

year) still represents 6.3 per cent of the production by the top 20 schools. In terms of sheer numbers, a recent publication of the National Research Council, *Report on Doctoral Programs*, shows that Berkeley ranked fifth out of 184 institutions in total doctorate production for the period 1958-62, and first out of 213 for the period 1963-67.²² Of the fields considered in this study, Berkeley's lowest departmental ranking in terms of Ph.D. output for the period 1963-67 was thirteenth out of 102 in the English and American Language and Literature category.²³ In virtually every other field, Berkeley ranked within the top four producers. Forgetting departmental enrollments and looking just at output, there would seem to be little cause for concern.

Shifting to individual fields, consider the supply of French Ph.D.'s, reported in Table 6. Note that Berkeley's output of two to three Ph.D.'s per year generally accounted for 4 to 6 per cent of top 20 production. One realizes how thin the market for French Ph.D.'s is by recalling that Brown's shortage index ranked this field last in terms of excess demand during the middle 1960s; in fact, Brown referred to French as one of the surplus disciplines. And yet, during that period, total production averaged only seventy Ph.D.'s, per year with the top 20 schools averaging approximately fifty Ph.D.'s. If, during 1963-64, Berkeley's department, with a graduate enrollment of over ninety students, had produced a reasonable number of Ph.D.'s for that enrollment (say fourteen instead of four), Berkeley's per cent of the top 20 production would have risen from 6.0 per cent to 18.2 per cent. I submit that an increase of such magnitude would not have gone unnoticed in a very thin market. One can imagine the department facing a very difficult marketing operation; not only might the jobs not be there, but within the fraternity of French departments, such an increase might have been interpreted as a reduction in quality. The department might have found it very difficult to regain its reputation as a quality program.

Two additional representative tables are presented, covering the supply of Ph.D.'s in German (Table 7) and Political Science (Table 8). Since both fields are typified by high attrition rates at Berkeley, the reader is encouraged to consider the effect that tripling the department's output would have had upon the market in each field. I believe that these figures reveal a major determinant of each department's decision regarding the desirable number of Ph.D.'s to produce.

C. Placement of Berkeley Ph.D.'s

Earlier it was hypothesized that departments at Berkeley are not interested in producing Ph.D.'s for all segments of the academic market, but operate instead to produce a number that can be placed reasonably

TABLE 6 Annual U.S. Production of Ph.D. Degrees in French, 1947-48 to 1967-68

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1967-68	159	119	5	74.8	3.1	4.2
1966-67	118	83	5	70.2	4.2	6.0
1965-66	94	69	6	73.4	6.4	8.7
1964-65	80	57	2	71.2	2.5	3.5
1963-64	88	67	4	76.1	4.5	6.0
1962-63	63	50	3	79.4	4.8	6.0
1961-62	63	48	3	76.2	4.8	6.2
1960-61	51	35	2	68.6	3.9	5.7
1959-60	63	51	3	81.0	4.8	5.9
1958-59	70	55	3	78.6	4.3	5.4
1957-58	41	35	2	85.4	4.9	5.7
1956-57	50	43	3	86.0	6.0	7.0
1955-56	59	48	2	81.4	3.4	4.2
1954-55	53	40	2	75.5	3.8	5.0
1953-54	58	35	1	60.4	1.7	2.9
1952-53	57	43	2	75.4	3.5	4.6
1951-52	52	46	2	88.5	3.8	4.3
1950-51	44	35	1	79.5	2.3	2.8
1949-50	58	51	1	87.9	1.7	2.0

TABLE 6 (concluded)

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1948-49	48	39	0	81.2	0.0	0.0
1947-48	30	25	1	83.3	3.3	4.0
Total, 21 years	1,399	1,074	53	76.8	3.8	4.9

NOTE: Other statistics based upon 21-year totals:

	Total U.S. Universities	Berkeley
French degrees as % of total degrees awarded in all 28 fields	1.04	0.95
% of degrees in French awarded to men	64.8	81.1

SOURCE: H. E. W., *Earned Degrees Conferred*, Berkeley degrees gathered from dissertation records.
^a Ranked by the Carter Report.

