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Declining computer-science enrollments should worry anyone interested in the future of the U.S. IT industry.

Approaching San Angelo, Texas, on Route 87, travelers behold apanorama of a stony, flat terrain blanketed with buffalo and Indian grasses, cacti, yucca, prickly pears, and mesquite trees. The arid landscape segues into fields of maize and cotton. Nearby, sheep and cattle graze on large ranches. San Angelo, an oasis of a city of nearly 90,000, is situated near the junction of the southern stretch of the American Great Plains and the northern tier of the Great Chihuahuan Desert. It hosts a school that for three decades has been a quintessential training ground for the American IT workforce and that, like computer-science programs around the country, finds itself at a crossroads.

Angelo State University has been turning out computer-science graduates since 1974, supplying American businesses with the professionals who develop, implement, and operate their IT systems. Angelo State and other schools offering undergraduate computer-science programs are facing declining enrollments as the profession loses some luster, and fields as diverse as biotechnology and criminal justice are seen as more exciting choices for talented science-minded students.



Perception has become reality. Enrollment at undergraduate computer-science programs peaked at the turn of the millennium, then plummeted in the past few years by 30%. "In the '90s, people saw computer science as a quick opportunity for lucrative, high-paying jobs," says Stuart Zweben, chair of Ohio State University's computer- and information-science department. "Then companies began layoffs, and people heard about offshore outsourcing. That got them scared to go into this field. Students are becoming cautious. They have cold feet."

Undergraduate enrollment at Angelo State's computer-science department is down sharply. In the late 1990s, the school, which has 6,000 total students, graduated about 40 computer-science students a year; last spring, 18 received bachelor's degrees from the program. Angelo State isn't alone. Boston University's Metropolitan College counts some 400 computer-science majors, down from more than 500 just a few years ago. Intensely competitive, elite universities such as Carnegie Mellon and Stanford have no problem filling their classrooms, but they're getting fewer applications. Carnegie Mellon's School of Computer Science's incoming freshman class has 130 students, but applications have fallen about 40% from a peak of 3,200 in 2001. Mark

"IT is an important factor in our future," says Stuart Zweben, chair of Ohio State University's computer- and information-science department.

Photo by Jeff Sciortino

Stehlik, assistant dean of undergraduate education, characterizes the 2001 application figure as artificially high. "We had too many kids with parents who dreamed of six-figure initial job offers," he says. Stehlik says it would take another 40% drop-off in applicants to adversely affect the quality of the students admitted to the program.

Yet declining computer-science enrollments should worry anyone interested in the future of the U.S. IT industry. While the Carnegie Mellons and Stanfords of the world won't have trouble filling their chairs, the future of IT innovation depends on them getting their fair share of the very best young science minds to come up with the truly breakthrough ideas in still-emerging fields such as robotics, artificial intelligence, and next-generation information security. On the more practical level, if

companies can't get enough people in the United States trained in the IT skills they need, it provides one more reason to ship work to places such as India, which will mint more than 100,000 graduates in IT-related disciplines in the coming year, according to Nascomm, an Indian IT business association.

Here's one look at where the numbers have gone: In 1995, some 10,000 undergraduate students at Ph.D.-granting schools--which represent about a third of the nation's computer-science programs--declared majors in computer science and computer engineering, according to research conducted by the Computer Research Association, a group supported by more than 200 departments of computer science, computer engineering, and related fields. That number doubled two years later. By 2000, the number of students declaring computer-science majors at these universities approached 24,000 and hovered at that level for another two years. Enrollment in computer-science programs soared in the mid- to late 1990s, as year 2000 remediation and the dot-com and telecom booms created an IT labor shortage. "Parents steered their children to computer science for dreams of instant wealth," Stehlik says. "It wasn't that the field was cool, but the dollar signs were cool."

However, the bust doubled the nation's IT jobless rate to about 5.5%, and IT started looking like most any other field--you had to scrape and hustle for a job out of college, especially a high-paying one. The number of undergraduate students declaring as computer-science majors at Ph.D.-granting schools plunged by some 30% to about 17,700 last year. Non-Ph.D. programs reported similar declines.

Computer science often loses out to other fields of study, many of which depend on high-end computing. The type of student who once expressed interest in computer science now is lured by life sciences such as biology and chemistry, or even criminal justice, attracted to those fields by the popularity of criminal forensic shows such as *CSI* and *Crossing Jordan*. "Things on TV guide their interests," says Charles McCamant, head of Angelo State's computer-science department.

Leaders of computer-science programs, having ridden a rising tide of employment and prominence for decades, concede they need to do a better job promoting their discipline and highlighting the great challenges ahead. Stehlik notes that in real life, criminologists rely heavily on computers to solve crimes, something represented on TV shows by images of fingerprints quickly flashing by on a PC monitor. "What's really happening here is pattern matching. That's computer science," Stehlik says. "On these shows, we see the test-tube side; there's a computer-science side, too, that's not played up. ... As a field, computer science has done a lot less PR than it needs to do."

While waiting for a reversal in computer-science enrollment, schools aren't necessarily panicking. Though criminal justice and other disciplines gain at the expense of computer science, universities and colleges haven't made knee-jerk changes. At Angelo State, for instance, university president James Hindman maintains the status quo. "We don't respond to fads," he says. "If a program becomes entrenched after four or five years and passes from the fad into the mainstream, we'll adapt. The marketplace is a greater arbiter."

Most troubling for the future of computer science is the idea that students wouldn't pursue the field because they believe there are no jobs, that all the work is going to India, or that all the cool stuff has been done. "It's natural for people to look at a narrow point of time and conclude that businesses aren't well capitalized and jobs aren't plentiful," Ohio State's Zweben says. "They're wrong on both counts. You've got to believe IT is an important factor in our future." Indeed, over the next decade, the Bureau of Labor Statistics sees the need for an additional 307,000 computer-software engineers, 184,000 systems analysts, 106,000 network-systems and data-communications analysts, and 103,000 managers.

For the next 20 years, "every advance we can anticipate is going to require software that has not yet been written," predicts Grady Booch, an IBM fellow and author of several books on software programming.

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