Who's Who in Physics and Math

Caltech, Harvard, Princeton, and the University of California (UC) at Berkeley have the most distinguished physics faculties, but Cornell offers the most effective graduate education in physics, according to a poll of 211 academic physicists. At the other end of the scale, eight physics programs were judged less than "minimally effective" in providing graduate education.

These prestige and effectiveness ratings are among the results of a major study of the quality of graduate programs at U.S. universities, the first such study since the late 1960's. Undertaken by a group of academic organizations and quarterbacked by the National Academy of Sciences, the study indicates that there has been little change during the past decade in the top ranks of graduate schools, at least in the mathematical and physical sciences.

The study does not pretend to offer a definitive ranking of graduate programs. Instead, it offers 16 different measures of each program, such as size of faculty, number of graduate students, number of papers published in 1978–79, and proportion of faculty members receiving federal support. The reader is asked to make his own judgment. Moreover, to minimize the tendency to make across-the-board comparisons in order to pick the "best" overall university, the study is being published in installments. The first, covering the mathematical and physical sciences, was released on 23 September.* Volumes covering the humanities, engineering, biological sciences, and social and behavioral sciences will be published later this year.

The survey of faculty opinion on the prestige and effectiveness of individual programs—which makes up 4 of the 16 measures of quality—is sure to attract the most attention, and the most criticism. Researchers were asked to rate the quality of the faculty in each graduate program in their discipline on a scale of 0 (not sufficient for doctoral education) to 5 (distinguished). They were also asked to rate the effectiveness of each program in educating students for research careers on a scale of 0 (not effective) to 3 (extremely effective); to assess the improvement, if any, over the past 5 years; and to indicate their familiarity with the work of faculty members they were evaluating.

The report studiously avoids ranking the programs according to the results of these surveys. The programs are simply listed in alphabetical order, without comment. But, since most readers of the report will look to see who came out top, here, for what it is worth, is a list of the top-ranked schools in each discipline, in terms of the perceived quality of their faculties. Scores on the 0 to 5 scale are given in parentheses.

Chemistry. Caltech (4.9), UC Berkeley (4.9), Harvard (4.9), M.I.T. (4.8), Columbia (4.6), Stanford (4.5), Illinois (4.5), Cornell (4.4), Chicago (4.4), UC Los Angeles (4.4), and Wisconsin (4.4).

Computer Science. Stanford (5.0), M.I.T. (4.9), Carnegie-Mellon (4.8), UC Berkeley (4.5), Cornell (4.3).

Geosciences. Caltech (4.9), M.I.T. (4.8), UC Los Angeles (4.5), Chicago (4.3), Columbia (4.3), Stanford (4.2), Princeton (4.2), Yale (4.1), Harvard (4.1), and UC Berkeley (4.1).

Mathematics. Princeton (4.9), M.I.T. (4.9), UC Berkeley (4.9), Harvard (4.8), Chicago (4.8), Stanford (4.6), New York University (4.5), Yale (4.5), and Columbia (4.4).

Physics. Caltech (4.9), UC Berkeley (4.9), Harvard (4.9), Princeton (4.9), M.I.T. (4.8), Cornell (4.7), Chicago (4.6), Stanford (4.6), Columbia (4.5), and Illinois (4.3).

Statistics/Biostatistics. UC Berkeley (4.9), Stanford (4.9), Chicago (4.7), and Wisconsin (4.3).

Like its predecessors, notably the two assessments published by the American Council on Education (ACE) in 1966 and 1970, this study is likely to be widely used by would-be students in selecting graduate programs, and by researchers trying to understand the workings of the academic scientific enterprise. The ACE studies rapidly became the Baedeker of American graduate education (*Science*, 8 January 1971, p. 49).

It is also likely to influence funding patterns. Programs whose faculty have been rated marginal or less, and whose effectiveness is judged less than minimal, may have a harder time competing for funds.

Partly for these reasons, the study is sure to be controversial. The ACE studies certainly attracted some heavy fire. They relied exclusively on surveys of faculty opinion to rate graduate programs, and were thus criticized for mistaking prestige for quality. They were also faulted because faculty members often gave opinions on programs about which they knew very little. And, on a more fundamental level, they were attacked because of their potential for maintaining the academic pecking order by influencing the flow of funds and bright students into the top-rated schools.

By offering a range of measures to supplement the opinion survey, and by avoiding any explicit ranking of programs, the new study may blunt some of these criticisms. But should any new assessment have been undertaken in view of the limitations inherent in the exercise and the potential for misusing the results?

Gardner Lindzey, director of the Center for Advanced Study in the Behavioral Sciences at Stanford, who chaired committees to plan and carry out the study, argues that "the choice was not whether or not to do a study, but whether it should be left up to others to do hit-and-miss studies." Other assessments would have been done anyway, he argues, and it was felt that there was a need for a more rigorous approach. A total of half a million dollars was raised from foundations, government agencies, and the academy itself, and work began in earnest in mid-1980.

The following are among the more interesting findings:

- There is a high correlation between the size of a department and its prestige in the eyes of other faculty members.
- Not surprisingly, larger departments tend to produce the most publications and to publish in the more influential journals. But there are some intriguing exceptions. In computer science, for example, Stanford, M.I.T., and Carnegie-Mellon are all highly rated and have similar-sized departments, but Carnegie-Mellon's computer science department produced only half as many papers as each of the other two in 1978–79.
- Between 6 and 9 percent of the programs in each discipline were rated "extremely effective," while 2 to 5 percent were rated "not effective."—COLIN NORMAN

An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences (National Academy of Sciences, Washington, D.C., $10.50).

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