NSF to Take Closer Look at How Support Shapes Careers

The federal government spends more than a billion dollars a year on a variety of programs to support graduate students in science and engineering. But there is scant information on which mechanisms—individual fellowships, institutional traineeships, or grant-funded research assistantships—work best in getting young scientists launched on a successful career. After spending 6 months searching for an answer, a National Science Board (NSB) task force concluded recently that there isn't one. "It was a real surprise to us that such a key question hadn't ever been addressed," says chemist Marye Anne Fox, vice president for research at the University of Texas, Austin, and co-chair of a task force on graduate and postdoctoral education for the board, which oversees the National Science Foundation (NSF). "There just wasn't any useful information on how the mode of support affects career paths for scientists."

Some of that missing information may emerge over the next few years, however. In February, the board asked NSF to carry out a series of pilot projects and evaluate their effectiveness. The results could shift the balance among NSF's current $285 million portfolio of support, a mix of programs serving some 20,000 students. And NSF isn't the only agency taking a hard look at the way it supports graduate students. The National Institutes of Health (NIH) is in the midst of a similar review of its programs.

Training the next generation of scientists is a bread-and-butter issue for federal research agencies. But different agencies have very different mixes of programs (see charts), and there is no overarching philosophy. A report from the National Academy of Sciences drew attention to this scattershot approach last year, noting "there are no clear guidelines" for current programs. The production of Ph.D.s, it learned, "reflects the availability of research funds more than employment demand" (*Science*, 21 April 1995, p. 358).

The academy report recommended a shift toward traineeships—grants to institutions to support varying numbers of graduate students studying in particular fields—and away from research assistantships, which are paid out of a faculty member's individual research grant. Research assistantships, it said, tied students so closely to their mentor that there was "little time left for independent exploration or other educational activities." At the same time, the report recommended that agencies continue to offer fellowships—awarded to individuals in a national competition—as a good way to help the top tier of students planning an academic research career.

Although NSF spends more money on research assistantships than on the other modes combined, the graduate fellowship program has long been its shining star. "It gave me the flexibility to ask my own questions and to figure out how to get the answers," says biological oceanographer Deborah Penry, a 1980 recipient now at the University of California, Berkeley, where she studies the digestive systems of marine organisms as models for chemical reactors. In 1993 she received NSF's highest research prize, the $500,000 Waterman Award for young scientists.

In contrast, NSF traineeships have had a checkered history. In the 1970s, in response to a gloomy job market, NSF canceled a sizable traineeship program while preserving its prestigious fellowship program. In 1992 it resurrected the idea, although on a much smaller scale. The program was temporarily suspended this year because of a tight budget, but its proposed 1997 budget calls for a new round of traineeship awards. The science board has long felt that traineeships are "an important vehicle," says Fox, but the task force eschewed a "major restructuring" of graduate support without convincing data.

It now hopes NSF will be able to come up with such data by examining "alternative modes of graduate support." Says Fox, "We think it's an important experiment that ought to be funded at a sufficient level." Luther Williams, head of NSF's education directorate, says he plans to ask outside contractors to help design and carry out the necessary retrospective and prospective studies.

As NSF gears up to examine these issues, a separate but similar effort has been under way for a year at NIH. The study will look at the track record of the 22-year-old National Research Service Awards, a $385-million-a-year program for graduate and postdoctoral students that is heavily weighted toward institutional traineeships. NIH is also setting up a tracking system to follow future recipients. The first data on predoctoral students are expected this summer, and the tracking system should be in place within a year.

NIH's Walter Schaffer, director of research training, says he doesn't expect the exercise to demonstrate clear advantages for any one type of support, in part because programs serve different purposes. And they are not mutually exclusive. An NIH training grant in the first 2 years of graduate school is often followed by a research assistantship when a student is ready to tackle a research project, notes Schaffer, and many young scientists also receive postdoctoral fellowships to continue their research.

Fox acknowledges that it could take years to get a comprehensive picture of how modes of support affect the next generation of scientists. And it is hard to disentangle the effects of graduate support from other variables. Studies have shown that the prestige of one's graduate school or postdoctoral lab is a major determinant of academic success, says NIH's consultant on its study, psychologist Georgine Pion of Vanderbilt University.

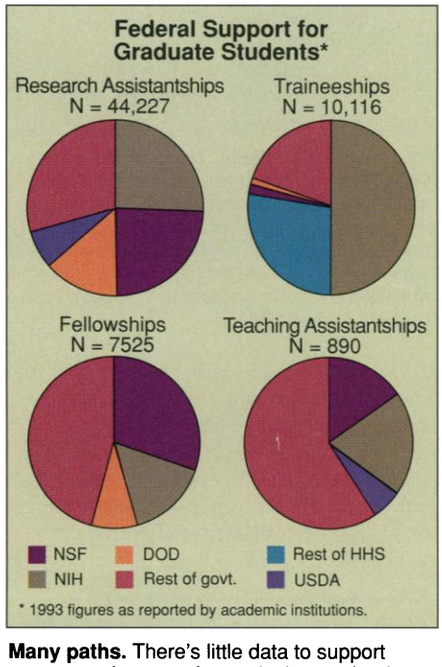
Still, NSB task force co-chair Eve Menger, director of technology for Corning Inc., says that taking a closer look can't hurt. "It was like squeezing a bowl of Jell-O," she says of the group's effort. "It was impossible to form a lasting impression of anything."

–Jeffrey Mervis

A TALE OF TWO AGENCIES	NSF	NIH
Total # of students supported*	20,071	20,012
# of fellowships	2,460	2,407
Graduate	2,360	645
Postdoc	(est.) 100	1,762
# of traineeships	570	12,380
Graduate	570	7,532
Postdoc	0	4,848

* Includes those supported by research grants.
SOURCE: NSF, 1995; NIH, 1994.

In step. NSF may increase its use of traineeships, a staple of NIH's portfolio.



Many paths. There's little data to support agency preferences for particular mechanisms.