

## Using Time, Money, And Human Resources Efficiently In The Case Of Women Graduate Students

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*Maresi Nerad*

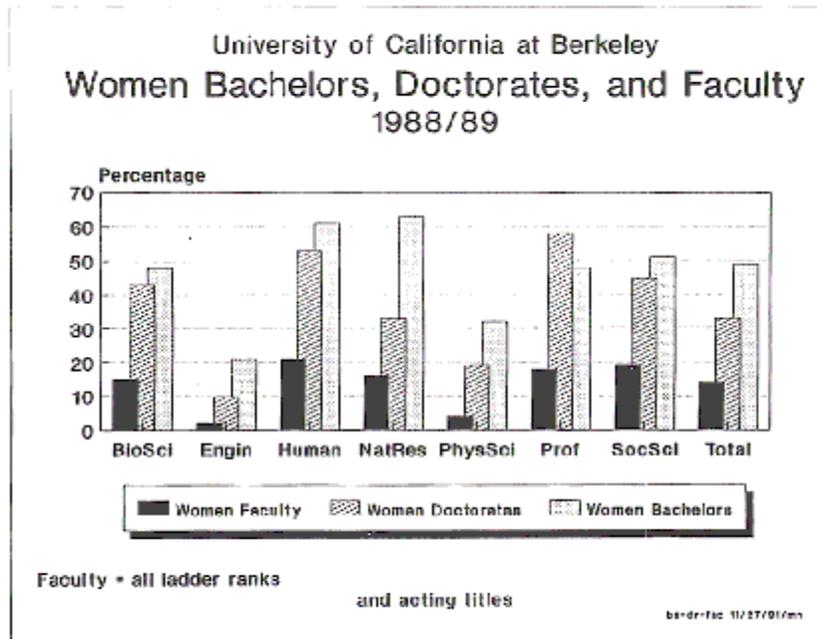
*University of California at Berkeley Graduate Division*

*March 1992*

*Graduate schools are increasingly concerned about their women doctoral students. Women are still underrepresented in many doctoral programs, particularly in the sciences and engineering, and have a higher attrition rate than men. Fewer women participate in graduate studies than in undergraduate studies, and even fewer go on to hold faculty positions.*

*While women at Berkeley earned about half of all undergraduate degrees between 1985-1990, they earned only 30% of all graduate degrees. In addition, women occupied only 14% of all ladder-rank faculty positions in 1988/89 (Figure 1)*

Figure 1



*In many fields, there is a 50% reduction in women's participation rate from undergraduate to graduate studies. In 1988, for example, women earned 21% of all engineering bachelor's degrees but only 10% of all engineering doctoral degrees, and only 2% of the faculty in engineering were women. In the physical sciences, women earned 32% of all bachelor's degrees, 19% of all doctoral degrees, and held 4% of all faculty positions. Even in the humanities and social sciences we find an 8% and 6% reduction in the participation rate from undergraduate to graduate studies and a further 40% and 32% reduction in the participation rate of women faculty. (For example, 61% of all humanities B.A.'s were awarded to women, and 53% of all humanities Ph.D.'s. Twenty-one percent of the faculty in the humanities were women.)*

*In light of these statistics, our concerns at Berkeley are threefold: (1) we want to bring more women into graduate school; (2) we want more women to complete graduate school; and (3) we want to assist women in obtaining professional employment. I am arguing that graduate schools and graduate programs will spend their time, their money, and their human resources supporting graduate women wisely if they: (a) systematically and continuously analyze graduate programs using a combination of statistical data and student interviews in addition to surveys and work with on-going student focus groups; and (b) apply the knowledge gained from these analyses to designing programs that help students overcome the major hurdles in their graduate student careers.*

*In the following pages, I will focus on how the Graduate Division at Berkeley has used time, money, and human resources to analyze graduate admissions and to research time to doctoral degree and doctoral completion rates, and how we have designed strategies for improving graduate education.*

### ***I. Bringing Women into Graduate School***

*Each year the Graduate Division monitors the departmental admission process to encourage departments to admit an equal proportion of qualified men and women. As a monitoring device, we created a "women's index" (**Figure 2**) by dividing women's admission rate by men's admission rate.*

Figure 2

**University of California at Berkeley  
Graduate Women Admit Index  
Fall 1987 to Fall 1991**

Year	Women Index	Women Admit Rate %	Men Admit Rate %
1987	1.10	26.8	24.4
1988	1.15	25.6	22.3
1989	1.06	25.4	24.0
1990	1.11	27.2	24.6
1991	1.02	19.9	19.6

