The Computer Science Mismatch

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The battle for the employer isn't over after a new hire starts, either, because other recruiters are immediately on the prowl. "You have to be sure to keep them happy, because 20 other companies could offer better salary, a better product, a better work environment."

With such fabulous employment prospects, especially in a down economy, you might think student enrollment in computer science programs would be soaring — and you'd be right.

You might also think colleges would be expanding their departments proportionately, since even with higher numbers of students, the universities aren't anywhere close to filling industry demand.

But there, you'd be wrong.

The Colleges: Stretched Thin

At a time of state budget cuts, some colleges are cutting back their computer science programs, while others are merely treading water in the face of vastly increased demand. The University of Florida in April announced plans for cuts in its engineering college, sparking campus protests and widespread condemnation (in light of the controversy, the university says it is now considering alternatives). At the University of Washington, the state legislature recently agreed to increase funding for computer science by about a third, but as of last year, the school was graduating the same number of students as it did 30 years ago, according to Ed Lazowska, who holds the Bill and Melinda Gates chair in computer science at the university.

There's no denying that enrollment overall has increased. The Computing Research Association (CRA), an association of more than 200 American departments and related fields, states in a recent report that overall undergraduate enrollment in computer science increased by 12%.

At some of the top schools, enrollment has increased more dramatically. At Harvard, enrollment in an introductory computer science course has almost quadrupled in five years. At Columbia, computer science majors were up 12% in 2011 alone. Enrollment at the University of Colorado increased 35% between 2008 and 2011.

It's not enough, though, a fact at least tacitly acknowledged by the CRA report, which cites "anecdotal evidence" that growth in enrollment is constrained by enrollment caps put in place by faculty or infrastructure limitations.

In human terms, that means that while recruiters like Ollestad are pounding the pavement in search of software engineers, students who would love to someday fill those jobs are being turned away from computer science programs unable to expand enough to let them in.

The Students: Smart but Out of Luck

Those students include people like Cody Stebbins, a high school valedictorian who graduated with a 4.0 grade point average but was not admitted to the University of Washington's computer science program, even after he took an intro computer science course there and got a 4.0.

"I was a little shocked," says Cody, who thinks an impending 3.2 in a physics class he ended up dropping may have been what set him back. Cody landed on his feet at the university's informatics department; an interdisciplinary major offering courses in business, technology ethics, and some programming and computer classes.

But many schools don't offer departments like informatics, and would-be computer science majors must turn to mathematics or to an entirely different field.

Until recently, the University of Washington was only able to accommodate 25% of computer science applicants, though it will be expanding somewhat this year due to the recent funding increase.

Cody has talented friends who also didn't get into the program. At other schools, the numbers are even starker. Carnegie Mellon, for example, admitted just 130 of the 4,200 applicants this fall to its computer science school. Harvey Mudd College in Claremont, Calif. accepted only 21% of 3,144 computer science applicants last year.

And that's a shame, with so many computer-related jobs going unfilled.

But it gets worse — much worse, when you look at the demand that's coming.

The Future: A Perfect Storm?

A US Bureau of Labor Statistics report projects huge increases in Science, Technology, Engineering, and Mathematics (STEM) jobs over the next decade, but not just *any* STEM jobs. The vast majority is in computer-related occupations:

