental majors. The current sizable budget deficit in California and the threat of a 10% cut in funding for the University may make this part of the sustainability plan much more difficult to achieve and other consistent sources of funding may need to be pursued.
- The Mellon initiative was fairly successful in enlisting the participation of Faculty Fellows in departmental and campus-wide discussions of undergraduate teaching reform and in the sharing of examples of research assignments devised for large enrollment classes. However, it is not clear whether these events or a possibly greater awareness of the topic of undergraduate teaching reform have resulted in actual changes to the teaching done in other large enrollment lower-division courses. The challenges described in point #3 above are examples of some roadblocks to wider adoption of research-based learning in those courses. Judging from the faculty colleague survey, greater awareness of the need for effective integration of research and undergraduate teaching may be having more of an effect on smaller upper division courses, but that is a possibility that needs further investigation.
- The surveys collected from the sample of faculty colleagues also reveal crucial differences in various faculty members’ views of their teaching role and understandings of the goals of the Mellon initiative that may limit expansion of the initiative. Some

faculty colleagues who returned surveys said that engagement in research assignments fosters a questioning perspective and develops marketable skills in undergraduates. But others maintained that their primary job was the teaching of content and that the teaching of library search and resource evaluation skills was not. They suggested that this was a type of teaching that librarians are trained to do, and should carry out. With regard to this overly narrow view of information literacy, it is possible that the new Undergraduate Student Learning Initiative may make faculty aware of key educational goals that a broader view of research-based learning might achieve. But the Mellon initiative may also need to seek ways to clarify its most basic goals—communicating to faculty that the point of engaging students in research assignments is not just to get them to go to the library but to make them more active in discovering and processing course information and to make the course a deeper and more valuable experience.

- Another roadblock to sustainability of curriculum change within key AC or gateway classes is the practice of rotating the teaching of lower division large enrollment classes among different faculty. The fact that different or multiple faculty teach key gateway courses means that it is hard to maintain innovations in a targeted set of classes.
- A barrier to future extensive collaboration of I-Teams with new Faculty Fellows and continued assistance for existing courses by support staff are the limited resources of the various partner units. The current budget crisis in California may make it harder for these units to assume the costs of extensive individualized faculty assistance. Consequently, implementation support for future courses may need the exploration of different approaches such as on-line modules and collections of concrete examples of course innovations, expansion of courses and presentations for multiple faculty members, and peer mentoring by Faculty Fellows from previous cohorts.
- The Mellon Initiative's plan to create sustainability by strengthening collaboration among key campus Academic Partners has been quite successful, judging from the joint efforts already undertaken and those still being planned. One challenge common to all intervention programs involves sustaining the effort and long-term vision if key individuals in the partnership change jobs or leave the University. Although the Mellon Project has already successfully managed a transition between Project Directors during the second year, future losses in leadership may be more significant unless mechanisms are put in place to prepare for regular changes in project management and direction. The recent loss of the Assessment Consultant is a case in point. Carefully planned and mentored transitions in management may also benefit the project through the injection of new ideas and renewed vigor of key participants.
- Innovations in teaching need to be tied to continuous research and evaluation work—to enlist the participation of skeptical faculty, to obtain additional extramural funding for the project, and to reward participating faculty and staff in a way that counts professionally and is consistent with the research focus at Berkeley. Instituting research groups on different topics and an online publication series might be possible ways to facilitate such work. Efforts to assess student outcomes of the Mellon initiative should also be coordinated with other campus evaluations such as those proposed by the Undergraduate Outcomes Task Force and those carried out in connection with the University of California Undergraduate Experience Survey (UCUES).

## IMPACTS ON STUDENT LEARNING

Questions originally posed regarding the impacts of the Mellon initiative on student learning focused on the perceived value of the research assignments to students, the types of student learning assessment that were designed and carried out by Faculty Fellows, the obstacles to effective assessment of students' research and information literacy skills, and the ways students demonstrated changes in these skills (see Attachment 1).