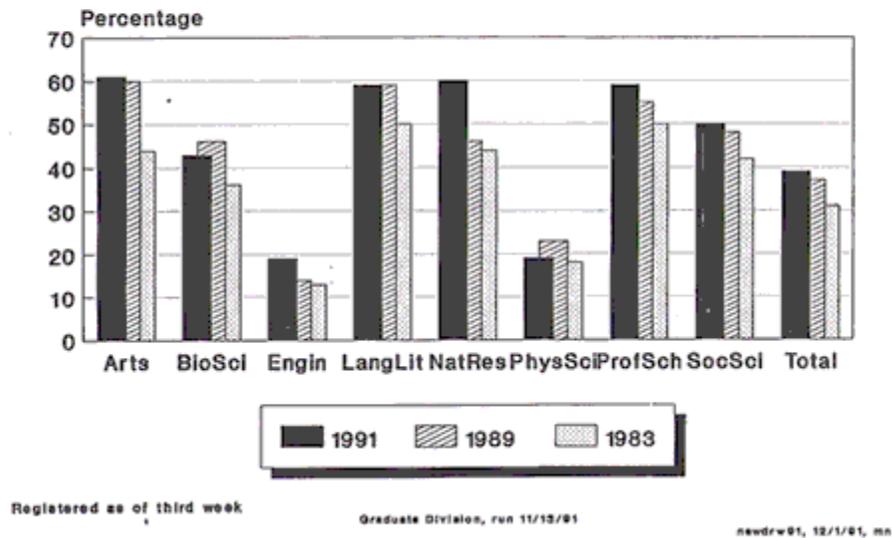
Women Index = Women Admit Rate divided by Men Admit Rate

Source: Graduate Division, as of 10/30/91, report A1Y88  
women/wadmit91\*, 12/1/91, mn

*If an equal proportion of qualified women and men have been admitted, the index should be one. In cases where the index is considerably lower than one, we contact the department during the subsequent fall semester and ask for an explanation of their admissions decisions. The admission process is also discussed during the Dean's half-day visits to individual departments. Since 1983, we have seen a progressive increase in the proportion of newly-enrolled women doctoral students in almost all fields (Figure 3). In addition to Graduate Division efforts, special recruitment programs in the College of Engineering and the Mathematics Department are aimed at increasing the number of women graduate students.*

Figure 3

**University of California at Berkeley  
NEWLY Enrolled Doctoral Students  
WOMEN**

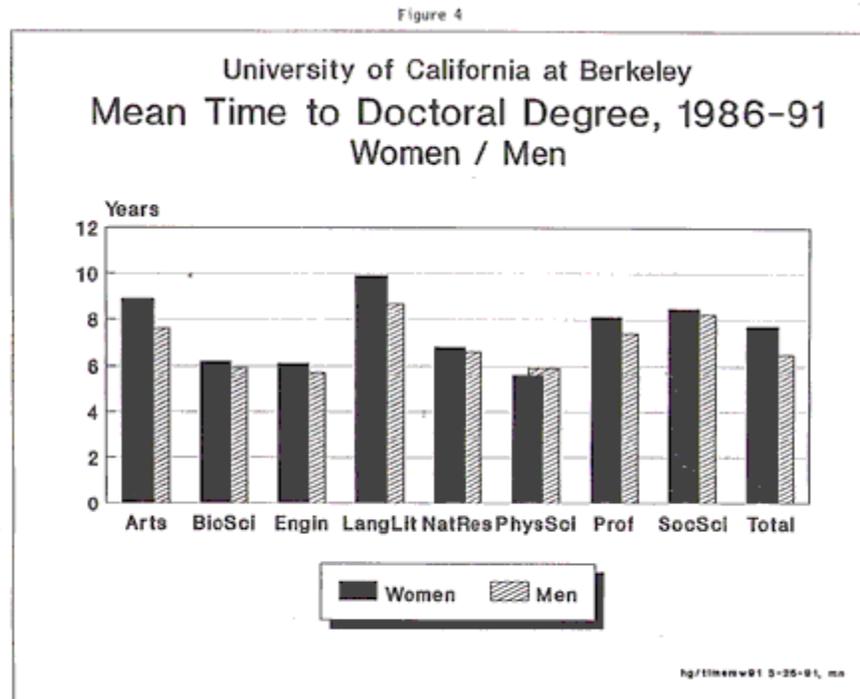


## II. Getting Women Through Graduate School

*As a first step toward our goal of getting women through graduate school, we examined how long it took, on the average, for women and men to complete a doctoral program. We also determined how many students actually received a doctoral degree.*

### *Time to Doctoral Degree*

*The average time-to-degree for all our doctoral recipients (3,917) between 1986 and 1991 was 6.9 years (Figure 4).*

