



A DATA-BASED ASSESSMENT OF RESEARCH-DOCTORATE PROGRAMS IN THE UNITED STATES (2010)

This assessment from the National Research Council offers an unprecedented collection of data on over 5,000 doctoral programs in 62 fields at 212 universities in the United States -- including information on faculty research productivity, institutional support for students, and the diversity of faculty and students, among many other characteristics.

This large dataset will enable university faculty, administrators, and funders to compare, evaluate, and improve programs, while prospective students can use the data to help identify programs best suited to their needs. Universities will be able to update important data on a regular basis, so that programs can continue to be evaluated and improved.

The assessment also illustrates how the data can be used to rank the quality of programs based on the importance of particular characteristics to various users. It does not include an authoritative declaration of the 'best programs' in given fields, as the study committee concluded that no single such ranking can be produced in an unambiguous and rigorous way.

The assessment includes a report describing the approach used and general findings about U.S. doctoral education, as well as an Excel spreadsheet containing the data and illustrative rankings. The report and spreadsheet can be downloaded free of charge at <http://www.nap.edu/rdp>, along with a revised guide to the study methodology.

Data Provided by the Assessment

The assessment offers data for each program on the following 20 characteristics:*

-- Publications per allocated faculty member	-- Percent non-Asian minority students
-- Citations per publication	-- Percent female students
-- Percent faculty with grants	-- Percent international students
-- Awards per allocated faculty member	-- Average PhDs, 2002 to 2006
-- Percent interdisciplinary faculty	-- Average completion percentage
-- Percent non-Asian minority faculty	-- Median time to degree
-- Percent female faculty	-- Percent students with academic plans
-- Average GRE scores	-- Student work space
-- Percent 1st-yr. students with full support	-- Student health insurance
-- Percent 1st-yr. students with external funding	-- Number of student activities offered

The data were collected from academic year 2005-2006 through questionnaires sent to those identified as doctoral faculty by their institutions, as well as through questionnaires sent to the heads of doctoral programs, administrators, and students. Information on characteristics such as publications and citations came from public sources and uses a considerably longer timeframe.

Data on these 20 characteristics also served as the basis for the illustrative rankings included in the assessment. In addition, the assessment offers data on some characteristics not incorporated in the illustrative rankings, such as the percent of program faculty who are tenured and the percent of students employed as research or teaching assistants.

*For computer science and humanities fields, only 19 are included; citations are not included.

Understanding the Illustrative Rankings

To illustrate how the data can be used to assess and compare the quality of programs, the report offers five sets of rankings of programs in each field. These illustrative rankings should not be interpreted as definitive conclusions about the relative quality of doctoral programs, nor are they endorsed as such by the National Research Council. Rather, they demonstrate how the data can be used to rank programs based on the importance of particular characteristics to various users -- in this case, to faculty at participating institutions.

The approach used to generate the illustrative rankings incorporates both data on program characteristics and faculty values. For each program, the study analyzed data on 20 characteristics, "weighing" the data according to the characteristics valued most by faculty in that field. Thus, the weights on which the rankings are based are derived from the faculty in each field. The rankings are given in broad ranges rather than as single numbers, to reflect some of the uncertainties inherent in any effort to rank programs by quality.

Overall Illustrative Rankings

For each program, two illustrations of rankings for overall program quality are given, based on two different methods of discerning what faculty in each field believe is important in a high-quality doctoral program.

- **The S (or survey-based) rankings** are based on a survey that asked faculty to rate the importance of the 20 different program characteristics in determining the quality of a program. Based on their answers, each characteristic was assigned a weight; these weights varied by field. The weights were then applied to the data for each program in the field, resulting in a range of rankings for each program.
- **The R (or regression-based) rankings** are based on an indirect way of determining the importance faculty attach to various characteristics. First, groups of randomly selected faculty were asked to rate the quality of a sample of representative programs in their field. Based on the sample program ratings, weights were assigned to each of the 20 characteristics using statistical techniques; again, these weights varied by field. These weights were applied to the data about each program, resulting in a second range of rankings.

Each approach yielded a different set of weights, and therefore resulted in different ranges of rankings. In the S-rankings, for example, faculty in most fields placed the greatest weight on characteristics related to faculty research activity, such as per capita publications or the percentage of faculty with grants. Therefore, programs that are strong in those characteristics tend to rank higher. Such characteristics were also weighted heavily in the R-rankings for many fields, but program size (measured by numbers of PhDs produced by the program averaged over five years) was frequently the characteristic with the largest weight in determining these rankings.