TABLE 7 Annual U.S. Production of Ph.D. Degrees in German, 1947-48 to 1967-68

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1967-68	122	69	4	56.6	3.3	5.8
1966-67	100	67	4	67.0	4.0	6.0
1965-66	95	49	4	51.6	4.2	8.2
1964-65	68	46	4	67.6	5.9	8.7
1963-64	78	51	2	65.4	2.6	3.9
1962-63	37	28	1	75.7	2.7	3.6
1961-62	46	34	5	73.9	10.9	14.7
1960-61	38	26	1	68.4	2.6	3.8
1959-60	24	17	0	70.8	0.0	0.0
1958-59	29	26	2	89.6	6.9	7.7
1957-58	35	27	5	77.1	14.3	18.5
1956-57	32	25	5	78.1	15.6	20.0
1955-56	33	17	3	51.5	9.1	17.6
1954-55	26	19	2	73.1	7.7	10.5
1953-54	46	35	4	76.1	8.7	11.4
1952-53	37	33	1	89.2	2.7	3.0
1951-52	56	43	0	76.8	0.0	0.0
1950-51	31	22	1	70.1	3.2	4.5
1949-50	40	30	3	75.0	7.5	10.0

TABLE 7 (concluded)

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1948-49	27	14	0	51.8	0.0	0.0
1947-48	21	18	2	85.7	9.5	11.1
Total, 21 years	1,021	696	53	68.2	5.2	7.6

NOTE: Other statistics based upon 21-year totals:

	Total U.S. Universities	Berkeley
German degrees as % of total degrees awarded in all 28 fields	0.76	0.95
% of degrees in German awarded to men	78.6	86.8

SOURCE: H.E.W., *Earned Degrees Conferred*.

^a Ranked by the Cartter Report.

TABLE 8 Annual U.S. Production of Ph.D. Degrees in Political Science, 1947-48 to 1967-68

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1967-68	457	267	17	58.4	3.7	6.4
1966-67	390	213	20	54.6	5.1	9.4
1965-66	336	192	15	57.1	4.5	7.8
1964-65	304	181	16	59.5	5.3	8.8
1963-64	263	171	12	65.0	4.6	7.0
1962-63	228	134	9	59.2	3.9	6.7
1961-62	214	142	7	66.4	3.3	4.9
1960-61	217	153	10	70.5	4.6	6.5
1959-60	201	137	7	68.2	3.5	5.1
1958-59	191	118	6	61.8	3.1	5.1
1957-58	170	104	8	61.2	4.7	7.7
1956-57	156	106	8	67.9	5.1	7.5
1955-56	203	126	9	62.1	4.4	7.1
1954-55	181	114	6	63.0	3.3	5.3
1953-54	153	109	9	71.2	5.9	8.2
1952-53	164	114	7	69.5	4.3	6.1
1951-52	147	121	11	82.3	7.5	9.1
1950-51	152	104	6	68.4	3.9	5.8
1949-50	127	85	3	66.9	2.4	3.5

TABLE 8 (concluded)

Year	No. of Ph.D.'s Awarded in U.S.	No. of Ph.D.'s Awarded by 20 Top Quality Schools ^a	No. of Ph.D.'s Awarded by Berkeley	% of Total Produced by Top 20 Schools	Berkeley % of Total	Berkeley % of Top 20
1948-49	119	75	4	63.0	3.4	5.3
1947-48	99	72	4	72.7	4.0	5.6
Total, 21 years	4,472	2,839	194	63.5	4.3	6.8

NOTE: Other statistics based upon 21-year totals:

	Total U.S. Universities	Berkeley
Political science degrees as % of total degrees awarded in all 28 fields	3.33	3.49
% of degrees in political science awarded to men	92.2	92.8

SOURCE: H.E.W., *Earned Degrees Conferred*.

^a Ranked by the Carter Report.

well within the prestige system. Underlying this view was the assumption that quality of doctoral student placement reflects positively or negatively upon the prestige of the producing institution; it was argued that if a department "overproduced" to the extent that significant numbers of its placements were in inferior quality schools, the department's reputation would suffer. These assertions are open to empirical test, the purpose of this section.

