



Our emerging crisis: the graying of American science

By Shirley Ann Jackson, Ph.D., April 28, 2003, *Research USA*

From the
President's
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No other nation has been able to replicate the success and technological superiority of the U.S. space program. The National Aeronautics and Space Administration has accomplished amazing feats, fueled by America's scientific and engineering prowess and the American passion for exploration.

But, in the aftermath of the Columbia disaster, a problem has come to light which threatens NASA's ability to achieve its mission, as well as our global leadership and our national security. As the agency's chief, Sean O'Keefe, told a Senate panel recently, approximately one-quarter of NASA's engineers and scientists are nearing retirement age, and fewer students are seeking degrees in the physical sciences, mathematics and engineering.

The nation's scientists and engineers, who understand what goes into achieving and maintaining technological superiority, are deeply concerned. There simply are not enough U.S. students in the pipeline to maintain the status quo, much less sustain our leadership. As a result, there is growing evidence that the technological superiority, which has served us so well, is eroding swiftly.

Centers of technology-based activity, training, and entrepreneurialism are rapidly spreading throughout the globe. Thus, even the status quo for the U.S. represents a declining share of the global marketplace for innovation and ideas.

International test scores show that the United States ranks well behind other nations in science, mathematics, engineering, and technology achievement, and is lagging in graduate enrollments and doctoral candidates. Pervasive science and mathematics illiteracy among the general public threatens basic understanding of advances in sciences as well as national support for federal funding for basic scientific research.

Technologies for counter-terrorism and homeland security are the result of U.S. investment in science and technology and science education made decades ago. Some of these crucial technologies are based, in part, on the work of international scientists who immigrated to this country. They have represented, and continue to represent, a valuable human resource for this country. The fact that we rely on importing overseas talent, when we have been unable to find the science and technological professionals at home, has shielded us

from the troubling reality of our growing domestic shortage of talent.

In fact, this is a crisis.

Another critical case in point is in nuclear science and technology. Like the NASA workforce, the nuclear workforce is approaching retirement age without a corresponding influx of qualified younger personnel to replace them. Fewer young people are studying nuclear science, nuclear engineering, and related fields at the university level, and many universities have given up their nuclear education programs altogether, due to a lack of interest and the perception that the nuclear power industry is fading.

The overriding concern is national security—both physical and economic. The nations most likely to achieve peer status with the U.S. in science and engineering competency have strong national strategies to promote and to expand their core technological strengths. And yet, the U.S. has no national plan for "growing our own" technological talent.

To maintain U.S. technological superiority across a spectrum of fields, we must examine the scale and severity of the current shortfall in "succession planning" for the science and engineering workforce. We must identify educational and training initiatives to rebuild the nation's human reservoir of scientific and technological knowledge and expertise, and we must invest in the workforce of the future.

A significant portion of that workforce will come from the nation's new majority—women and minorities. Women now outnumber men in undergraduate collegiate enrollments. Yet, although they, together with minorities, make up more than half of the U.S. workforce, they are underrepresented in science and engineering.

Their numbers must increase, not because of an affirmative action or even moral mandate, but because they are the resource that can replenish our science, engineering, and technological talent.

For the United States to remain competitive in a vibrant global innovation and research environment, it must have access to the best minds. The nation's technological strength depends entirely on its ability to attract, educate, recruit, and retain the best science and engineering workers. Our government, universities, and industry must act now to develop the intellectual capital of the future.

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