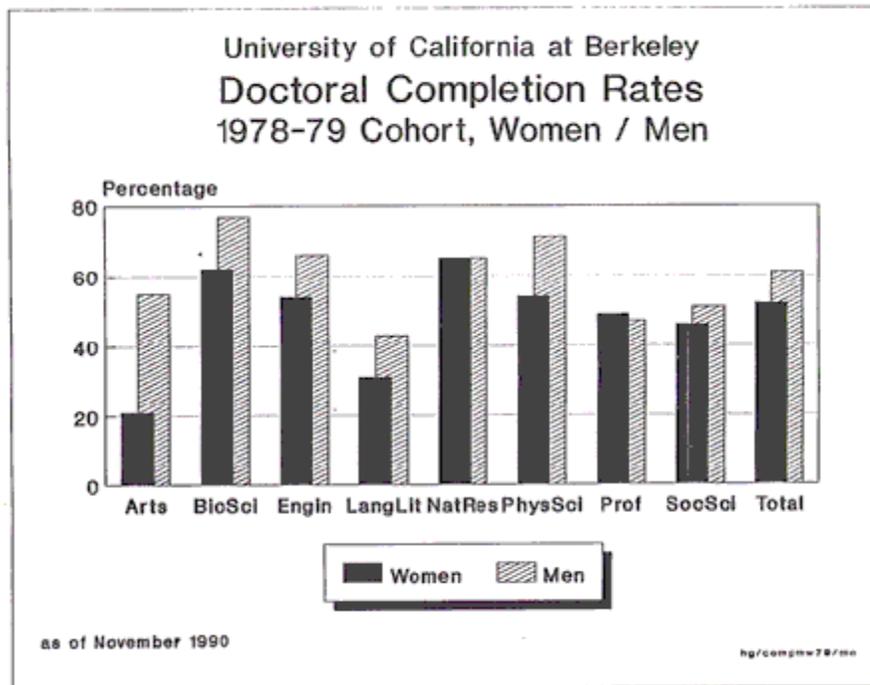


*This period was calculated from the time a student entered the Ph.D. program and included the time spent earning a master's degree, if it was required for the Ph.D. The time during which students were not registered and were, perhaps, away from the campus was also included in the total time-to-degree.*

*As expected, we found that time-to-degree varied widely by field of study. The most substantial differences in mean time-to-doctoral-degree occurred between students in engineering (5.7 years), physical sciences (5.9 years), and the biological sciences (6.0 years), and students in the social sciences (8.4 years), arts (8.4 years), and languages and literature (9.3 years). Although, overall, women took 1.2 years longer than men to complete their doctoral degrees (7.7 versus 6.5), they took slightly less time than men in the physical sciences (5.6 versus 5.9) and only slightly longer than men in the biological sciences (6.2 versus 5.9) and engineering (6.1 versus 5.7). The longer time-to-degree overall for women is in part due to the relatively high concentration of women in the social sciences, humanities, and professional schools, fields in which it traditionally takes a long time to complete a doctoral degree.*

*While women doctoral students in science and engineering completed their degrees in about the same amount of time as men did, they were not as successful in completing their degree program. While 61% of the men in our 1978 and 1979 cohorts had completed the doctoral degree program by 1990 (eleven and twelve years later), only 52% of the women had. In almost all fields, we retained fewer women than men (Figure 5).*

Figure 5



*In science and engineering programs, the completion rates of women are about 15% lower than those of men. Of the students who entered in 1978 and 1979, 62% of the women in the biological sciences completed their doctorates compared to 77% of the men; in the physical sciences, 54% completed compared to 71%; and in engineering, 54% of the women completed their doctorates compared to 66% of the men.*

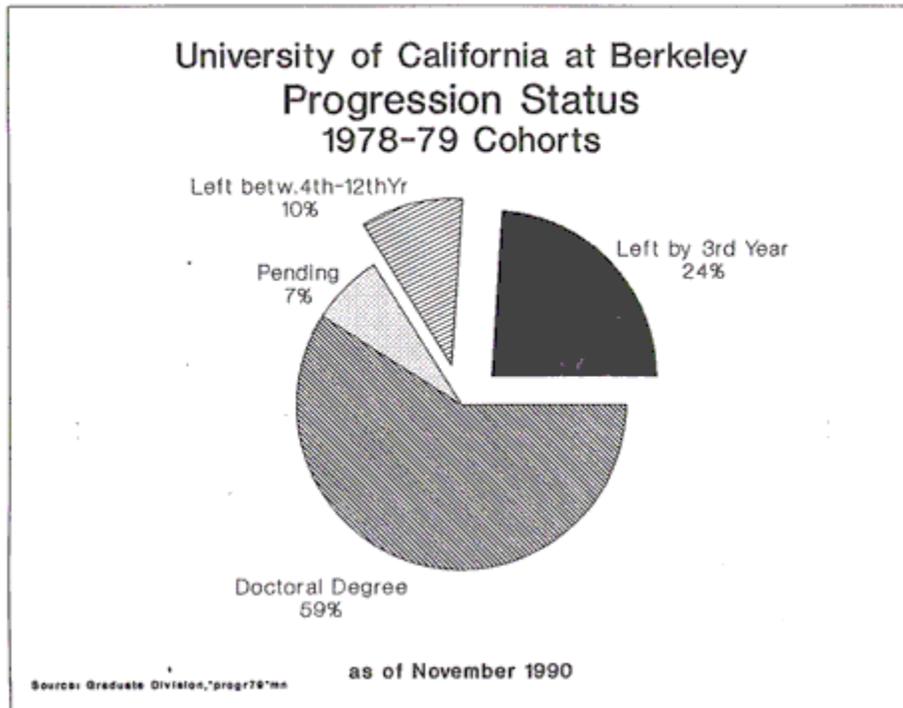
*It is important to point out that 20% of those students who did not complete the doctorate completed a master's degree before leaving graduate school. Altogether, from the 1978-79 cohort, a total of 78% completed a graduate degree of some kind.*