In the theoretical section, it was suggested that conceptually one could categorize the colleges and universities in this country into five prestige classes, ranking them symbolically ++, +, 0, -, and --. The argument was made that Berkeley departments control their output so that the vast majority of placements will be made within the first three groups; placements in the - and -- categories would be avoided by not overproducing. To give meaning to these classifications, we turn again to David Brown's publication *Academic Labor Markets*.²⁴

For his own purposes, Brown produced a Prestige Index, by which he ranked 1,121 U.S. colleges and universities. With numerous caveats, he proposed the following eight factors as measuring elements of academic prestige:²⁵

1. percentage of faculty with Ph.D.'s;
2. average compensation (salary and fringe benefits) per faculty member;
3. percentage of students continuing to graduate school;
4. percentage of students studying at the graduate level;
5. number of volumes in library per full-time student;
6. total number of full-time faculty members;
7. faculty-student ratio; and
8. total current income per student.

Every school was ranked from 1 to 1,121 on each factor, and an average rank, or composite rating, was computed for each institution. The schools were then broken into six groups, labeled A through F, with group A being the most prestigious, group F the least prestigious.

Brown's classification was accepted for the present study, with one major change. The ++ category in our conceptualization was reserved for universities ranked 1 through 10 in each field by the Cartter Report, for it was felt that the very highest prestige accrues to placement in such schools. Brown's "A" ranking included colleges such as Amherst and Swarthmore, which, while prestigious in their own way, do not have the status of graduate-oriented research institutions. Consequently, Table 9 sets forth the definitions of our proposed prestige rating system.

It is not feasible to reproduce the list of all 1,121 schools; the interested reader is referred to Brown's book.²⁶ To give an idea of the type of school included in each category, a few examples are provided:

TABLE 9 Definition of College and University Prestige Groupings

Group	Definition	No. of Institutions
++	Top 10 Cartter Report schools in each field	10
+	Brown's groups A and B plus schools ranked 11-20 in Cartter Report	65 (approximate)
0	Brown's groups C and D	335
-	Brown's group E	283
--	Brown's group F	428
	Total	1,121

SOURCE: Cartter Report, and Brown, *Academic Labor Markets*.

- ++ Refer to Cartter Report for each field—generally the well-known universities, such as Harvard, Yale, Princeton, Michigan, etc.
- + Amherst, Swarthmore, Williams, Wellesley, Rochester, University of California at San Diego, Tulane.
- 0 Antioch, Colorado College, George Washington University, University of Colorado, Kansas, Rutgers, Ohio State, Temple.
- University of Alabama, Arizona, Butler, Central Michigan, Clemson, East Texas State, Elmira College, San Diego State, University of San Francisco, Southern Oregon.
- Abilene Christian, California State Polytechnic, Brigham Young, University of Dayton, DePaul, Florida A&M, Golden Gate College, Slippery Rock, Memphis State, Seton Hall, Washburn University.

Data on first academic position taken by Berkeley doctorates were gathered from the National Academy of Sciences, "Survey of Earned Doctorates."²⁷ Beginning with fiscal year 1967, the computerized data list the name of the first academic employer or postdoctoral institution; thus, data on two years' placement (1967, 1968) were available for the twenty-eight departments. A total of 466 academic appointments were listed; of these, seventy-four new Ph.D.'s remained at Berkeley, presumably for postdoctoral work. These seventy-four were excluded from the ratings. The remaining 392 were ranked according to prestige groupings described in Table 9. Results for the total placements are presented in Table 10. Comparing the number of placements in each category to the number of schools in each prestige group (Table 9), we note that nearly half (47.5%) of Berkeley's graduates accepted first positions in

TABLE 10 Number of Berkeley Academic Placements in Each Prestige Grouping, 1967, 1968

Group	No. of Placements	% of Total
++	85	21.7
+	101	25.8
0	157	40.0
-	37	9.4
--	12	3.1
Total	392	100.0

SOURCE: National Academy of Sciences, "Survey of Earned Doctorates," computer tape for University of California, Berkeley.

schools ranked either ++ or +, although these two categories encompass only 75 colleges and universities. Furthermore, of the 428 institutions listed as -- schools, only 12 secured the services of a Berkeley Ph.D. The 410 schools representing ++, +, and 0 categories employed 87.5 per cent of the Berkeley graduates entering academia; the fact that only 49 Berkeley doctorates (12.5%) accepted positions in one of the 711 institutions carrying a - or -- rating suggests that the departments have not been interested in serving this sector of the market.