Although some data were collected relevant to all of these questions, this evaluation summary concerns primarily student, faculty, and GSI **perceptions** about the value of the research assignments to students. Information relevant to the questions concerning Faculty Fellows' plans for the assessment of student learning and obstacles to student learning assessment is contained primarily in the report of the special Assessment Project carried out with nine Faculty Fellows during the final three years of the project. Performance data (completed assignments or sequenced assignment sets collected from a random sample of 25 students in each of the six courses taught during the final year of the project) have, so far, been studied only by the Assessment Consultant in order to give feedback to Faculty Fellows involved in the Assessment project. These data will not be summarized in this report.

Even while limiting the analysis of student impacts to student, faculty, and GSI perceptions of learning, it is necessary to ask some other preliminary questions. The first question has to do with the **goals** of the Mellon research assignments, i.e., what faculty wanted students to gain from their library research experiences and why those goals were selected. The second set of preliminary questions concerns the **methods** used to implement the assignments and how well the procedures worked in these particular courses. Finally, one can ask about the **perceived benefits** of the assignments, from the point of view of students and faculty, and of the graduate students who assisted in the course and usually graded the assignments.

### Goals and Rationale for Mellon Research Assignments

The most general reasons for incorporating library research assignments into undergraduate courses could be worded as wanting (a) to engage students in discovering knowledge for themselves (i.e., involving them in activities other than listening to lectures and studying assigned reading) and (b) to build undergraduates' knowledge and skill in working with information resources. The decision to focus the resources of the Mellon initiative on reaching a large number of Berkeley students was based partly on the presumption that most undergraduates are not currently getting enough opportunities to acquire information literacy skills that are well-integrated with their coursework. Data from the student survey provided some information related to the assumption about the research and library experiences of Berkeley undergraduates enrolled in Mellon courses. Data from the Faculty Fellow interviews provided more information about the specific goals that ended up being the focus of the research assignments implemented in the Mellon courses.

1. A majority of students in the six new Mellon courses taught during the 2006-07 academic year reported some previous research and library orientation experiences, but also indicated that they most frequently used a non-library search engine like Google for research.

Three-quarters of the 620 undergraduates responding to the 2006-07 Mellon Student Survey reported that they had completed at least one previous research assignment for a course at U.C. Berkeley.<sup>3</sup> One-third of the total sample said they had completed three or more previous research assignments. At the same time, 74% of students in these six classes indicated that, during the current year, they had used a non-library search engine like Google for research “often” or “very often.” Over 90% of the 143 students who said they had no previous research experience were freshmen or sophomores. Within the six separate courses, lack of previous research experience varied considerably (from 1% to 40%). In general, however, courses with a high concentration of lower-division students also had more students lacking previous research experience.

With regard to undergraduates’ library knowledge, one fifth of the surveyed students reported no previous library education experiences of any sort, and, again, about 80% of students without such orientation were freshmen or sophomores. In the six new 2006-7 Mellon classes the percentages of students with no previous library education at Berkeley ranged from 10–30%. The most frequent type of previous library orientation (reported by a little less than half the sample) was instruction given as part of another course at Berkeley. One third had taken a library tour, and one third claimed to have had some type of self-guided library instruction. The 2006 UC Undergraduate Experience Survey (UCUES) adds another bit of information to this picture of library use by Berkeley undergraduates. In answer to a question about how often they used the campus libraries including online resources, 24% of the approximately 10,000 respondents said that they used the library once or less during an average term.

Although these data suggest that a majority of Berkeley undergraduates eventually get some exposure to research-based learning and to library resources, the question of what types of research skills they gain through these other experiences is important in evaluating the added value of the Mellon research assignments.<sup>4</sup> A corollary question concerns what particular learning goals the Mellon Faculty Fellows emphasized in the design of their assignments, since one research assignment cannot, by itself, develop all types of desirable research skills and attitudes. Drafts of the research assignments submitted by Faculty Fellows at the end of the summer Institute (and sometimes updated in subsequent years) provide some information about their particular goals for student learning. However, the clearest descriptions of priorities and emphases in these learning activities were provided during interviews conducted with 24 of the Fellows as reflected in the discussion of the following point.