#### *Time of Attrition*

*In our attempt to understand why more women than men leave before completing the doctorate, we examined at what stage they left the program. Contrary to popular belief, the majority of doctoral students who failed to earn their doctorates left the program before advancement to candidacy for the Ph.D., not after. Twenty-four percent of the students in the 1978-79 cohorts left during their first three years of graduate study.*

*An additional 10% left after advancement to candidacy, and another 7% were pending at the time we analyzed the data (Figure 6).*

Figure 6



*This also holds true for women in science and engineering. With the exception of the biological sciences, women have a higher attrition rate than men both before and after advancement to candidacy (Figures 7 and 8).*

Figure 7

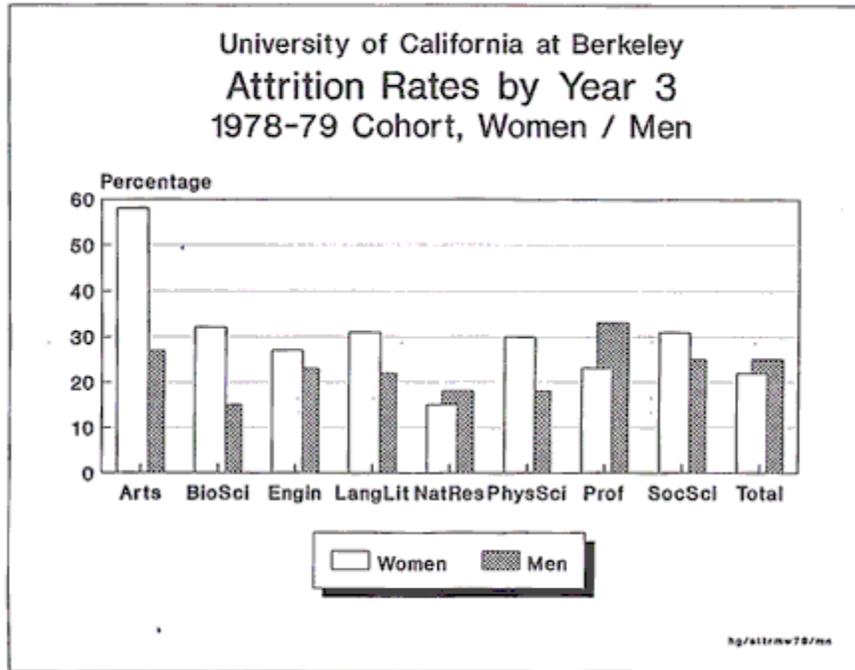
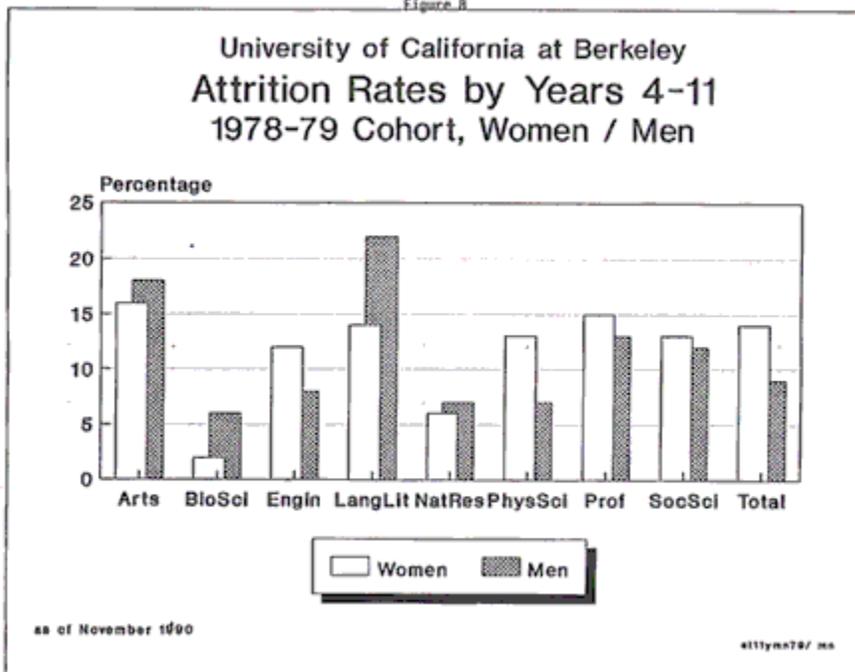