Our understanding of academic placement is enhanced by examining the positions accepted from 1962-63 to 1969-70 by the graduates of Berkeley's English Department, a large department (492 graduate students enrolled in 1965-66) with attrition from the doctoral program in excess of 80 per cent. Information was gathered from the annual departmental reports of the Committee on Placements.²⁸ Table 11 lists the schools where jobs were taken, by prestige grouping. Note that of the 136 placements ranked on the prestige index, 118 (87%) were in schools in the top three categories. Clearly, during the 1960s, Berkeley's English Department was not producing Ph.D.'s for the vast, less prestigious portion of the academic market.

D. Interviews with Faculty and Students

The purpose of interviewing faculty and students in several departments was simply to gain more understanding of the factors perceived by the participants as affecting time to degree and attrition. The theory of Section II was not directly presented to the interviewees because we did not wish to bias the response; instead, the differences in departmental performance were described and interviewees were asked how they

TABLE 11 Placement of Berkeley English Ph.D.'s, 1962-63 to 1969-70, by Prestige Grouping

Year	++	+	0	Unranked
1962-63	Harvard (2)	Virginia	Rutgers	Hunter
	Stanford	Amherst		
	Princeton	U.S.C.		
	Indiana	UCLA (2)		
	Yale (2)	Reed (2)	Texas	
1963-64	Columbia (2)	Williams	Bucknell	
	Indiana (2)	Smith	Rutgers	
	Cornell	Dartmouth		
		Stony Brook		
		UCLA	Carleton	McGill
1964-65	Columbia	Tufts	Mich. State	
	Indiana	Pomona	Texas	
		UC-Santa Cruz	Massachusetts	
		UC-Irvine	Colorado	
		St. John's		
		UC-S. Barbara		
		Wellesley		
		Virginia	Kansas	Boston U.
		UC-Riverside	Buffalo	McGill
			Kentucky	Victoria (2)
1965-66	Harvard		New Mexico	University of
	Princeton		University of	British Columbia
	Chicago		Illinois,	
	Columbia		at Chicago Circle	
	Yale			
Wisconsin				

1966-67	Chicago Cornell Wisconsin Indiana	Washington (2) Minnesota M.I.T. (2) Pennsylvania (2) Tufts Michigan	U. of Pacific Kansas Buffalo (2) Massachusetts	Hunter (2) Boston U. San Jose State	University of British Columbia
1967-68	Stanford Wisconsin	UCLA (2) Williams Washington Pennsylvania Pittsburgh Dartmouth UC-Santa Cruz	Nebraska (2) Texas Colorado (2) Rutgers Penn. State Mich. State Temple Buffalo	Boston U. (2) Harpur-SUNY Richmond-CUNY San Diego State San Jose State	
1968-69	Columbia Yale Chicago	Illinois UC-Riverside	Temple Penn. State (2) S. M. U. Colorado Hawaii Buffalo Fresno State Rutgers	Conn. (2) Indiana Northern Villanova	CSC at Dominguez Hills
1969-70 ^a	UC-Berkeley (Rhetoric) Harvard Indiana	Minnesota UCLA Illinois (2)	Texas (2) Rutgers Buffalo	California State University at San Francisco	

SOURCE: Berkeley English Department reports of the Committee on Placements.

^a Interim Report, Jan. 20, 1970. Ten other students had received at least one offer and were still negotiating.

would explain the relative performance of their department. Two senior professors in each of five fields were interviewed separately for an hour or more. The men were chosen for their knowledge of the program; in all but one instance, the professors had been members of the Berkeley faculty for 15 years or more. Students were interviewed in groups of three to five, representing different amounts of time in the program. Highlights of the interviews in three fields follow.