Graphic for computer story
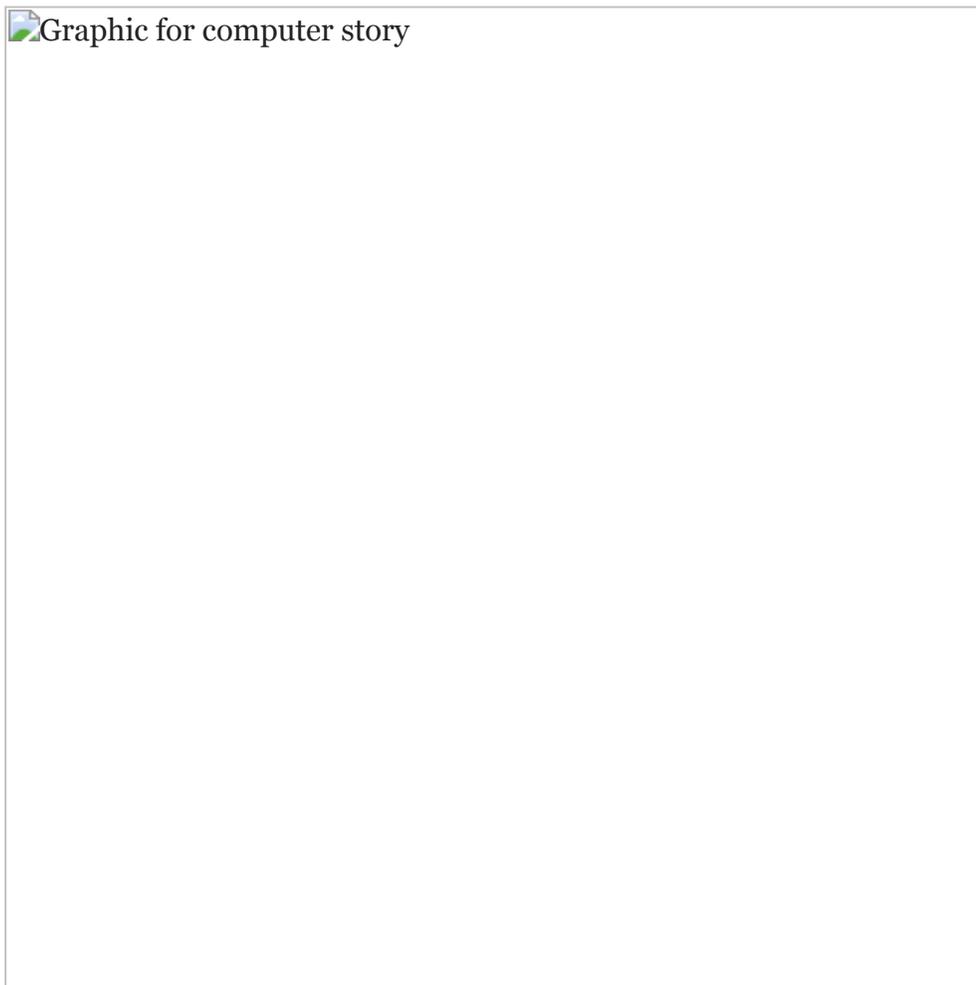
If computer science programs don't quickly and drastically increase enrollment, who in the world is going to do all these jobs?

At more specialized levels, work-visa issues may also come into play. Though at the undergraduate level just 7% of computer science students are non-resident aliens, at the master's degree level, the figure is 57% percent, according to the CRA report.

Of course, not every computer-related job requires a computer science degree, or any kind of college degree. Banking, insurance, and manufacturing all hire IT professionals who can do their jobs without one. But companies like Microsoft and Google that carve out new avenues in computing only hire degreed students from schools with strong programs, and they would rather leave a position vacant than fill it with someone they consider unqualified.

The kind of skill those businesses require doesn't come cheap, and economics is the reason universities aren't responding to the demand as well as they'd like to.

"We lose money for every student on a tuition basis in computer science and other fields of engineering. Only state subsidies can provide it," says the University of Washington's Ed Lazowska.

Engineering programs require labs, mentoring, and small teams, which makes them more expensive than liberal arts programs. Plus, professors who could make exponentially more working for private industry require higher compensation from colleges than professors in liberal arts fields.

Creative ideas such as differential tuition for different majors have been bandied about in academia, but because of the way education is planned for and structured, not much has come of them. Slow economic growth and weak tax revenues are predicted to continue for years to come, giving little hope of substantial increase in government help.

For the fortunate students able to enroll in and graduate from good computer science programs, recruiters, high-paying jobs, and the company Xbox await. For those who didn't make the cut due to enrollment restrictions, there's currently no algorithm for success.

"These degrees cost more money. There's no magic way to provide it," Lazowska said.

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