

NRC Releases Reports on Science Education

The National Research Council (NRC) released two reports in 1995 on science education: *Research-Doctorate Programs in the United States: Continuity and Change* and *Reshaping the Graduate Education of Scientists and Engineers*. Information in the studies can be used by prospective students to select programs and to gain an understanding on the directions their studies should be taking, by administrators responsible for the decision-making structures of universities, and by policymakers to set priorities and allocate resources.

The study on research-doctorate programs updates and expands on NRC's 1982 assessment of graduate programs. It examines the quality and effectiveness of 3,634 doctoral programs in 41 fields at 274 universities across the United States, adding eight fields, including materials science, to the 1982 list. The updated study refines the techniques for assessing programs, and provides a benchmark database for future studies. Universities provided data on the students and faculty participating in their programs. National databases yielded detailed information about faculty research productivity and the demographic characteristics of program graduates. A survey of nearly 8,000 university faculty members provided peer assessments of each program's effectiveness in training scholars and research scientists and of the scholarly quality of its faculty.

The data were analyzed in various categories, and programs were grouped by discipline into quarters—from top-rated to lower-rated—on the basis of the reputational rating of the program faculty. Among the committee's findings are that programs that were included in the 1982 study tended to have a similar rating 10 years later; students take longer to earn a doctorate at almost every institution in almost every field, but, on average, the time is greatest for lower-rated programs; in many fields, women and minorities are still underrepresented among those receiving doctorates; however, they are as likely to graduate from highly rated programs as nonminority males; and highly rated programs tend to be larger, as measured by the number of faculty members, graduate students, and degrees conferred.

A series of appendices provide detailed information on different measures for

each program. Although several of the tables rank programs on the basis of the "scholarly quality of program faculty," a program may be ranked highly by that measure, but lower in other dimensions, the committee said. In addition, the rankings of individual programs should not be averaged to obtain an overall ranking for an institution since each institution has a unique set of programs and very few institutions have programs in all fields covered in the assessment.

The NRC report on *Reshaping the Graduate Education of Scientists and Engineers* finds that the job market for scientists and engineers has become more interdisciplinary, collaborative, and global than before, requiring people who are adaptable and flexible as well as technically proficient. Graduate education must better serve the needs of those whose careers will not center on research, said the committee conducting the study. Only 31% of those awarded PhD degrees between 1983 and 1986 were in tenure-track positions or have tenure as of 1991. More than half of new graduates with a PhD degree now find work in nonacademic settings.

The committee recommends that students be discouraged from overspecialization and provided with options that allow them to gain a wider variety of academic and other skills. The committee said, "Department advisors should help students choose between three distinct options: to stop with a master's degree, to proceed toward a PhD and a position in research, or, for a student interested in nontraditional fields, to design a dissertation that meets high standards for originality but requires less time than would preparation for a career in academic research." Rather than offer financial aid strictly for research, the committee recommends that federal agencies provide education/training grants awarded competitively to institutions and departments to encourage changes that would improve the versatility of students, both through curricular innovation and through more effective faculty mentoring to acquaint students with the full range of employment options.

The committee said graduate students and their advisors could also be more informed of career options through an up-to-date, accurate national database that would include data on career tracks by field as well as data on graduate pro-

grams, including financial aid, placement rates, and the time it takes to complete a degree.

Both reports are available from the National Academy Press, 2101 Constitution Ave. NW, Box 285, Washington, DC 20055; phone (202) 334-3313 or 1-800-624-6242. The cost of the *Research-Doctorate Programs* report is \$59.95 (prepaid) plus shipping charges of \$4.00 for the first copy and \$0.50 for each additional copy. An electronic file of selected tables from this report is available on NRC's World Wide Web homepage at <http://www.nas.edu>. The cost of the *Reshaping the Graduate Education* report is \$30.00 (prepaid) plus shipping charges of \$4.00 for the first copy and \$0.50 for each additional copy.

Signed Bill Supports DOE Programs

On November 13, President Clinton signed the "Energy and Water Development Appropriations Act, 1996." The Act provides \$19.3 billion in budgetary resources for programs of the Department of Energy, portions of the Departments of Interior and Defense, the Army Corps of Engineers, and several smaller agencies.

The president stated that the bill supports his proposal for the reinvention of the Department of Energy. The bill provides \$6.1 billion to continue cleaning up DOE's former weapons production facilities. It supports the president's key science initiatives to enhance the operation and availability of DOE's science facilities to enable more researchers access to these facilities to conduct more basic and applied research.

The bill also provides \$3.6 billion for DOE's Stockpile Stewardship and Management program, assuring the safety and reliability of the nuclear weapons stockpile without nuclear testing. This program is a result of the Presidential Decision Directive and act of Congress (P.L. 103-160) in response to the extension of the nuclear testing moratorium in July 1993. The program has reduced the number of plant sites from seven to four (Kansas City, Pantex, Savannah River, and Oak Ridge). Without nuclear testing, research is required to improve the scientific understanding of nuclear weapons and to develop advanced manufacturing and materials technologies to correct stockpile problems. □

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