

MAY 1, 2006

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## A Red Flag In The Brain Game

**America's dismal showing in a contest of college programmers highlights how China, India, and Eastern Europe are closing the tech talent gap**

Ben Mickle, Matt Edwards, and Kshipra Bhawalkar looked as though they had just emerged from a minor auto wreck. The members of Duke University's computer programming team had solved only one problem in the world finals of the ACM International Collegiate Programming Contest in San Antonio on Apr. 12. The winning team, from Saratov State University in Russia, solved six puzzles over the course of the grueling five-hour contest. Afterward, Duke coach Owen Astrachan tried to cheer up his team by pointing out that they were among "the best of the best" student programmers in the world. Edwards, 20, still distraught, couldn't resist a self-deprecating dig: "We're the worst of the best of the best."

Duke wasn't the only U.S. school to be skunked at the prestigious computing contest. Of the home teams, only Massachusetts Institute of Technology ranked among the 12 highest finishers. Most top spots were seized by teams from Eastern Europe and Asia. Until the late 1990s, U.S. teams dominated these contests. But the tide has turned. Last year not one was in the top dozen.

### WAKE-UP CALL

The poor showings should serve as a wake-up call for government, industry, and educators. The output of American computer science programs is plummeting, even while that of Eastern European and Asian schools is rising. China and India, the new global tech powerhouses, are fueled by 900,000 engineering graduates of all types each year, more than triple the number of U.S. grads. Computer science is a key subset of engineering. "If our talent base weakens, our lead in technology, business, and economics will fade faster than any of us can imagine," warns Richard Florida, a professor at George Mason University and author of *The Flight of the Creative Class*.

Software programmers are the seed corn of the Information Economy, yet America isn't producing enough. The Labor Dept. forecasts that "computer/math scientist" jobs, which include programming, will increase by 40%, from 2.5 million in 2002 to 3.5 million in 2012. Colleges aren't keeping up with demand. A 2005 survey of freshmen showed that just 1.1% planned to major in computer science, down from 3.7% in 2000.

For young Americans, a computing career isn't the draw it was even a few years ago. Never mind that experienced programmers make upwards of \$100,000 and that the brainiest of them are the objects of heated bidding wars ([YHOO](#)). Students fear that if they become programmers they'll lose their jobs to counterparts in India and China, who work for a fraction of the pay. Analysts say those worries are overblown: Programmers with leadership and business skills will do just fine. But the message isn't getting through.

Then there's the thrill factor, or lack thereof. Given the opportunity to make a mint on Wall Street or land a comfortable academic job, many math and science students are turning away from software. "I couldn't really get excited about sitting

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in front of a computer and just writing programs," says Duke junior Brandon Levin, who has taken computer courses but is majoring in math and plans a career in academia.

You might think the influx of eager foreign students would make up for the deficit, but that's not happening. While about 25% of students enrolled in graduate computer science programs are foreign, many won't be able to stay in the country after graduation because of restrictive post-9/11 immigration policies. That's if they even want to work here anymore. Foreign students are increasingly returning to their home countries after graduation. Duke's Bhawalkar, 19, from Pune, India, plans to go back after getting a degree in math and computer science and attending grad school in the U.S. "In the past, people from India stayed here after they got their degrees," she says. "But now India is at a turning point. It's getting to be a leader."

The foreign students have a palpable determination to succeed. Bhawalkar's role model is Srinivasa Ramanujan, an early 20th century Indian mathematician who became famous worldwide in spite of an inferior education. This year, as a Duke sophomore, Bhawalkar placed 70th among 2,500 top North American university students in the prestigious Putnam math competition. Her life goal is "to make a mark in some discipline so people will say, 'That's Kshipra. She did this.'"

Bhawalkar is inspired by her entrepreneur parents. Her father, a chemical engineer by training, invented breakthrough water-purification systems that use biological processes. Mom runs the business. Bhawalkar showed signs of being a math prodigy in sixth grade and fixed on science after a family friend read her palm and told her she would be a scientist when she grew up. Says her mother, Vidula: "She has seen us achieve something that's a first in the world, and she wants to do something better than her father." At Duke, Bhawalkar spends much of her time in a dorm room doing 35 to 40 hours per week of homework and extra reading.

It's not that foreign students are any smarter, say U.S. university leaders. They just have relentless discipline. The team at Shanghai Jiao Tong University, which finished first last year and fifth this year, uses past participants to train each successive team. "We pile up experience year after year," says coach Yong Yu. The team practices year-round and puts in three hours a day during the months before the contest. U.S. teams typically spend much less time preparing.