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<sup>3</sup> On the 2006 UC Undergraduate Experience Survey (UCUES), a similar percentage of Berkeley juniors and seniors (77.8%) reported completing a research project, creative activity, or paper as part of their coursework.

<sup>4</sup> In this study, the only information relevant to this question are comments made by some students on their survey in explaining what they had or had not learned through their Mellon research assignments.

2. The research assignments designed by the various Mellon Faculty Fellows differed in terms of their connection to the course content and the configurations of library resources and research skills they targeted.

Some of the Mellon research assignments were closely connected to the subject matter of their embedding courses but others focused more on the enrichment and extension of distinctions, theories, or concepts. Still others had as their primary focus the fostering of an inquiring attitude or orientation toward research in the subject matter area, rather than reinforcement or extension of course concepts.

Assignments that were principally designed to prompt students to review and better understand course material tended to be more structured and restrictive about the topics or objects of inquiry. Enrichment types of assignments tended to give students more leeway to pursue topics of special interest in the subject matter area of the course whether or not they were directly related to lectures or the readings. Part of the rationale for this latter type of assignment was to make the course more interesting and the content more engaging to students.

Among the assignments whose primary goal was to foster a research attitude, there were examples of both fairly structured and fairly open types of projects. For example, there were both more structured and more open assignments that encouraged students to ask basic questions about the completeness and trustworthiness of research information contained in the popular press and then to check on the reporting and integrity of the source material in the scientific literature. In another research assignment where a major learning goal was for students to realize that scientific knowledge evolves and changes, the topics and scientific authority sources were specified.

In constructing research assignments for students, Mellon Faculty Fellows also focused on knowledge and skills related to working with different configurations of information resources by seeking to accomplish one or more of the following:

- To familiarize students with particular Berkeley Library collections, such as historic landscape and architectural drawings, artifacts from museums on campus, historical texts, video documentaries and other films, topographical maps, and books and other materials in particular subject matter areas
- To help students gain experience and skill in searching particular databases, such as those containing journal articles, newspaper articles, images, or government documents
- To acquaint students with the distinction between primary and secondary sources of information and how each might be used to investigate important questions in a particular subject matter field

In addition to research goals related to working with information resources and developing an inquiring attitude, one or more Faculty Fellows wanted students to become more research savvy by:

- Gaining experience in collecting their own primary data via interviews, surveys, etc.
- Developing skills in working on a research project as part of a group

- Learning how to construct research products such as article and book summaries or reviews, information fact sheets, annotated bibliographies, technical reports, or web page evaluations
- Learning how to present the products of their research orally or visually (via oral presentations, posters, or web-pages) or in a polished piece of expository writing

As this brief summary suggests, Fellows' *particular* sets of learning goals differed when they were examined in detail. This suggests that generalizations about student learning impacts cannot be made across all of the Mellon courses. Although differences in learning goals also had an impact on research assignment design, observations can be made about how well various implementation strategies worked within subgroups of courses, and how these results may have affected student learning. Survey and interview data collected from faculty, students, and GSIs all contain information relevant to strengths and challenges in research assignment design and implementation.

### **Strategies and Practices Used to Implement Mellon Research Assignments**

1. In general, Mellon Faculty Fellows felt that the practice of “staging” research assignments (breaking assignments up into phases or smaller steps), which was encouraged during the summer Institutes, was successful in promoting earlier and continuous work on the projects by students, in helping to clarify misunderstandings and to provide needed assistance early on, and in focusing students’ attention on the process rather than just the product of research. A number of Faculty Fellows cited this strategy as one of the most useful insights of the Mellon project for their teaching.

Some GSIs also indicated that the staged assignments had these benefits. However, because GSIs often were given responsibility for grading and assisting students, they also were aware of some problems connected with staged assignments. Assignments with many parts often complicated scheduling, and neither GSIs nor students felt they could do justice to their work on the assignments when their deadlines were on or near the date of an exam. Providing instructions, assistance, and feedback for multiple separate assignments (even if they were smaller in scope) still required a greater overall expenditure of time by GSIs. In addition, GSIs, as well as Fellows who evaluated staged assignments, made the point that students expected feedback at each assignment stage and were not satisfied with simply a completion check-off. Survey comments from students reinforced this conclusion.

