

## GRADUATE TRAINING

# NSF Fellowships Called Powerful Tool for Building the Pipeline

A prestigious program is slated for a big increase next year thanks in part to recent data showing its ability to draw talented students into science

A fellowship program that has nurtured the early careers of Nobel prizewinners and a co-founder of Google has quietly been gaining political favor in Washington. Last month, the Bush Administration proposed a sharp increase in the number of Graduate Research Fellowships (GRFs) awarded by the U.S. National Science Foundation (NSF). And Democratic presidential hopeful Senator Hillary Clinton (D-NY) has called for its expansion as part of her “innovation agenda.”

The GRF’s rise to prominence has been propelled in part by the work of Harvard University labor economist Richard Freeman, who calls the fellowship “the U.S.’s premier award for science and engineering graduate students.” In a 2005 study, Freeman found that the GRF—which provides a 3-year stipend to U.S. citizens or permanent residents for graduate study at the university of their choice—is a powerful mechanism for luring talented U.S. students into science (www.nber.org; working paper 11623). He argues that NSF should triple the number of GRF awards (from roughly 1000 to 3000 a year) and increase the amount of the scholarship (now \$30,000) by \$10,000. Although NSF has responded with a more modest proposal—a 32% budget increase that could mean as many as 700 new awards in 2009—agency officials are happy to disseminate Freeman’s message to make their case.

Created in 1952, the merit-based program funds all science and engineering disciplines proportionately—that is, it selects the same percentage of applicants in each field that NSF supports. In the early years, the physical sciences and engineering accounted for the bulk of the awards. Those fields now make up about half the recipients, with the life sciences comprising another quarter and the social and behavioral scientists about one-sixth.

The program helped nurture a post-Sputnik generation of researchers. Its 43,000 alumni include more than 20 Nobelists; a more recent recipient is Sergey Brin, a co-founder of

Google. But by the 1990s, it had fallen on hard times. Stipend levels had failed to keep up with those of other fellowships, and the number of awards had remained constant for decades despite a steady rise in the number of undergraduates majoring in science and engineering. The shrinking ratio, from 5.4 awards per 1000 science and engineering majors in its first few years to 2.2 earlier this decade (see graph), “sent a very bad signal to students that science wasn’t important,” says Freeman.

Students responded by avoiding the pro-

Analyzing 50 years of data, Freeman calculated that increasing the number of awards substantially would have only a slight impact on quality while resulting in an influx of students into science and engineering. A survey of 1800 Harvard undergraduates similarly suggested that talented students would be lured into science if NSF gave out more fellowships to support their graduate studies. In particular, some 40% of students said that they would opt for graduate school in science if given “a national fellowship”; only 18% already had such plans.

Freeman’s analysis soon gained adherents. The Brookings Institution’s Hamilton Project to foster economic growth has promoted it (www.hamiltonproject.org; policy brief 2006-09), and Clinton has embraced the tripling of awards and a 33% boost in the stipend, asserting that the fellowships are “the key financial resource for [U.S.] science and engineering graduate students.”

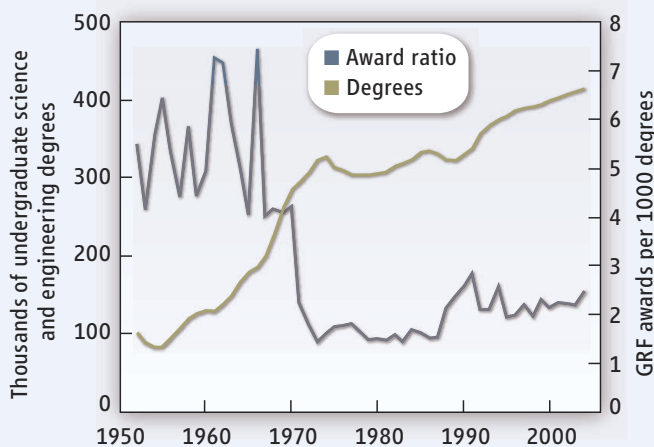
It also struck a chord at NSF. “He put the pieces together,” says Carol Stoel, acting head of graduate education at NSF. The agency expects to make about 825 awards this year, says program director William Hahn, down from 925 in 2007. (For the past 2 decades, the annual number has fluctuated between 800 and 1000.) Its 2009 budget request of \$117 million for the education directorate, up from the current \$88 million, would raise the current 10% success rate for applicants. Because the fellowships run for 3 years, however, Congress would need to sustain the increase for several years to avoid sending the program on a roller-coaster ride.

As the biggest single increase in NSF’s education budget, the request for the GRF program will attract close scrutiny from Congress. It must compete against programs serving different populations that enjoy strong legislative support, in particular those for minorities, undergraduates, and precollege science education.

“It deserves serious consideration because NSF feels so strongly about it,” Representative Alan Mollohan (D-WV), chair of the House panel that controls NSF’s budget, explained after a 27 February hearing in which NSF made its case. “Is it the fastest way to fill the pipeline? I don’t know. And I don’t want to prejudge [the request]. But there are a lot of things we need to do to improve science and math education.”

—JEFFREY MERVIS

## Not Keeping Pace



**Negative numbers.** A declining ratio of awards to degrees sends students “a bad signal,” says Harvard’s Richard Freeman.

gram. Hoping to turn things around, NSF began raising the annual stipend, which stood at \$15,000 in 1999, until it reached \$30,000 in 2004. (Universities also receive \$10,500 as an institutional allowance.) The number of applicants nearly doubled, Freeman found, to almost 9000 in 2004, and the overall quality of the applicant pool also rose. In other words, he says, the fellowship’s prestige caused more of the “best and brightest” seniors to consider graduate degrees in science and engineering.

It certainly opens doors at Harvard, Freeman explains. “My department has a policy that if you get a GRF, you’re admitted,” he says. “Absolutely. Because you’re not costing us anything. And we know NSF runs a pretty tight ship.”