#### "ARE WE HUNGRY ENOUGH?"

Some tech-industry leaders are concerned that U.S. students have become complacent. "There has to be a passion to be innovative," says Nicholas M. Donofrio, executive vice-president for innovation and technology at IBM ([IBM](#)), which sponsors the ACM contest. Donofrio's father was an Italian immigrant who worked three jobs to feed his family in Beacon, N.Y., then a gritty factory town. Donofrio questions whether Americans still have that kind of drive. "Are we hungry enough?" he asks. "Or are we going to amble along and take our time? If so, the Indians and Chinese will close the gap and perhaps even surpass us. You can see the passion in their eyes. They're people on a mission."

When *BusinessWeek* visited Duke on a Saturday in early April, it was clear why many American students don't have the intensity of their overseas counterparts. There are a zillion distractions. The campus was like a carnival, with concerts, outdoor parties, and sunbathing on the grass. Meanwhile, the programming team was sequestered in a concrete-and-steel computer science building writing algorithms on whiteboards and tapping out C++ code on a PC. Sample problem: You have a population of Tribbles (the furry *Star Trek* beasts) who live for a day. Each Tribble has the potential for producing a number of offspring. What's the probability that, after a certain number of generations, every Tribble will be dead?

Bhawalkar's teammates are no slouches. A year ago, Duke's ACM programming team (she was not yet on it) solved four problems in the world finals. Mickle, now a 21-year-old senior, got job offers from Google and Microsoft ([MSFT](#)), and chose Microsoft. Edwards landed a Microsoft internship this summer. But they acknowledge that they don't have the dedication to programming that some overseas aces do. During a break, Edwards ticked off his list of college activities. In addition to classes and homework, he plays tennis four times a week, practices with the Ultimate Frisbee team, and sings in a choir. "We're like pickers and

choosers at a buffet rather than concentrating on one thing. Some of the other countries, they focus more," he said.

Is the answer to turn American students into programming-obsessed drudges? Even if you could do that, it would just make the field less popular. Duke coach Astrachan, the computer science department's director of undergraduate studies, says the way to reverse the decline in interest is to make computer science more compelling to students by linking it to practical, real-world situations. He has proposed two new double majors, computational biology and computational economics, applying programming to medicine and business. He's also developing a course on social networking Web sites such as MySpace, where students will build and manage Web sites -- learning about programming along the way.

Other academic and tech-industry leaders also are striving to make computing more exciting. The University of California at Berkeley and Georgia Institute of Technology, among others, are developing multidisciplinary programs linking technology, business, and social sciences. Intel ( [INTC](#) ) and Microsoft sponsor student science and technology contests. Yet computer science advocates say that unless the government enacts sweeping legislation aimed at improving the nation's technology competitiveness -- legislation now bogged down in Congress -- there's a limit to what can be done. "The attitude in the House is very toxic, and I don't see much chance of them coming together," says Deborah L. Wince-Smith, president of the Council on Competitiveness.

While Congress was fiddling, the kids from Saratov State were marching toward victory in San Antonio. The 83 teams sat at tables that were gradually festooned with color-coded balloons signaling which group had solved which problems. After an announcer ticked off the last 10 seconds in the contest, Saratov's players, coaches, and hangers-on shouted with joy and gave each other back-pounding bear hugs. "I feel euphoric," said team member Ivan Romanov. Victory was especially sweet, he added, because it came on the anniversary of cosmonaut Yuri Gagarin's 1961 voyage into space.

Gagarin's rocket ride shocked Americans out of their postwar complacency, sparking a national quest for tech superiority that led to such breakthroughs as the moon landing and the microchip. A trouncing in a programming contest doesn't inspire the same kind of response today. Truthfully, Americans just don't feel threatened enough to exert the effort. But if we wait too long, we might find ourselves playing catch-up again.

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#### READER COMMENTS

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**Nickname:** NerdusDomesticus

**Review:** Engineering and Computer Science have always been "pseudo professions" because we lack the power to self-regulate our ranks. Imagine a time when the U.S. is flooded with lawyers from other countries. Not likely. We are (shiny) cogs in corporate machines. As the shine wears off, we are replaced. This issue has been flogged to death. Nothing has changed in 25 years. For another bleak view on the "profession" check out [www.sea-code.com](http://www.sea-code.com). Indian engineers flying into LAX and taking water taxis to an offshore cruise ship to displace even more CS jobs.

**Date reviewed:** Apr 25, 2006 4:47 PM

**Nickname:** gee bee

**Review:** Another article that wonders why more students aren't chasing the pot of gold at the end of a computer science degree. CS, Math, and Physics are really hard degrees. Do you really think these students can't major in sociology and go to law school? It's easier, pays better, and has greater long-term job stability. If you can't quite stomach a career in law, medicine is even nicer - it's tough, but so is physics. The average salary for a physician/surgeon is probably 2.5 times greater than for a computer scientist -- and people last much longer in medicine than they do in computer science. So, once again: if the original author is reading these comments, please answer this question: why would a young, bright student with talent, focus, and ambition prefer to become a computer scientist instead of a tax lawyer, investment banker, or a cardiologist? I'm not


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By Steve Hamm

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