The separate presentation of the S- and R- rankings is a change from the initial approach described in *A Guide to the Methodology of the National Research Council Assessment of Doctoral Programs in the United States* (2009), which combined them into one overall ranking.

The degree of uncertainty in the rankings is quantified in part by calculating the S- and R-rankings of each program 500 times. The resulting 500 rankings were numerically ordered and the lowest and highest five percent were excluded. Thus, the 5th and 95th percentile rankings -- in other words, the 25th highest ranking and the 475th highest ranking in the list of 500 -- define each program's range of rankings, as shown in the Excel spreadsheet.

Dimensional Illustrative Rankings

The report also offers illustrative ranges of rankings for each program on three separate dimensions of doctoral education -- research activity, student support and outcomes, and diversity. These rankings are based on the "S-ranking" approach described above, but only the characteristics relevant to each dimension were included in the calculation.

Research activity. These rankings reflect program characteristics such as publications, citations, the percent of faculty holding research grants, and recognition through honors and awards. Faculty in science and engineering fields placed the greatest weight on grants per faculty member. Faculty in the humanities and social sciences generally placed the greatest weight on publications. Both groups valued honors and awards.

Student support and outcomes. These rankings reflect program characteristics such as the percent of students fully funded in the first year, the percent of students completing their degrees in a given time period, and expected placement in academic positions. Surveyed faculty tended to place more importance on student support and completion rates than on time to degree or placement.

Diversity of the academic environment. These rankings reflect characteristics such as the percent of faculty and students from underrepresented minority groups, the percent of faculty and students who are female, and the percent of students who are international. Faculty in most fields placed the most weight on the percent of students from underrepresented minority groups.



The report urges users to consider which of the characteristics are most important to them and to use the abundance of data to compare programs accordingly. Tutorials with examples of how students, faculty, and administrators can use the spreadsheet are available at <http://www.nap.edu/rdp>.



PhDs.org, an independent web site not affiliated with the National Research Council, is incorporating data from the assessment into its Graduate School Guide. Users of the Guide can choose the weights assigned to the program characteristics measured by the National Research Council and others, and rank graduate programs according to their own priorities.

Findings and Trends in Doctoral Education

The report also examines trends in U.S. doctoral education since the National Research Council's last assessment was released in 1995, based on data collected in 1993. Comparisons are limited to programs that participated in both studies.

- The number of students enrolled has increased in engineering (4%) and in physical sciences (9%) but declined in the social sciences (-5%) and humanities (-12%).
- On average programs in all fields have experienced a growth in the percentage of female students. The smallest growth (3.4%) was in the humanities fields, which were already heavily female, while the greatest growth (9%) was in engineering -- to 22 percent overall.
- The percentage of Ph.D.s awarded to students from underrepresented minority groups has increased for all fields. For example, minority Ph.D.s increased from 5.2% to 10.1% in engineering, and from 5% to 14.4% in the social sciences.
- As was found in the 1995 report, larger programs tend to be more highly ranked. This result holds despite the current study's primary reliance on per capita measures of scholarly productivity.

The report also offers general findings on graduate education in the U.S., including the following:

- Doctoral education is dominated by public universities, which housed 72% of the doctoral programs ranked in the study. Of the 37 universities that produced the most Ph.D.s from 2002-2006, only 12 were private universities.
- The faculty is not diverse with respect to underrepresented minorities, who make up 5% or less of faculty in all broad fields except the social sciences (7%) and the humanities (11%).
- Over 50 percent of students complete their degree in six years or less in the agricultural sciences and in engineering. In the social sciences 37 percent complete in six years or less, which is the same percentage of humanities students who complete by eight years.
- The majority of students in five fields surveyed for the report -- chemical engineering, physics, neuroscience, economics, and English -- were "very satisfied" or "somewhat satisfied" with the quality of their program. Over 60% in most fields felt they benefited from the program's intellectual environment, but only 40% or less of were satisfied with the program-sponsored social interaction.

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For More Information

Copies of *A Data-Based Assessment of Research-Doctorate Programs in the United States* and CDs of the Data Tables in Excel are available from the National Academies Press; call (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area), or visit the NAP web site at www.nap.edu/rdp. For more information on the project, contact staff at (202) 334-2700 or visit the Policy and Global Affairs web site at www.nationalacademies.org/pga.