Computer science trouble lies in education, not jobs, professor says

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Contrary to tales of doom about the decline of America's computer science industry, the biggest problem facing computing today is not a lack of jobs but a shortage of qualified workers to fill those jobs, says Stanford Professor Eric Roberts, who spoke about the crisis in computer science education at the annual meeting of the American Association for the Advancement of Science (AAAS) on Feb. 19 in San Francisco.

"There are more jobs in the U.S. today than there were at the height of the dot-com boom," says Roberts, the John A. and Cynthia Fry Gunn University Fellow in Undergraduate Education, whose talk is part of a panel titled "New Approaches to the Development of the U.S. Computing Work Force. "We're training far fewer people than we need to fill the available positions."

The problem not only has serious implications for the computing industry, but it also can severely hinder advances in other areas of science that have come to rely more and more on computing technology.

"Computational science is where the breakthroughs are happening," Roberts says. The computational algorithms that model the movements of a robot's arm, for example, also can help determine if a particular drug molecule can bend to fit, like a puzzle piece, into a human protein in a way that will block diseases from developing.

Despite the abundance of job opportunities, enrollment rates in computer science classes dropped to less than half of what they were at

their peak in 2000, according to a study published by the Higher Education Research Institute at the University of California-Los Angeles in 2005.

"The field seems to have lost its luster," says Roberts.

Waning interest, according to Roberts, largely has resulted from the prevalent but mistaken belief that computer science job opportunities have declined since the dot-com crash. Recent media focus on offshoring has heightened the perception that the U.S. computing industry is declining, raising the concern that jobs are rapidly moving to China and India. Although demand for talent has led companies to seek new employees abroad, more new jobs are created each year in the U.S. high-tech industry than are moved overseas, says Roberts.

The unfounded fear of disappearing job opportunities is having real effects on the computing industry. "The real problem is that fear of offshoring is keeping people out of the field," Roberts says. "If you believe that there will be no computer jobs in the U.S., that will become true. It's a self-fulfilling prophecy."

As the United States trains fewer computer scientists, companies hungry for qualified employees have intensified their search for talent abroad. While the cost of hiring remains a factor, talent-driven innovation can prove even more valuable economically. "Talent is what drives this industry," Roberts says. "If they can find talent, they can turn it into dollars."

And talent will be found where education fosters it, says Roberts, who is co-chair of the education board of the Association of Computing Machinery (ACM), the world's largest educational and scientific computing society.

The lack of adequate computer science education in high schools is another major factor contributing to the dire state of computer science enrollment in colleges. The principle driver, Roberts says, is economics. Lured by high salaries in the corporate world-salaries that will grow even higher as the gap widens between job opportunities and worker availability-few college graduates with computer science degrees choose to pursue the path of teaching.

"It makes it really hard to build more computer scientists if you can't hire teachers," Roberts says.

Without a push from educators, high school computer science programs remain weak. "Almost no place is looking at computer science as on par with learning physics or mathematics, which it should be," says Roberts. Consequently, few students leave high school looking at computer science as a serious career option, he says.

Universities also struggle with attracting enough computer science educators. "In the '80s boom, there was one year in which there was one applicant for every seven open [teaching] positions, which means that six of the positions just did not get filled," says Roberts. Today, there are more applicants than openings, but the ratio-hovering at around two to one-still stands in stark contrast to that in most humanities departments, where hundreds of applicants compete for one faculty job opening.

"I used to argue that Ph.D.s in computer science probably lowered your salary, because they opened lower paying jobs [in academia]," Roberts half jokes. "There's an economic incentive not to teach but to go off and make your killing in the field."

'Sputnik-level push'

Where the economy creates a problem, the government must find a

solution, Roberts says. "We need to make sure there's a national effort that's supported by government, industry and professional societies, including the AAAS, to encourage people to study computing."

A cohesive, nationwide effort to improve computer science education would include increasing funding and establishing requirements for computer science curricula in high schools.

Two other speakers on the panel, John King of the University of Michigan at Ann Arbor and Jan Cuny of the National Science Foundation, will further address strategies for strengthening the U.S. computing work force.

While vulnerable to the economic forces hindering computer science education, the computing industry is also a key player in economic growth, Roberts says.

"I think what the U.S. government should do is to mount a Sputnik-level push to get more people involved in those areas of technology which are obviously going to be the leading edge of the economy," Roberts says. "There's a lot of worry about whether the U.S. is maintaining its competitive edge."

At bottom lies the question of untapped human potential. "We have huge resources in terms of our intellectual capital. Why aren't we exploiting them more?" Roberts asks. "We were the unquestioned leader in computing. We can't just give that up because nobody is interested."

Source: Stanford University