A Phony Science Gap?

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It's true that in a "knowledge economy" -- one where new information and ideas increasingly form the basis of useful products and government programs -- nations need an adequate science and engineering (S&E) workforce. But it's emphatically not true, as much of the alarmist commentary on America's "competitiveness" implies, that the United States now faces crippling shortages in its technological elites.

Here are some facts:

· In 2004 American colleges and universities awarded a record 233,492 undergraduate S&E degrees, reports the National Science Foundation (NSF). That was up 38 percent from 169,726 in 1990. Within that total, some fields have expanded rapidly. Computer science degrees have doubled since 1990, to 57,405. Other fields have stagnated. Engineering degrees, 64,675 in 2004, have been roughly the same since 1990. (Note: These figures exclude psychology and social sciences, such as economics, that are often counted in S&E totals.)

· Graduate science and engineering enrollments hit 327,352 in 2003, another record. They've jumped 22 percent since their recent low in 1998. Computer science graduate students have increased 60 percent, to 56,678, since their low point in 1995, and engineering graduate students are up 27 percent, to 127,375, since their low in 1998. It's true that for these higher degrees, especially doctorates, foreign-born students have represented a growing share of the total. But that's also changing because -- after years of declines -- enrollment of native-born Americans and permanent residents for graduate work has increased 13 percent since 2000.

· Judged realistically, China and India aren't yet out-producing the United States in engineers. Widely publicized figures have them graduating 600,000 and 350,000 engineers a year respectively, from six to 10 times the U.S. level. But researchers at Duke University found the Chinese and Indian figures misleading. They include graduates with two- or three-year degrees -- similar to "associate degrees" from U.S. community colleges. And the American figures excluded computer science graduates. Adjusted for these differences, the U.S. degrees jump to 222,335. Per million people, the United States graduates slightly more engineers with four-year degrees than China and three times as many as India. The U.S. leads are greater for lesser degrees.

Ever since Sputnik (1957) and the "missile gap" (1960), we've been warned that we're being overtaken technologically. Up to a point, that's inevitable. As countries modernize, they need more scientists and engineers. Technological competence expands. The United States now produces only about 11 percent of the world's S&E undergraduate degrees, reports the NSF's Mark Regets.
But a country's capacity for scientific and commercial innovation does not correlate directly with its number of scientists and engineers. Hard work, imagination and business practices also matter. Here the United States has some significant strengths: widespread ambition; an openness to new ideas, especially from the young; an acceptance of skilled immigrants; strong connections between universities and businesses; and well-funded venture capitalists. Recall: Two Stanford University graduate students, one an immigrant, started Google.

In some ways the worldwide "knowledge economy" is unthreatening. Good ideas and products spread quickly. Knowledge is stateless. Two Americans invented the computer chip; now it's used everywhere. Still, we need to maintain a world-class science and engineering workforce. We want to keep high-value economic activity here, and we need to ensure superior military technology.
Only about 4 percent of the U.S. workforce consists of scientists and engineers. Having an adequate supply depends on what thousands -- not millions -- of smart college students decide every year to do with their lives. People choose a career partly because it suits their interests. This applies especially to science. "Physics is like sex," the physicist Richard Feynman famously quipped. "Sure, it may give some practical results, but that's not why we do it." But intellectual satisfaction goes only so far.

On average, American lawyers make 42 percent more than chemical engineers. At elite levels, huge pay gaps also exist. In 2005 the median starting salary for a new Harvard University MBA was $100,000. An MBA is a two-year degree. By contrast, a science or engineering PhD can take five to 10 years, with a few years of "post-doc" lab work. At a Business Roundtable press briefing, one CEO said his company might start this sort of scientist at $90,000. Does anyone wonder why some budding physicists switch to Wall Street?

Although we don't now have an S&E shortage, the retirement of baby boom scientists and engineers may cause one. There are some sensible ideas for avoiding this, including making it easier for foreign students who have earned advanced U.S. degrees to stay. But the main solution is obvious. "If we want more [scientists and engineers], we have to pay them better and give them better careers," argues Harvard economist Richard Freeman. The high-tech executives who wail about scarcities are part of the problem. They "would love to have more S&E workers at lower wages," he says.

The good news is that they may not have the last word. From 1993 to 2003, the median salary of engineers with bachelor's degrees and one to five years' experience rose 34 percent (after inflation), to $58,000, the NSF's Regets says. Among math and computer science graduates, the increase was 28 percent, to $50,000. By contrast, the average increase for non-S&E college graduates was only 7.7 percent, to $37,000. These are encouraging signs. Despite an eroding manufacturing base and the threat of "offshoring" of some technical services, there's a rising demand for science and engineering skills. That may explain higher enrollments and why this "crisis" -- like the missile gap -- may be phony.