Chemistry

From faculty interviews, a clear picture of the economy of a Chemistry Department emerged. A faculty member must publish in order to gain a reputation so that he may acquire research grants with which to support graduate students who help him produce more research so that larger grants can be acquired allowing more students to be supported, etc.—a true vicious circle. The department simply could not afford to have a nonproductive faculty member, since each professor is expected to generate enough funds to support several students in a research group.

In this field, publish or perish is an understatement. I spend half my time supervising graduate students, making sure that the work gets done, and the other half in Washington begging for more money. My knuckles are raw from bowing and scraping in front of those agencies. I think it's a great tribute to our faculty that we manage to do as good a teaching job as we do under these circumstances.²⁹

The economic pressure to publish felt by faculty members in this field has led to an efficient organizational adaptation in which faculty members suggest topics and provide guidance and the graduate students do the actual research. The final product is published jointly under both names, with benefits flowing to both parties. The faculty member expands his publication list, thereby increasing his reputation and ability to earn more grants, while the student gains his Ph.D. and a first publication. The student is thus a critical input into the faculty member's research production function, freeing the professor from the tedious work in the laboratory and allowing him to operate more productively as a source of research proposals and as a fund raiser.

Back in the early 1940s when I was a young assistant professor at Berkeley working 90 hours a week to get tenure, I actually did a research project by myself one summer and published it under just my name. So many people quizzed me about that at the professional meetings, questioning my sanity and so forth, that I learned never to make that mistake again, and haven't published solo since then.

One can understand why course work is kept to a minimum—the student is simply much more valuable in the laboratory than in the classroom.

The departmental decision regarding the number of graduate students to admit has been dictated primarily by the availability of extramural faculty grants which support graduate students and their research; hence, external resources appear to be more important to the department than internal resources. However, the department is keenly aware of the work-load measures used by the university's budget personnel:

Even though our students take very few formal courses, they're all enrolled for the maximum course load in 298's and 299's.³⁰ Believe me, we produce more than our share of student credit hours.

The market's influence on departmental decisions governing the output rate of Ph.D.'s was brought out in several comments:

When we're considering a marginal student in an oral exam, we know that if we pass him he'll be able to get a job in an industrial lab somewhere and will probably be a damn good chemist, so we generally let such students through. Of course, if we had to place all our students in academic jobs, we'd have to change our requirements and eliminate marginal students. We couldn't let as many through.

As far as prestige is concerned, we view a placement in Bell Labs, or at Dupont or General Electric, as very acceptable, almost as good as a top academic position. In general, however, we hope that our best students take academic jobs.

Queried about the department's response to the currently worsened job market, one professor expressed uncertainty as to whether this was a temporary decline or represented a more permanent change. Should the decline be long-lived, he thought the department would reduce enrollments somewhat (although noting that this would be resisted by many professors), and that the curriculum would be revised to include more course work in order to train less specialized, more flexible chemists. The clear implication was that the product would be adapted to enhance its marketability.

Two other factors importantly related to student success rates emerged from the discussions. First, both professors stressed the value of the student's belonging to a specific research group, a place where the student could "hang his hat." This affiliation means that a professor is concerned with the student's progress from the beginning and provides a supportive group to bolster the student's confidence when the work becomes discouraging. Secondly, it was very apparent that the faculty

expect and want the students to succeed; we were told that if there were any doubt concerning the ability of an applicant to earn the degree, he would not be admitted. Thus, the faculty does not expect a high attrition rate, an expectation that becomes self-fulfilling.

The chemistry students' description of the program was virtually identical with the faculty description. The students agreed that there was only one critical test—the ability to perform research adequately.

We don't sweat course work or exams or the German requirement. The only thing that matters to the faculty is what we produce in the lab. The students who are asked to leave are the ones who spend a year trying to do research and make no progress.

When asked about student response to the worsening job market, it was observed that students are beginning to stay in Berkeley for a fifth year. By working as a T.A., the student can avoid the 25 per cent pay reduction accorded R.A.'s;³¹ furthermore, it was noted that several faculty members have not reduced student pay if the research being done is useful. We asked the first-year student whether the worsening market had affected his decision to enroll:

I don't give a damn about the poor market—who knows what it will be like four years from now? I just don't think about it because I'm doing what I want to do now. I want to teach when I finish, and I figure something will be available then.