Figure 8



*One may conclude from these figure, that these two stages, the transition from undergraduate to graduate study from coursework and preparation for the qualifying examination to the dissertation research and writing period, are more difficult for women than for men. Preliminary research into the*

*reasons for women's higher attrition and our prior research into reasons for long time-to-degree suggest a more complex set of explanations.*

### *Reasons for Attrition*

*Before explaining some of the key differences between men and women students, I want to describe briefly the reasons and conditions that contribute to students leaving doctoral programs before completing the degree and to their taking a long time to complete the degree. The following are the results of more than 60 individual in-depth interviews with Berkeley doctoral students, plus group interviews with about 300 advanced doctoral students from all nine campuses of the University of California and ongoing student focus groups, and individual interviews with departmental chairs and graduate advisors.*

*Students leave for many reasons; some are personal, some institutional. The personal reasons cited by students included the following. Students who left graduate school after one or two years reported that their expectations about study, graduate student life, or the focus of the program were not met. Students who already had a master's degree, particularly in the professional schools and engineering, or who had just received the master's degree, rethought their career goals and chose to leave, often after the first year. These students had well-paying jobs as an graduate school. There will always be students, even with full financial support, who leave after the first or second year.*

*For the continuing students, we developed the following nine-point model interpret the complexity and interconnectedness of field-specific and which contribute to long or short time-to-degree and to high and low attrition rates (see Figure 9): (1) how research is conducted and taught; (2) how the doctoral program is structured; (3) what role the dissertation plays in doctoral training-, (4) how the department organizes graduate student advising and guidance; (5) what climate the department cultivates; (6) how research is funded; (7) whether students are supported teaching assistantships, research assistantships, fellowships, or loans; (8) whether or not student housing and child-care are available on campus; and (9) what professional job opportunities are available and whether placement support is offered by the department and the campus.*

FIGURE 9  
FACTORS DETERMINING TIME TO DEGREE AND ATTRITION

Institutional and Field-Specific Factors		
1 Research Mode	Apprenticeship Mode Team Work Laboratory	Individualistic Learning Solitariness Library
2 Structure of Program	No M.A./M.S. required QE includes Dissertation Prospectus Annual Evaluation	M.A./M.S. required QE does not include Dissertation Prospectus Sporadic Evaluations
3 Dissertation Definition	Test of Future Ability to do Research	Contribution to Knowledge (Book)
4 Advising	Faculty Mentoring Departmental Advising	Absence of Faculty Mentoring and Dept. Advising
5 Departmental Climate	Sense of Community Students treated as Junior Colleagues	Factions among Faculty Students treated as Adolescents
6 Research Money	Many Sources	Few Sources
7 Type of Financial Support	Research Assistantship Fellowships	Teaching Assistantship Loans Own Earnings
8 Campus Facilities Housing Child-care Space Transportation Library	Affordable Available Available (Office, Meeting) Efficient, Affordable Long Hours, Year round	Expensive Overcrowded Overcrowded Slow, Expensive Short Summer Hours
9 Job Market Post-doc Academic Industry	Many Openings Well-paid	Few Openings Medium or Low Salaries
	SHORT TIME LOW ATTRITION	LONG TIME HIGH ATTRITION

Maresi Nerad, 7-27-1990, \*src:modelcpec\*, mn

Besides these factors which influence the outcome of graduate education for all students regardless of sex, ethnicity or citizenship, women doctoral students seem to encounter some particular problems. The results of our doctoral student exit questionnaire and our interviews with graduate students demonstrate that, in nearly all fields, a higher proportion of women than men experienced dissatisfaction with the departmental advising and the professional help they received from their dissertation adviser. One quarter (26%) of all the women students (990) who filed their dissertations between fall 1987 and fall 1991 reported that they were dissatisfied with departmental guidance and advising, while only 19% of the men reported dissatisfaction (Figure 10).

