

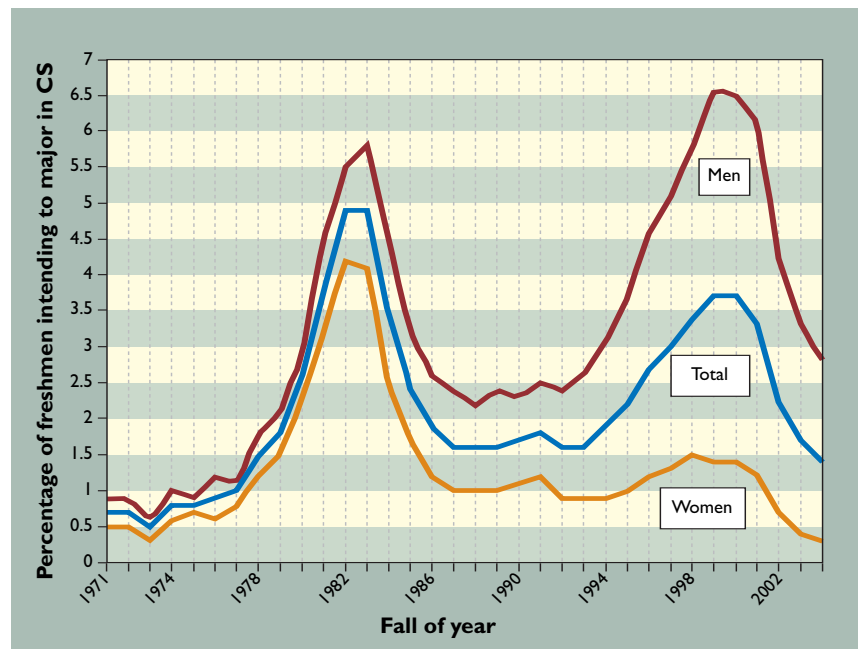
Restoring the Popularity of Computer Science

Inaccurate impressions of the opportunities of 21st century CS are shrinking the next generation of IT professionals. You can help by dispelling incorrect beliefs about employment and by helping improve pre-college education.

Although universities were recently struggling to cope with an avalanche of computer science majors—some going so far as to erecting academic barriers to deflect the masses—they may soon need to reverse course and remove obstacles to the major, and even to recruiting to broaden participation in CS. Figure 1 tracks the change in popularity of the CS major among incoming freshmen over time in the U.S., which has been a good predictor of graduates four to five years later [1].

Clearly, the CS major is now in a downward cycle in the U.S., especially for women. While the percentage of men intending to major in CS is no worse than the mid-1990s, the number of female CS majors is at a historic low. This drop is occurring while their academic numbers are increasing, as the majority of college students today are female. Colleagues outside North America suggest a similar decline in Europe. As an extreme example, a few CS departments were even closed in the U.K.

Everyone has an opinion as to why the CS numbers are down in this age group, so let me share mine: The expected negative impact of offshoring



Source: HERI at UCLA

Figure 1. Computer science listed as probable major among incoming freshmen.

IT jobs in North America and Europe, and the current negative view of the CS profession by pre-college students, especially females. What can we do about these issues?

ACM's Job Migration Task Force has examined the impact of outsourcing extensively and is working to publish its findings, which we hope to complete this fall. I believe the truth will surely be better for our field than the worst fears of pre-college students

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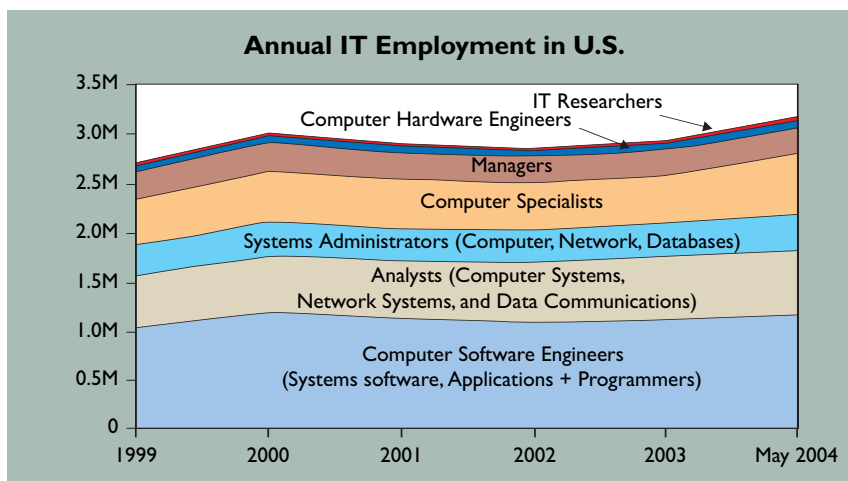