Asked for their attitude toward the joint authorship of research, the students responded favorably, indicating that it was, "a help in establishing a scientific career." Departmental organization into research groups was strongly supported for giving the student a sense of belonging. Morale in the department appeared to be very high.

English

We began both faculty interviews by inquiring into department policies regarding graduate enrollments; we wanted to know how faculty explained the growth of the department to 492 graduate students during the 1965–66 academic year. The first professor was not aware of any conscious policy regarding departmental size. He had noticed, however, a tendency for enrollment growth to correspond rather closely to increased faculty size. He did not express an opinion regarding the direction of causality.

The second professor offered numerous explanations. He stated that the department had established objective criteria for admission and felt

obligated to accept all qualified applicants, noting the absence of physical constraints such as laboratory space and facilities that would restrict enrollments. Next, he observed that English professors display near "missionary zeal" regarding the teaching of their subject, seeing their duty as rescuing the country from "cultural barbarism and illiteracy." Presumably, this made it harder for the department to reject applicants. Finally, he commented:

In reality, I suspect our growth had a lot to do with the way the University keeps its books—you know, that weighted enrollment formula. While this was never overtly discussed when considering applicants, I know we all had in the back of our minds the knowledge that more graduate students meant more faculty. I'm sure most department members would never admit this, but I think you should adopt a behavioral approach—don't go by what we say, but by what we did.

This professor felt that the department had gotten far too large in terms of both students and faculty.

What sense of community can you have when the chairman's annual cocktail party for faculty, teaching assistants, and wives is attended by over 250 people? Why, we have to rent space off campus just to house the affair. . . . There are assistant professors who have been in the department for two or three years whose names I don't even know. It's a bit embarrassing when I pass them in the hall.

He felt that the department would be much better off if graduate enrollments were reduced to a number small enough so that all students could be supported. The loss of faculty positions that such a policy would entail was viewed as an acceptable cost, perhaps even a move in the right direction. "Perhaps we could regain a feeling of community."

The other professor did not express a desire for such substantial change. Shocked by the worsening job market, he indicated that the department was aiming for a steady-state enrollment of 340 Ph.D. students, with 75 to 100 new doctoral students admitted each year. When asked how many Ph.D.'s the department would want to award annually when in that steady state, he indicated that "with the new program we hope to reduce attrition to an acceptable level and award 30 to 40 Ph.D.'s each year."

Note that these figures imply an attrition rate in excess of 50 per cent, and yet the professor clearly indicated that such performance would be viewed by the English faculty as optimal. The pronounced difference between faculty expectations in the English and Chemistry departments certainly helps to explain why attrition rates differ so markedly. Of

course, my fundamental argument is that these divergent faculty attitudes are a reflection of the different markets being served.

The English graduate students described the program as "a series of hurdles accompanied by continual anxiety and humiliation." A third-year student stressed the "feeling that you are not fully accepted by the department until you've neared the end of the program." A second-year student stated that, "the feeling in this department is, they're out to fail you." She noted that during the first year in the program she met few of her fellow students, largely because the intense competition was not conducive to friendships. And yet the students were stunned when shown the data from Stark's study; they had no idea that so few students actually earned the Ph.D.

The students described the Comprehensive and Oral examinations as the major obstacles in the program. The open-ended nature of the Comprehensive exam, coupled with the awareness that the department would fail some of the students, made that exam a particularly frightening experience. Although the brochure states that students must take the Comprehensive between the fourth and sixth quarter, the students knew several people who had managed to postpone the exam until the seventh or eighth quarter for fear of failure. (In keeping with the theory of Section II, such behavior may be perfectly rational given the all-or-nothing nature of the investment; an extra quarter's study is well spent if it makes the difference between passing and failing. Faculty attitudes are critical, for if the students know a certain number will be flunked, the incentive is to expand study time and minimize that risk.)