Not surprisingly, students did not often mention assignment staging except when a problem like one of the above occurred. So, they were critical when an assignment was due on the date of an exam or when they did not get substantive feedback on an assignment piece. Students also complained when they thought the time allotted to the various tasks was unrealistic or when they felt the credit given to a multi-stage assignment was insufficient. Other student comments suggest another potential difficulty with staged assignments. Some students objected that they already knew how to do what was being taught in an early assignment stage (usually one focusing on accessing and evaluating information sources). Others said that what they really wanted to do was to focus not on “data collection” but on analysis and interpretation. Staging (at least as it

was done in some assignments), then, may lead students to think of information literacy processes as independent of and prior to subject matter learning, rather than the two being recursive and interconnected.

Although some Faculty Fellows indicated that students do not always realize what they do not know, perhaps different levels of student sophistication about research processes need to be acknowledged with options provided for students with more previous research experience. Alternatively, more experienced students might be paired with those with no previous experience for work on some of the early research assignment stages.

2. The clarity of instructions and preparation for research assignments was important both to insure student buy-in to the assignment and to increase the quality of student performance. A key part of this preparation involved making clear to students how the research assignment would help them better understand the content of the course.

A number of Faculty Fellows mentioned the helpfulness of the session on syllabus construction at the summer Institute in making them aware of the types and amount of information they should include in their syllabus about the assignment. The discussions of examples of syllabi and assignment handouts developed by Faculty Fellows from earlier cohorts also were valuable in helping Fellows in the later cohorts think through how to present the rationale and instructions for the assignment. Input from some of the I-Teams also influenced the wording of directions and the way students were prepared for the research assignment. Fellows who gave students samples of completed assignment pieces or who modeled component research procedures such as oral presentations felt that these practices gave additional valuable help to students. GSIs concurred that students benefited from these examples as well as from class discussions of expectations.

Judging from student ratings and comments on their surveys, some Fellows seemed to be more successful than others in presenting an assignment rationale that made the connection to students' understanding of the subject matter. In some cases such a bridge was built into the required parts of the assignment. For example, students in one course were asked to include a description of the ways insights from their research related to the content of the course. In another course students were asked to specify what they had learned about the subject matter from their classmates' oral presentations of their research projects. In the student surveys from a third course, the number of similarly worded phrases about ways the research assignment contributed to the learning of course content suggest that students may have received frequent reminders about this connection.

3. The type, amount, and timing of feedback to students was acknowledged to be one of the most important but most difficult aspects of the implementation of research assignments, especially in the large enrollment courses.

As noted earlier in connection with the discussion of staged assignments, students' free responses on the 2006-07 surveys frequently included complaints that they did not get enough feedback on their work. In addition, average student satisfaction ratings of the feedback dimension were the lowest for that aspect of implementation in four of the six surveyed courses.

Faculty Fellows were aware that adequate feedback on assignments was crucial to the achievement of their learning goals for students. A number of assignments designed by Fellows incorporated features that they hoped would increase the amount and quality of feedback to students. In one course two similar assignments were included to enable students to use feedback from the first to improve their performance on the second. Some Fellows planned oral group presentations, and others incorporated poster sessions to encourage peer feedback as well as to provide an authentic way for students to present their research. As the culminating event in another course, students were required to participate in a public presentation of their group reports for local officials, after receiving preliminary feedback on their presentation in their section and from their GSI.

Despite these good intentions, there were often difficulties in providing feedback that students perceived to be timely and helpful. Sometimes faculty were surprised at the amount of help and feedback students needed early on to clarify key distinctions, such as difference between primary and secondary sources. Frequently, an insufficient number of sessions were allotted to presentations of student work, resulting in not enough time being left for feedback by students' classmates. It also turned out that students were turned off rather than helped by repeating variations of the same assignment, doing what they termed "the same thing twice." In courses with large enrollments and large sections, GSIs found it difficult to provide substantive feedback on student's analysis and synthesis of content. Moreover, when assignments were designed with few topic restrictions, GSIs found it even harder to give students substantive feedback about the quality of sources and their interpretation of content because the subject matter of the research was unfamiliar to them. Fellows who left assistance and feedback to their GSIs ended up being less clear about the difficulties students were having or what they were learning from the assignment.

