

Does the US Face an Engineering Gap?

*A new study deflates claims that China and India have
a vast advantage in graduates*

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By Mark Clayton

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If China graduates more than eight times the number of engineers that the United States does, is it thrashing America in the technology race?

That's what many scientists and politicians are suggesting in the wake of an October report by the highly regarded National Academies. Its numbers are startling: China adds 600,000 new engineers a year; the US, only 70,000. Even India, with 350,000 new engineers a year, is outdoing the US, the study suggests.

But that gloomy assessment depends on how one defines engineers: Those with at least four years of college training? Or do their ranks include two-year graduates of technical schools and even, in China's case, auto mechanics?

By making more specific comparisons, US competitiveness, as measured by newly minted engineers, is not eroding as fast as many say - if it's eroding at all, according to a Duke University study released last week. "Inconsistent reporting of problematic engineering graduation data has been used to fuel fears that America is losing its technological edge," the study states. "A comparison of like-to-like data suggests that the US produces a highly significant number of engineers, computer scientists, and information technology specialists, and remains competitive in global markets."

In some ways, experts say, today's debate over engineers reflects the cold-war controversy over the so-called missile gap in which the Soviets' advantage in missile numbers was counterbalanced to some extent by the quality and accuracy of America's nuclear arsenal.

"During the 'missile gap' and post-missile gap until the fall of the Berlin Wall the same sorts of issues were being raised about Russia as are being raised now about China and India," says Frank Huband, of the American Society for Engineering Education in Washington.

Is there an "engineer gap" today? Many groups say yes. In a report last summer, the Business Roundtable and 14 other corporate groups called for doubling the number of graduating US engineers, citing China's lead.

"As others have copied our blueprint, we have departed from it," said House minority leader Nancy Pelosi in a speech last month. "They are investing heavily in improving their educational systems, and creating world-class universities, particularly in science and technology. We have fewer students studying math and science."

But some researchers say such fears are overblown and argue that US corporations are trying to cloud the issue as they go in search of cheaper engineering talent overseas.

"Business groups have been very smart about trying to change the subject from outsourcing and offshoring to the supposed shortfall in US engineers," says Ron Hira, an outsourcing expert at Rochester Institute of Technology. "There's really no serious shortage of engineers in this country."

India provides the clearest example of how the numbers can be interpreted differently. The 350,000 engineers that it supposedly graduated last year is almost certainly false. After publishing that number in October, the National Academies revised it downward to 200,000 in a note issued last month. The Duke study pegs the number at 215,000, but it also points out that nearly half of those are three-year diplomas - not the four-year degrees counted in the US.

More four-year diplomas than India

Last year, the US awarded bachelor's degrees to 72,893 engineering students, according to the American Society for Engineering Education. But using India's more inclusive definition, the Duke study finds the US handed out 137,437 bachelor's degrees last year, more than India's 112,000. The US number is far more impressive in relative terms, since India has more than three times as many people.

China's numbers are more problematic because its government does not break them down. In its revised figures, the National Academies reduced the Chinese total from 600,000 to 500,000. The Duke study pegs the total at 644,106, as reported by the Chinese Ministry of Education. But the study also points out that, as with India, the Chinese total includes engineering graduates with so-called "short cycle degrees" that represent three years or less of college training.

"China includes in its count a lot of graduates - including auto mechanics - who would not be included as engineers in the US or many other nations," says Gary Gereffi, a coauthor of the study and a professor of sociology who directs Duke's Center on Globalization, Governance, and Competitiveness.

A press spokesman of the Chinese embassy in Washington declined comment, and its education office there did not respond.

China still graduated 351,537 engineers with four-year degrees. That's 2-1/2 times the US total (although China has four times the US population).

For its part, the National Academies stands by its report, even after its revisions. "I don't think we believe at all that these new numbers change the ultimate recommendations we have," says Deborah Stine, of the National Academies. "The US is well behind other countries."

Back toward 1986 graduation peak

The number of US engineering graduates peaked in 1986, fell back, then has slowly built back up since the late 1990s, says Daniel Bateson, of the Engineering Workforce Commission.

While US numbers don't approach China's, some experts say the quality of US graduates remains superior. A McKinsey Global Institute study last summer found that only 10 percent of Chinese engineers and 25 percent of Indian engineers were capable of competing for outsourced work.

Other experts say what's needed is a greater focus on improving engineering education. "The basis for US technological success so far hasn't been because of the raw numbers of people we have, but the particular type of thinking and capability they bring to the table," says Richard Miller, president of Franklin W. Olin College of Engineering in Needham, Mass.

An engineering gap?

In an apples-to-apples comparison, the US still confers more four-year engineering degrees than India, and its gap with China is less than half of what other reports suggest.

ENGINEERING	U.S.*	INDIA	CHINA
Bachelor's degrees	137,437	112,000	351,537
Associate degrees (or equivalent**)	84,898	103,000	292,569

**US figures adjusted to reflect more inclusive measures used by India*

***Three-year diplomas in India; short-cycle degrees in China*

SOURCE: DUKE UNIVERSITY STUDY;
RICH CLABAUGH - STAFF