The language requirements were not viewed as a direct cause of attrition although it was felt that the Latin requirement does contribute to the "disgust" which finally causes some people to leave the program. The forced study of Latin is apparently viewed by many students as highly irrelevant; one student commented that:

The faculty has preserved the Latin requirement because they view it as a hurdle which demonstrates the high quality of the Berkeley graduate program in English.

An advanced student argued that the department was constantly comparing its program to that of Yale and Harvard (the English departments ranked number one and two ahead of Berkeley in the Cartter Report), trying to outdo those two schools in the rigor of the doctoral program.

The Oral Examination was viewed as somewhat less an ordeal now that the student's area of interest occupies a larger portion of the exam. The students still characterized the exam as sadistic, marked by petti-

ness and competition among faculty members. Fear of the exam and the belief that a number will fail at that point does result in some postponement beyond the prescribed tenth-to-twelfth quarter.

In general, the English students expressed considerable bitterness toward their graduate experience. The faculty seem distant and unfriendly, large portions of the curriculum seem pointless and irrelevant, and the students express concern over their continually uncertain status in the department. Financial problems are also a contributing factor; for example, the second-year student had applied for a T.A. position next year and had been named an alternate, but the department will not tell her in what order she appears on the list. She expressed reluctance to borrow more money for a degree "which gets farther and farther away." One suspects that the willingness of humanities students to borrow is considerably reduced by the perception that the investment is very risky and replete with random factors over which the student has no control. The nature of the Ph.D. curriculum in English, and the humanities in general, with all the attendant uncertainties, may greatly reduce the value of an option to borrow, needlessly compounding the financial difficulties facing humanities students.

Electrical Engineering

Interviews in Electrical Engineering tended to confirm the theory almost precisely. One outspoken professor, having heard the topic described, burst out immediately:

The differences between departments that you mention are obviously caused by differences in demand. We're teaching useful, relevant material in our department, and so we have a strong demand for our Ph.D.'s, both in industry and in the universities. Our students have valuable options with the M.S., and wouldn't stand for a lot of trivia in the Ph.D. program that wasted their time. Graduate students in the humanities have no right to expect financial support since those subjects are basically useless. No wonder they can't get jobs.

He commented on the "insanity" of an institutional incentive system that rewards departments for building up huge enrollments, regardless of whether degrees are ever awarded.

The result is that a medieval corporation like the English Department packs in graduate students by the hundreds and then tries to keep them around forever because there aren't enough jobs. I'm sure that this crazy system has a lot to do with the student unrest at Berkeley—who can blame students in those departments for rioting?

Regarding placement of the Electrical Engineering Department's Ph.D. candidates, the professor indicated no preference for academic or industrial positions; the main concern is that students perform well in whatever position they accept. One professor mentioned the importance of feedback from industries employing the department's Ph.D.'s; apparently the Berkeley professors are very concerned that their students not be outperformed by graduates of competing Electrical Engineering departments.

I think it would be really sick if more than half of our Ph.D.'s went into teaching each year. After all, we train our students to perform a useful service to society, and we don't want them all merely instructing others.

One professor commented that the Mathematics and Physics departments had very foolishly allowed their curricula to become so academic that industry was becoming increasingly less interested in hiring Ph.D.'s from those departments.

The last thirty years have witnessed a tremendous broadening and deepening of the engineering curriculum, allowing our doctoral students to compete very effectively with students trained in the pure sciences. At this point, I think our students have the edge over applied math students when it comes to industrial positions.

The interviewer commented that the job market for Ph.D. electrical engineers was reported to have worsened dramatically this year, and asked what the department's response would be if the decline proved long-lasting. The professor smiled and said, "We'd simply have to enforce stricter standards and flunk a few more out."

SUPPLEMENTARY NOTE—1976

In the six years since this paper was written, several major changes have occurred in the environment of graduate education nationally and within California and the University of California specifically. Nationally, the labor market for new Ph.D.'s switched dramatically from substantial excess demand to conditions of oversupply in many fields, and the federal government and many state governments sharply reduced support for graduate students and for research. In California, the budget formula described in this paper was set aside and did not determine the state appropriation for several years. New funding formulae have been considered, including a proposal to change from an input to an output

budgeting approach based on degrees granted rather than on enrollment levels.