In addition, the Assessment Project revealed that the development and use of rubrics for grading research assignments required considerable time and effort on the part of both the Faculty Fellows and their I-Teams. In many cases the learning goals developed during the Institute were fairly general and needed to be further specified in order to guide the definition and scaling of the dimensions of the grading rubric. There were also difficulties deciding the scope of the rubric and what the range of performance would be without examples of student work at hand. Rubrics are intended not only as a way to provide detailed feedback but also as a way to promote standardization of grading. Yet, aside from evaluating whether all parts of the assignment were there and sources correctly cited, it was sometimes difficult to achieve consistency in the evaluation of the subject matter content. Finally, there was some evidence that sharing rubrics with students tended to make them focus more on grades and compliance with details of the rubric and less on excitement about research and making sense of ideas.

During their interviews, some Faculty Fellows shared thoughts about ways they might improve the feedback aspect of their Mellon courses the next time they taught them. One Fellow talked about how disappointed he was when many of his students did not pick up their final research assignments with his lengthy feedback. He said he intended to add a presentation and peer response phase to his assignment so students would have an opportunity to hear suggestions for improvement before the course was over. Other Fellows proposed incorporating other methods of peer evaluation, such as having

students vote for a favorite group project website. Some Fellows said they were considering narrowing the choice of topics or resource sources for assignments to make grading and feedback of GSIs more manageable and informed. Additionally, group projects were suggested as a way not only to increase students' collaborative skills, but also to facilitate peer feedback and support throughout the research process. However, judging from the experience of Mellon Fellows, group work presents challenges and difficulties of its own. One Fellow without GSIs allowed class time for groups to get together and regularly met with each of the groups to provide feedback and assistance.

### **Contributions of Research Assignments to Student Learning Outcomes**

As described earlier, the questions about student learning outcomes centered primarily on student and instructor perceptions about the impact of the Mellon research assignments on:

- Students' subject matter learning
- Students' knowledge and skills relevant to the use of library resources
- Other research skills developed by students

Differing amounts of information were available about these student outcomes in the courses of the 48 Mellon Faculty Fellows. At one end of the continuum were courses for which data from student surveys, one or more GSI questionnaires, a Faculty Fellow retrospective survey, and a Faculty Fellow interview were available along with copies of the research assignment and supporting materials distributed to students. For other courses, none of these types of data was available.

Since student perceptions were directly tapped only in the six new Mellon courses taught during the 2006-07 academic year, information about these courses was especially influential in the formulation of the conclusions summarized below. The student survey contained three types of information relevant to the evaluation of student impacts. It asked students to assess their level of proficiency in various areas when they started at UC Berkeley and at the end of the semester in which they were enrolled in a Mellon course. It also asked students to rate the amount of various types of knowledge and skills they had gained from the research assignments, and then to provide details or examples about how the research assignment had contributed to the three targeted areas. GSI questionnaire data were available for five of these six courses. Three of the six Faculty Fellows teaching these courses volunteered for in-depth interviews and/or contributed retrospective survey information. Insights drawn about these six classes were supplemented and enriched by information supplied by the other 21 Faculty Fellow interviews.

1. Faculty Fellows and students sometimes have different interpretations about what it means for an assignment to contribute to the understanding of concepts in the course. These various views of the meaning of subject matter learning may create discrepancies in students' and Faculty Fellows' evaluations of student learning. Some Faculty Fellows tended to think about the content of the course more in terms of the overarching themes or theoretical principles governing the inclusion and organization of course topics and

materials. Students tended to think more in terms of the specific content tested in examinations or covered in lectures or course readings. When a research assignment was designed by a faculty member to reinforce or provide illustrations of more abstract principles, students often did not see it as contributing to their learning of the course subject matter. In addition, although students sometimes expressed appreciation for being able to investigate a topic of personal interest, they did not usually see that as contributing to their understanding of the course material. Because of this difference in focus and interpretation, students were somewhat less likely than their professors to think that some research assignments contributed to their learning of subject matter. It is interesting to note in connection with this observation that, when asked whether their research assignment assisted students' content learning, a few Fellows replied that it might not have helped students on the final but that it helped them understand the material better.