Figure 10  
University of California at Berkeley  
Doctoral Exit Questionnaire  
Doctoral Recipients Fall 1987 – Spring 1991

Question: **As you look back over your doctoral studies at UC Berkeley, how satisfied have you been with departmental advising/guidance?**

Major Field	MEN			WOMEN			TOTAL						
	very satisfied	satis- fied	dis- satisfied	very satisfied	satis- fied	dis- satisfied	very satisfied	satis- fied	dis- satisfied				
	N	N	N	N	N	N	N	N	N				
Arts	27%	(6)	55%	(12)	18%	(4)	30%	(8)	35%	(9)	29%	44%	27%
Biological Sciences	23%	(51)	56%	(121)	21%	(45)	19%	(24)	59%	(73)	22%	57%	21%
Engineering	24%	(160)	60%	(406)	16%	(110)	27%	(18)	52%	(34)	21%	59%	17%
Lang. & Literature	22%	(28)	58%	(69)	20%	(24)	27%	(37)	44%	(62)	29%	51%	25%
Natural Resources	32%	(46)	50%	(71)	18%	(25)	19%	(13)	64%	(44)	17%	54%	18%
Physical Sciences	23%	(150)	57%	(387)	19%	(122)	12%	(17)	63%	(87)	25%	58%	20%
Professional Schools	32%	(64)	51%	(100)	17%	(34)	29%	(61)	43%	(90)	28%	46%	23%
Social Sciences	24%	(79)	48%	(158)	28%	(92)	23%	(49)	48%	(103)	29%	48%	29%
Total Campus	25%	(582)	56%	(1,304)	19%	(456)	23%	(227)	51%	(502)	26%	54%	22%

\* 1% (50 students) did not answer this question.

Source: Graduate Division, UC Berkeley, Exit Questionnaire, "de-advis91", 3/27/92, mn

*When asked how satisfied they had been with the professional relationship with their dissertation adviser, 12% of the women reported that they were dissatisfied, compared to 8% of the men (Figure 11).*

Figure 11

University of California at Berkeley  
 Doctoral Exit Questionnaire  
 Doctoral Recipients Fall 1987 – Spring 1991

Question: **As you look back over your doctoral studies at UC Berkeley, how satisfied have you been with the professional relationship with your dissertation supervisor?**

Major Field	MEN				WOMEN				TOTAL								
	very satisfied	satis- fied	dis- satisfied	N	very satisfied	satis- fied	dis- satisfied	N	very satisfied	satis- fied	dis- satisfied						
Arts	68%	(15)	32%	(7)	0%	(0)	0%	(0)	56%	(15)	37%	(10)	7%	(2)	61%	35%	4%
Biological Sciences	58%	(127)	33%	(71)	9%	(19)	44%	(54)	35%	(43)	21%	(26)	53%	(26)	33%	13%	
Engineering	61%	(418)	31%	(213)	8%	(53)	58%	(38)	29%	(18)	12%	(8)	61%	(8)	31%	8%	
Lang. & Literature	67%	(80)	29%	(34)	4%	(5)	76%	(107)	16%	(23)	7%	(10)	72%	(10)	22%	6%	
Natural Resources	64%	(91)	30%	(43)	6%	(8)	58%	(40)	33%	(23)	9%	(6)	62%	(6)	31%	8%	
Physical Sciences	61%	(393)	30%	(192)	10%	(63)	52%	(71)	34%	(46)	15%	(20)	59%	(20)	30%	11%	
Professional Schools	65%	(129)	30%	(59)	5%	(9)	57%	(120)	31%	(84)	12%	(25)	61%	(25)	30%	8%	
Social Sciences	66%	(219)	27%	(89)	7%	(24)	65%	(141)	26%	(50)	9%	(19)	66%	(19)	26%	8%	
Total Campus	62%	(1,473)	30%	(708)	8%	(181)	59%	(566)	29%	(284)	12%	(116)	61%	(116)	30%	9%	

\* 1% (34 students) did not answer this question.

Source: Graduate Division, UC Berkeley, Exit Questionnaire, "facediv91", 3/29/92, mn

We were struck by the extremely high level of dissatisfaction expressed by women in the biological sciences (21% of the women were dissatisfied versus 9% of the men). In the physical sciences and engineering, women were also more dissatisfied than men with the professional relationship with their advisers, although less so than their biological science counterparts (physical sciences: 15% versus 10%; engineering: 12% versus 8%). We are presently investigating this situation.

Our preliminary findings offer two explanations for women's greater dissatisfaction with their departmental advising and their dissertation supervisors: (a) Women interpret faculty's behavior differently than men do; and (b) women suffer more in the "chilly" departmental climate than men do.

