



## **We need to keep leading students into science, math**

Kristina Johnson: Guest columnist

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Five paragraphs in President Bush's State of the Union address highlight a challenge that is of particular importance to the Triangle and other parts of the nation that thrive on technological innovation -- the math and science education of our children.

Elementary and high school science and math education in the United States clearly needs improvement. Although scholastic achievement varies from school to school and state to state, studies show that American fourth, eighth and 12th graders perform well below their international peers in science and math.

Even if high school graduates are skipping college and going directly into the workforce, they need solid math skills. Yet only 22 states and the District of Columbia require high school students to complete at least three years of math and science, according to the U.S. Department of Education. (North Carolina requires three years of math for all high school graduates and three years of science for most students.) Four years of high school math are required to qualify for an engineering career.

America is now graduating about 70,000 engineers a year, while India and China purportedly graduate five and nine times the number of engineers, respectively. That, however, may not be as bad as it seems. A recent study by a class in Duke University's Master of Engineering Management Program indicates that comparisons of U.S. engineering graduation numbers with the 350,000 in India and 644,000 in China may compare apples to oranges.

The study, led by executive-in-residence Vivek Wadhwa and sociology professor Gary Gereffi, performed a detailed analysis of the kinds of "engineers" counted in the numbers from India, and found that in addition to four-year baccalaureate degrees, they also contain a significant number of three-year sub-baccalaureate degrees. Furthermore, the number of U.S. engineering graduates does not count computer science and information technology graduates of four-year institutions when these programs are not part of an engineering school.

The Duke researchers were not able to verify the same detailed breakdown for the students graduating from Chinese universities. However, according to the Chinese Ministry of Education, any bachelor's degree or "short-cycle" degree with "engineering" in its title is counted, regardless of the degree's field or academic rigor.

Regardless of the current numbers, it is clear we need a continuing supply of creative minds to sustain innovation in the United States. Innovation has made America an economic powerhouse, and this is no time to let up. We need to continue to feed the intellectual pipeline to make sure

entering college students are prepared to be players in this ever more technological and global society. That's where K-12 math and science education comes in.

President Bush spelled out the situation succinctly:

"? To keep America competitive, one commitment is necessary above all: We must continue to lead the world in human talent and creativity. Our greatest advantage in the world has always been our educated, hardworking, ambitious people -- and we're going to keep that edge. ...

"I propose to train 70,000 high school teachers to lead advanced-placement courses in math and science, bring 30,000 math and science professionals to teach in classrooms, and give early help to students who struggle with math, so they have a better chance at good, high-wage jobs."

There are many reasons we need to compete in the global economy. As Bush noted, we need to keep the good jobs here in the United States. That's particularly important in North Carolina. We already have lost thousands of manufacturing jobs to China and other Asian nations simply because they can produce goods cheaper.

We cannot afford to lose the creative jobs that are so important to our future. As Cisco Systems CEO John Chambers once told me: "Jobs will go to the best educated workforce."

If we don't act now and invest in science and engineering education, we will lose the innovation edge we have enjoyed. Furthermore, as an engineering dean, I'd argue that it is our responsibility as good citizens of the planet to educate more engineers to help solve many of our global problems, such as developing renewable energy sources, purifying water, sustaining the environment, providing low-cost health care and vaccines for infectious diseases, to mention a few. Coupled with global climate issues, transportation and urbanization, we need all the technical horsepower we can educate.

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