In contrast, students gave exceptionally high ratings for subject matter learning in a course where they chose a topic for a research assignment from a list of themes that intersected with major content areas studied in the course. Some other Faculty Fellows managed to focus their assignments on both types of content—more abstract themes and specific course concepts that appeared in lectures and required readings. In these courses student evaluations (as well as faculty evaluations) of student content learning also tended to be higher.

2. Students in all six new 2006-7 Mellon courses rated their library research skills as having improved substantially across their time at Berkeley, and their perceived improvement was substantially higher than that for Berkeley students in general. More specifically, across all six Mellon courses, students averaged a perceived change of 1.06 rating categories in library research skills. Moreover, on average, 50% more students classified themselves as having changed to become "Very Good" or "Excellent" in these skills at the time of the survey, nearly twice the percentage of students perceiving improvement to that level in the 2006 Berkeley UCUES sample. The additional ratings and comments made by students about how their use of library resources had changed generally supported the conclusion that they felt the research assignment had contributed to their knowledge of various specialized branch libraries and collections, online search engines and databases, and skill in efficiently searching these resources.

To some extent, student responses to the questions about library knowledge acquisition related to their divisional standing and to their previous library research experience. Hence, freshmen and sophomores with little knowledge of the library were grateful for basic information about the nature of library resources and techniques they might use to access information sources. Students in courses with more upper division students appreciated assignments through which they learned about new and more specialized resources they had not encountered in previous courses and orientations. But there were also more students in the latter type of course who said they had not learned anything new about the library collections and library research.

3. Students in four of the six surveyed courses rated themselves as having improved considerably in analytical and critical thinking skills from the time they entered Berkeley. The levels of perceived improvement in this type of information literacy skill in these classes were higher than that of the total Berkeley UCUES sample. Specifically, across four of the six Mellon courses, students averaged a perceived change of 1.05 categories in analytic and thinking skills. On average 58% of students in those courses said they had improved and now were “Very Good” or “Excellent” in these skills as compared to 34% in the 2006 Berkeley UCUES sample that said they had changed to that level.

One explanation for the course differences in perceived analytical thinking skills might involve the amount of structure that was provided for the research assignments. The four courses in which students rated themselves as having improved their ability to do critical analysis were those where the research tasks were moderately constrained and there were clear instructions. The suggestion is that assignments that make it clear what students are to analyze and give them guiding examples lead students to feel more confident in their analytical abilities.

Of the two courses that did not show this improvement, one presented an assignment that had very few constraints, resulting in many students complaining that they were not clear about what they were supposed to do. In contrast, the assignment in the sixth course may have overly constrained student efforts, providing too few opportunities for students to explore ideas of their own and other sources of information. The GSI in this course said that students seemed to be so caught up with trying to follow the rules of the assignment that they did not enjoy doing it. However, since most students in this class were freshmen and sophomores and had little experience with research assignments, it is also possible that the lower degree of perceived improvement in analytical thinking might have been due more to students’ lack of research experience than to the nature of the assignment. The Faculty Fellow teaching this class, in fact, commented that it had been difficult to shift students in this class away from a “right answer” mindset toward doing their own analyses of the material.

4. The design of research assignments, when implemented well, can affect students’ overall estimates of their abilities in additional aspects of the research process. Students in one Mellon class rated themselves as having improved their proficiency in preparing and making presentations during their time at Berkeley. Their perceived improvement in this ability was much greater than that of the average Berkeley student on the UCUES survey. This class was the one whose major activity consisted of work on group presentations of the material they had researched. Students in their free responses to the survey question about research skills gained from the assignment also frequently mentioned having acquired both presentation skills and the ability to work in a team.

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