At Berkeley, the Graduate Division now has the power to set graduate enrollment ceilings for each department, and a simple debit-credit system has been created to monitor departmental performance (departments are debited for each enrolled student-year and credited for each Master's degree and Ph.D. awarded). The Graduate Division determines enrollment levels and the allocation of student financial support, to a degree, on the basis of this monitoring system.

Changes in the environment and in the incentive system would be expected to modify departmental performance, and an update of this study would be most interesting. Investigation into the economic behavior of nonprofit institutions remains a challenging and intriguing area of research.

NOTES AND REFERENCES

1. Bernard Berelson, *Graduate Education in the United States* (New York: McGraw-Hill, 1960); Joseph D. Mooney, "Attrition Among Ph.D. Candidates: An Analysis of a Cohort of Recent Woodrow Wilson Fellows," *Journal of Human Resources* 3 (Winter 1968): 47-62; Kenneth Wilson, *Of Time and the Doctorate—Report of an Inquiry into the Duration of Doctoral Study* (Atlanta: Southern Regional Education Board, 1965).
2. David W. Breneman, "The Ph.D. Production Process: A Study of Departmental Behavior" (Ph.D. diss., University of California at Berkeley, 1970).
3. Rodney Stark, *Graduate Study at Berkeley: An Assessment of Attrition and Duration* (Berkeley: Survey Research Center, University of California, Berkeley, 1966).
4. Joseph Mooney, "Attrition Among Ph.D. Candidates," pp. 47-62.
5. A less extreme assumption allowing positive payoff to incomplete degree work would not alter the analysis as long as a significant discontinuity between no degree and degree is present.
6. David Brown, *Academic Labor Markets* (a report to the U.S. Department of Labor, Washington, D.C., September 1965); and T. Caplow and R. McGee, *The Academic Marketplace* (New York: Basic Books, 1958).
7. National Education Association, "Teacher Supply and Demand in Universities, Colleges, and Junior Colleges" (published biennially from 1955 to 1965, Washington, D.C.).
8. Caplow and McGee, *The Academic Marketplace*, p. 92.
9. Allan Carter, *An Assessment of Quality in Graduate Education* (American Council on Education, Washington, D.C., 1966). (Known also as the Carter Report.)
10. In a different form and context, this description of a university's functioning was suggested to me by C. B. McGuire.
11. This fact was noted in a recent study of Berkeley doctoral students. See Ann M. Heiss, "Berkeley Doctoral Students Appraise Their Academic Programs," *Educational Record* 48 (Winter 1967): 40.
12. This formula has not been met in very recent years because of the state's decision to reduce the level of funding for the University of California.

13. National Academy of Sciences, *Doctorate Recipients from United States Universities 1958-1966* (Publication 1489, Washington, D.C., 1967), p. 82.
14. Stark, *Graduate Study at Berkeley*.
15. In May 1970, this requirement was eliminated. The analysis of this section helps explain why the change was bitterly contested by the language departments.
16. Allan Cartter, "The Supply of and Demand for College Teachers," *Journal of Human Resources* 1 (Summer 1966): 22.
17. *Ibid.*, p. 38.
18. Brown, *Academic Labor Markets*.
19. *Ibid.*, p. 87.
20. *Ibid.*, p. 92.
21. Reported in the Cartter Report.
22. National Research Council, *Report on Doctoral Programs* (Washington, D.C., 1968): pp. 16-17.
23. *Ibid.*, p. 17.
24. Brown, *Academic Labor Markets*.
25. *Ibid.*, p. 337.
26. *Ibid.*, pp. 341-352.
27. National Academy of Sciences, "Survey of Earned Doctorates" (Washington, D.C.; computer tape for Berkeley graduates, 1958-67, supplied by Graduate Division, University of California, Berkeley).
28. Department of English, University of California, Berkeley, "Report of the Committee on Placements" (provided by the English Department, 1962-1970).
29. Extracts are reproduced from notes.
30. Research seminars and individual research for graduate students for which course credit is given.
31. To provide an incentive for students to finish in four years, the department reduces an R.A.'s stipend by 25 per cent in the fifth year.