AAAS President Richard C. Atkinson urges action to encourage doctorates in science and engineering

February 19, 1990

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EMBARGOED FOR RELEASE MONDAY AMS, February 19, 1990

AAAS PRESIDENT RICHARD C. ATKINSON URGES ACTION TO AVOID NATIONAL CRISIS IN SCIENTIFIC MANPOWER

NEW ORLEANS--It is "nothing less than a scandal" that the proportion of American young people choosing to become scientists and engineers has failed to increase during a generation in which science and technology pervade every aspect of our lives, the president of the largest general scientific organization in the United States said Sunday.

The result is that American science is facing a period of severe constraints in both human resources and financial support.

"The most serious problem we face today is to maintain excellence and global leadership in an era of limited resources," said University of California, San Diego Chancellor Richard C. Atkinson, president of the American Association for the Advancement of Science.

In remarks prepared for the President's Lecture at the annual meeting of the AAAS in New Orleans, Atkinson called for a broad range of actions to encourage more young people to pursue doctorates in science and engineering:

* Immediate establishment of a National Fellowship Program for Graduate Study to award 3,000 new four-year fellowships annually to support Ph.D. candidates in science and engineering

* Creation and funding of new trainee and research assistant positions

* New strategies to keep large numbers of interested and qualified college students, especially women and minorities, from dropping out of science between their freshman and senior years

* And among research scientists themselves, "a recommitment to the proposition that research and teaching prosper best in an environment in which they are closely linked to each other"

Atkinson called on fellow scientists "to ask whether we are communicating, through our actions, the values that attracted us to science in the first place.

"Our universities take justifiable pride in the world-class research facilities on their campuses. Yet few research professors pay much attention to teacher training programs at their university, and fewer still would willingly sacrifice even a small percentage of their budget to improve such training programs."

Yet difficult choices must be made if we are "to assure the vitality of science and engineering in an era of limits," he noted. "Obtaining funds to pursue even a fraction of the research opportunities on the horizon will be difficult. Finding trained scientists and engineers to further those opportunities will be an even more daunting task. We have little hope of securing the needed human resources unless we invest some of our current capital in that future."

Atkinson, former director of the National Science Foundation, cited figures and studies from NSF and other sources indicating "that there may be a cumulative shortfall of several hundred thousand scientists and engineers at the baccalaureate level by the turn of the century. That shortfall could translate into an annual supply-demand gap of several thousand scientists and engineers at the Ph.D. level, with the shortage persisting well into the twenty-first century."

Although disagreement persists over various models used to project these shortfalls, the fundamental conclusion is not in doubt, he said. "Namely, that unless corrective actions are taken immediately, universities, industry and government will begin to experience shortages of scientists and engineers in the next four to six years, with shortages becoming very significant during the early years of the next century."

Atkinson noted that the size of the college-age population is declining, and this will not reverse until 1996 or 1997. During the past three decades, the proportion of college students receiving bachelor's degrees in science and engineering has hovered between 4 and 5.3 percent. To maintain the current numbers in the face of declining college enrollments, that rate would have to increase to more than 6 percent, he said.

If no change occurs in student career choices, the NSF projects a decline of almost 400,000 baccalaureate recipients in the natural sciences and engineering by the turn of the century. And historically, only about 5 percent of this declining pool of baccalaureate recipients will go on to obtain Ph.D.'s in those fields.

During this same period, demand for doctoral-level scientists and engineers is almost certain to rise, Atkinson noted. Universities are facing a surge in faculty retirements over the next two decades, and by the late 1990s, when college enrollments begin expanding again, faculties will have to be expanded just to maintain current student/faculty ratios. In business, industry and government, the NSF projects that the Ph.D.-level workforce must grow 4 percent annually just "to maintain economic growth and international competitiveness."

If this scenario is correct, Atkinson noted, it indicates a cumulative shortfall of 153,600 Ph.D.'s over the 16-year period between 1995 and 2010.

The scenario does not represent an "extreme case," he said. "These are minimal requirements if we believe that education and research are critical for economic growth, international competitiveness, advances in health care and national security."

Leaving "market mechanisms" to solve the problem as employers compete for the dwindling supply of Ph.D.'s would be a slow and ineffective solution, he said. Ironically, the short-term decline in college enrollments during the next few years, and the temporary decline in demand for new faculty, may even transmit the wrong signal to new baccalaureates about the market for Ph.D.'s of their generation.

Atkinson urged instead a set of active interventions at two levels: (1) to increase the number of college students who complete baccalaureate degrees in science and engineering, and (2) to increase the number of these who go on to obtain Ph.D. s.

U.S. Department of Education statistics indicate there are enough qualified students to meet the first goal, he said. For instance, only 58 percent of qualified high school seniors from the class of 1980 enrolled in four-year colleges. And only 46 percent of the freshman from that class who declared an intention to major in science or engineering eventually did so. The loss of declared science and engineering students before their senior year was "greater for women than for men, and greatest for underrepresented minorities."

Atkinson outlined a number of strategies such as targeted financial assistance and effective counseling to get more qualified high school graduates into four-year college programs. He also called for "retention strategies" aimed at reducing the number of students who drop out of college or switch from science and engineering majors into other fields.

Even if such strategies were put in place immediately, however, it would take at least a decade for them to result in substantial increases in doctoral level scientists and engineers.

"A comprehensive program for the production of more Ph.D.'s should be initiated as soon as possible," he said. "What I have in mind is immediately establishing a National Fellowship Program for Graduate Study similar to the NDEA [National Defense Education Act] program created after Sputnik."

His envisioned first-step program would provide 3,000 new four-year fellowships a year and provide each doctoral fellow with a stipend and tuition waivers totaling $25,000 per year. At full implementation there would be 12,000 fellows in the program at any given time, at an annual cost of $300 million.

"With a concerted effort, the program could be sold to key members of the Administration and Congress during the coming months and be part of the budget package sent to the Congress in January 1991," he noted.

(February 19, 1990)