

EXECUTIVE SUMMARY

The purpose of this report is to examine the matrix of support patterns of science and engineering (S&E) doctorates in 1995,¹ showing the distribution of various modes of support to individuals. The data provided in this report are intended to be a source of contextual and background information for those interested in examining the various types of graduate support modes and in assessing the impacts of support modes on graduate education outcomes. The data in this study show the complexity of support mechanisms and thus the limitations of analyses of the effects of only a single mode of support.

The analysis in this report is based on the Survey of Earned Doctorates (SED). SED collects data from doctorate recipients at the time of their Ph.D. conferral regarding primary, secondary, and all other modes of support used over the course of graduate study, as well as information on individual and institutional characteristics. The following highlights some of the main results of the study.

NUMBER OF SUPPORT MODES USED

New S&E Ph.D.s commonly used more than one mode of support during graduate school. Only 16 percent of 1995 S&E Ph.D. recipients reported using one mode of support and more than 40 percent used 3 or more modes of support. The average number of modes of support reported by these recipients was 2.5. Numbers of modes of support varied by field, sex, race/ethnicity,² and citizenship. For example, 72 percent of those in the agricultural sciences, but only 44 percent of those in psychology, used one or two support modes. On average, women reported more support modes than men in S&E as a whole and within most fields. Asians and foreign students, on average, reported fewer modes of support than did other groups.

¹Throughout this report, the terms science and engineering doctorates and science and engineering Ph.D.s refer to research doctorates in agricultural sciences; biological sciences; computer & information sciences; mathematics; physical sciences; earth, atmospheric, & ocean sciences; psychology; social sciences; and engineering, as well as the health sciences (e.g., environmental health, nursing, pharmacy, and veterinary medicine). Although this study examined support patterns in 1995, more recent data are currently available (see NSF 1999a.).

²Race/ethnicity and citizenship are aggregated into the following categories: U.S. citizens and permanent residents who are further subdivided as: Asians (Asians or Pacific Islanders), underrepresented minorities (black non-Hispanics; Hispanics, and American Indians or Alaskan Natives), and white non-Hispanics; and foreign students (defined here as persons on temporary visas at the time of receipt of the Ph.D.).

Although the number of support modes did not vary by institutional control (public/private), it did vary by the research emphasis of the institution. In every field except earth, atmospheric and ocean sciences, students receiving doctorate degrees from Carnegie Research I (Research I)³ institutions were more likely than those receiving their degrees from other institutions to report use of more than one mode of support.

PREVALENCE OF MODES OF SUPPORT

S&E Ph.D. recipients in 1995 reported greater use of research assistantships (RAs) (66 percent) than any other support mode in many fields. Exceptions were the health sciences, mathematics, psychology, and the social sciences. In the health sciences, psychology, and the social sciences, use of one's own funds was the most frequently cited support mode; in mathematics, it was teaching assistantships (TAs). Fellowships,⁴ traineeships,⁵ and loans were less frequently cited modes of support in S&E as a whole.

Among 1995 S&E Ph.D. recipients, women were more likely than men to report using fellowships, traineeships, their own funds, or loans as a mode of support. Men were more likely than women to have received support in the form of RAs. However, some of these aggregate differences between women's and men's support modes are related to differences in field of doctorate.

As in differences in support modes cited by men and women, some of the aggregate variations across racial/ethnic groups also reflect field differences. However, field differences do not explain all of the racial/ethnic variations in modes of support. Asians reported using RAs with greater frequency than other groups in every field except computer and information sciences and psychology.⁶

³See the definitions of Research I and all other Carnegie-classified institutions in appendix A.

⁴Fellowships are here described as nationally competitive awards granted directly by the sponsoring organization to a student.

⁵Traineeships are here considered to be those awards that are not nationally competitive and that are awarded by individual academic departments or institutions rather than by a sponsoring organization.

⁶The Chinese Student Protection Act of 1992 allowed Chinese students to apply for permanent residency in 1993. Three-quarters of the U.S. citizen and permanent resident Asians receiving S&E Ph.D.s in 1995 were permanent residents and 77 percent of those permanent residents were from the People's Republic of China. Thus, a large proportion of the U.S. citizen and permanent resident Asians receiving S&E Ph.D.s in 1995 were Chinese who may have entered graduate school as temporary residents and were therefore ineligible for modes of support that required U.S. citizenship or permanent residency.

In every field, a larger percentage of both underrepresented minorities and whites reported using their own funds and loans than did either Asians or foreign students. Also in every field, higher percentages of underrepresented minorities than of other groups reported using traineeships. In all fields but earth, atmospheric, and ocean sciences, higher percentages of underrepresented minorities than of other groups reported using fellowships.

Little difference existed in support patterns reported by new S&E Ph.D.s in public and private institutions. However, those with doctorates from Research I institutions—the Nation’s largest research performing universities—did differ notably from those in other types of academic institutions. New S&E Ph.D.s from Research I institutions were more likely to report use of RAs, and less likely to report use of their own funds, than were new Ph.D.s from all other institutions. In addition, they were also somewhat more likely to have held fellowships or traineeships or to have served as teaching assistants.

COMBINATIONS OF MODES OF SUPPORT

Five combinations of support modes out of a possible 127 were reported by just under 40 percent of the 1995 S&E Ph.D. recipients. Two combinations—RA + TA⁷ and RA + own funds—accounted for about 20 percent of all combinations of modes. RA + TA + own funds and RA alone were the third and fourth most frequent combinations. TA + own funds was the fifth most frequently used combination of support modes.

In most fields, i.e., engineering, the social sciences, computer and information sciences, physical sciences, and

biological sciences, predominant combinations of support modes do not differ greatly by sex. However, differences are apparent in a few fields. For example, in the health sciences, 12 percent of women, but only 6 percent of men, reported using their own funds as their only mode of support. In mathematics, women and men have the same top four combinations of support, but for men the predominant combination was RA + TA; for women, TA + own funds. In the earth, atmospheric, and ocean sciences, women and men reported the same top four combinations; but the predominant combination for women was RA + TA + own funds, that for men was RA + own funds.

Combinations of support modes also differed by race/ethnicity. Each of the top five support combinations for underrepresented minorities involved the use of own resources, but their top five support modes involved only 22 percent of underrepresented minority Ph.D. recipients; for Asians and foreign students, their top five accounted for about 60 percent each. In fact, just under 40 percent of those of Asian background received their support from two sets of combinations: either the RA + TA combination or RA alone.

Four of the top five combinations of support modes were the same for new S&E Ph.D.s from both public and private institutions, with only the order and level varying. The top five combinations in private institutions were used by 33 percent of the doctoral recipients compared with 43 percent in public institutions.

The Nation’s major research—Research I—universities and other types of academic institutions also shared four of the top five combinations of support modes for new S&E Ph.D.s.

⁷Order does not imply anything in combinations of support modes, i.e., RA + TA is the same as TA + RA.