#### Differential Interpretation of faculty Behavior by Men and Women

Women interpret faculty's attitudes and behavior differently than men do. The following quote from a student interview transcript illustrates the point: "Last week I got two thesis chapters back from my committee. I'd been working on these for a long time. I was particularly nervous about the response from one of my committee members. At first, I was delighted to see that he hadn't beaten me up over my chapters. But then started thinking about it, and I got really mad. This is the first stuff that he has seen in years, and he had nothing positive to say about it. And these are chapters that are wellwritten-interesting. The first chapter was a manuscript I wrote for Nature. It had just been accepted for publication, so other people thought it was okay. He didn't say 'Congratulations,' he didn't say 'Good job.' He didn't say anything. And my own professor also didn't say anything positive, until I forced him to. It made me realize that the way that a lot of academic business is conducted is that the feedback that we are expected to be satisfied with is, 'I don't have any major problems with it.' We're supposed to be

*happy with the absence of negative feedback."*

*Assuming that most professors accord their male and female students the same treatment, I came to conclude from my many interviews that this absence of positive feedback seems to affect men and women students differently. In the above described situation, women ask themselves, "What did I do wrong? What could I have done better? What should I have done differently?" Whereas many men tend to accept the comment, "I don't have any real problems with it," as a pat on the back-as "Go ahead! You're doing fine." Women students begin doubting their intellectual capability and tend to end up being demoralized by the lack of positive feedback, while male students, when commenting on the lack of feedback, said they were disappointed but remained sure of their intellectual capability.*

*These differential interpretations result from the different standards by which women evaluate their faculty's behavior. Women judge faculty by the same criteria they would apply to themselves if they were in a similar position. One student gave this example: "If I have a Biology I student who writes a lousy paper, I couldn't imagine not saying, 'You have some very good ideas here, but let's think about your organization.' Even more appalling is to think about having a Biology I student who writes a really good paper and handing it back saying, 'Well, Fred, I don't have any major problems with your paper.'"*

*What seems to be occurring here is that women expect their faculty to operate under the same set of rules that they do. This may be the reason women end up becoming differentially demoralized.*

#### *The "Chilly" Departmental Climate*

*This second argument is related to the first. When the climate is "chilly," women have a difficult time valuing themselves and persevering confidently with their studies. As one student stated, "If the departmental culture is such that you feel like the department is interested in the students getting jobs and doing well, and if you feel like the department is behind you and supporting you, that allows you to think more positively about yourself and your prospects."*

*Most male doctoral students, conversely, are more self-confident, and consider themselves entitled to an advanced degree, so the absence of departmental caring does not seem to bother them as much as it does women. They carry on. Many women, however, tend to believe that lack of departmental attention and caring means that they don't deserve to keep going or that they must not be good enough. As one woman student said, "I feel like I've been pretty successful in my graduate career here, by objective standards. I've been a good girl; I've done good work; I've gotten my papers published; I've gotten grants; I've gotten teaching awards; I've gotten awards for giving talks at meetings. And I feel like nobody would notice if I decided tomorrow not to finish my thesis. Nobody takes the time to notice. That is the sort of departmental culture thing that I think takes a pretty heavy toll on the women."*

*Many men, in contrast, seem to accept more easily the climate of benign neglect. They do not believe that they did something wrong or that they were not good enough. Their greater sense of entitlement carries them more easily through graduate school. While both men and women seek validations from such sources as publications, fellowships, and awards, women also look for interpersonal validation, such as positive comments from their adviser, to carry them through. Men seem to internalize their*

*successes and that alone seems to carry them through the difficulties of doctoral education, whereas women seem to need the additional interpersonal validation to assure them of their successes.*

*I further suggest that women with children (about one quarter of our graduate women have children) are affected differentially by the lack of sufficient child-care facilities than are men. This is particularly true for women in fields where research is done in a laboratory. Further, there are few women faculty who have successfully combined family and career, and lacking these role models, women graduate students who are considering having a family find little encouragement to pursue academic careers.*

### *Spending Time, Money, and Human Resources*

*What are we, at Berkeley, doing about this? We acknowledge that departmental climate and culture play an important part in doctoral students' progress, particularly for women and ethnic minority students. We consistently send departments the summarized results of our doctoral student exit questionnaire with a letter from the Dean pointing out positive developments and asking for responses to students' comments on their level of satisfaction with the department. We meet monthly with an on-going student focus group to discuss students' concerns and our research findings, and we have developed with them many of our new programmatic activities. We invited faculty, administrators, and students to a monthly seminar in which we discuss our research results and solicit advice on further programmatic improvements. We meet on a monthly basis with departmental graduate secretaries to exchange ideas and suggestions for improving the departmental climate. Finally, we have developed *Easing the Way, A Guide to Departmental Activities in Support of Graduate Students*, which we distributed to all departmental graduate student associations, graduate secretaries, and department chairs. This guide contains descriptions of existing activities at all stages of the doctoral program, beginning with recruitment and orientation and ending with dissertation writing and the job search. The activities described often cost little or nothing in staff time or supplies. There is information on how to go about choosing a dissertation adviser, how to set up mock orals, how to organize dissertation writing groups, and how to offer a workshop on presenting a research paper. Where such activities exist, students experience the department's involvement in and concern for their progress and professional goals.*

*In addition, the University of California university-wide Task Force on Faculty Rewards issued a report in June 1991 recommending changes in the criteria for academic advancement. One recommendation was that "a leadership role in activities that develop human resources, such as mentorship programs for graduate students" be adopted as a criterion for advancement.*

### *III. Assisting Women in Finding Professional Employment*

*Finally, we are concerned that all students, particularly women, receive adequate assistance in finding professional employment. The results of our exit questionnaire indicate that, overall, women were less satisfied than men with faculty efforts in assisting them in the job search (Figure 12) and that women in the biological sciences and professional schools were most dissatisfied.*

University of California at Berkeley  
 Doctoral Exit Questionnaire  
 Doctoral Recipients Fall 1987 – Spring 1991

Question: **As you look back over your doctoral studies at UC Berkeley, how satisfied have you been with the faculty efforts in assisting you to find professional employment?**

Major Field	MEN			WOMEN			TOTAL								
	very satisfied	satis- fied	dis- satisfied	very satisfied	satis- fied	dis- satisfied	very satisfied	satis- fied	dis- satisfied						
	N	N	N	N	N	N	N	N	N						
Arts	35%	(7)	25%	(5)	40%	(8)	18%	(5)	56%	(15)	26%	(7)	25%	43%	32%
Biological Sciences	34%	(87)	45%	(89)	21%	(41)	29%	(31)	41%	(44)	30%	(33)	32%	44%	24%
Engineering	30%	(102)	48%	(160)	22%	(136)	30%	(118)	48%	(180)	22%	(13)	30%	48%	22%
Lang. & Literature	31%	(34)	50%	(55)	19%	(21)	36%	(44)	40%	(48)	24%	(28)	34%	44%	22%
Natural Resources	33%	(43)	43%	(57)	24%	(31)	28%	(18)	53%	(34)	17%	(11)	30%	53%	17%
Physical Sciences	37%	(231)	47%	(292)	16%	(87)	25%	(32)	53%	(87)	21%	(27)	35%	48%	17%
Professional Schools	27%	(44)	48%	(78)	25%	(42)	28%	(45)	39%	(64)	33%	(53)	27%	44%	29%
Social Sciences	40%	(124)	42%	(128)	18%	(54)	30%	(92)	46%	(147)	24%	(74)	36%	44%	20%
Total Campus	34%	(742)	46%	(1,010)	20%	(430)	29%	(252)	45%	(391)	26%	(220)	33%	46%	21%

9% (337) of the students did not answer this question  
 Source: Graduate Division, UC Berkeley, Exit Questionnaire, '1-emp/91', 3/30/92, mn

*Information gathered in student interviews suggests that a woman student with a spouse and children has to take into account additional factors when approaching the job search. As a result, she may appear to be less focused when it comes to pursuing employment, and in turn, may receive ambivalent support from her faculty. This is one possible explanation extracted from our interviews, but more research needs to be undertaken.*

*In response to these concerns, the Graduate Division offers assistance in the search for professional employment. Our Graduate Adviser's Handbook now includes a section reminding the dissertation adviser that it is his or her duty "to meet with the student to discuss the student's career. He or she should point out tactical advantages, such as giving a paper at a professional meeting or publishing articles, if that is customary for the field."*

*We also work very closely with the Career Planning and Placement Center and the Academic Placement Officer for Doctoral Students. Each semester the placement officer for doctoral students offers a series of outstanding workshops on the academic job search including writing a c.v. and letters of application, preparing for on-campus interviews, interviewing at national conferences, and career decision-making for the Ph.D. candidate.*

*In addition, the Graduate's Division newsletter, The Graduate, has devoted lead articles to job-related matters including: "Going to Conferences," "Interviewing for a Faculty Position," and "Alternative Jobs: How to Go About it." The last issue was devoted to an exploration of the topic of couples and careers: how academic couples cope with the challenge of finding two professional positions in the same location.*

*Finally, we inform our departments and the departmental secretaries, via our guide, *Easing the Way*, about exemplary departmental placement services. In this difficult budgetary climate, we believe it is crucial to do all we can to assist our students to find professional employment.*

*To summarize, I have described why we at Berkeley take the issue of gender and graduate education seriously. I have shown how we spend our time, money, and human resources to bring more women into graduate school, to see that more women successfully complete graduate school, and to assist women in obtaining professional employment. In short, we believe that these activities will have the cumulative effect of improving the climate for graduate women at Berkeley.*

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*I want to thank Dean Joseph Cerny for his support for this research and for his careful reading of this paper. The data used in this study were produced by the staff (Betty Liu, Bob Tidd, and Dennis Anderson) of the Information and Technology Unit of the Graduate Division, under the direction of Judi Sui. Debra Sands Miller provided editorial assistance.*