Figure 2. Annual IT employment in U.S.

and their parents. For example, Figure 2 shows the annual U.S. IT employment through May 2004. (The U.S. Bureau of Labor Statistics is about 15 months behind.)¹ Moreover, most of us believe things have gotten much better in the year since the survey was completed. Does anyone besides me know that U.S. IT employment was 17% higher than in 1999—5% higher than the bubble in 2000 and showing an 8% growth in the most recent year—and that the compound annual growth rate of IT wages has been about 4% since 1999 while inflation has been just 2% per year? Such growth rates swamp predictions of the outsourcing job loss in the U.S., which most studies estimate to be 2% to 3% per year for the next decade.²

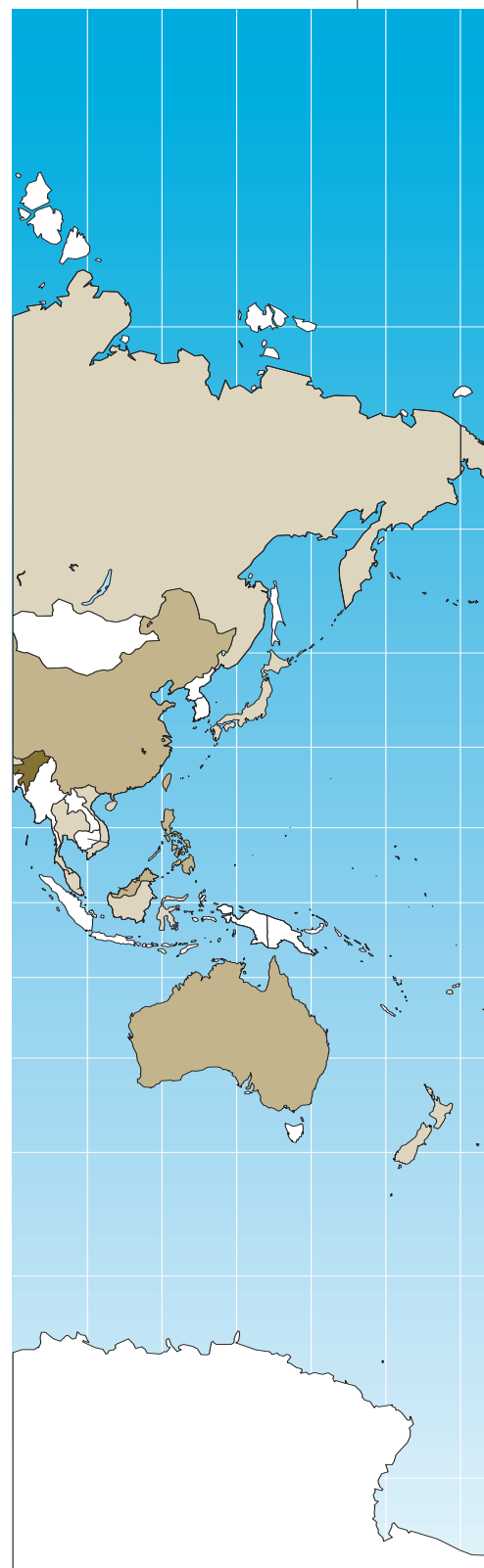
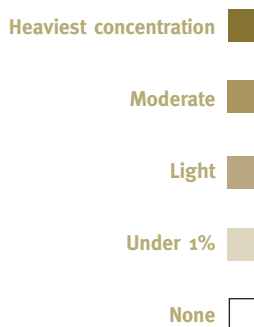
Regarding the negative CS impressions held by students not yet in college, we hope ACM's new Computer Science Teachers Association (CSTA) will help in this regard. CSTA is a membership organization that supports and promotes the teaching of CS and other computing disciplines. CSTA provides opportunities for pre-college teachers and students to better understand the computing disciplines and to more successfully prepare themselves to teach and learn. Remarkably, before ACM formed CSTA nine

¹Private communication, John Sargent, Office of Technology, Policy Technology Administration, U.S. Department of Commerce, July 2005. For clarity, Figure 2 combines the 12 official U.S. Department of Labor titles into seven related categories.

²Private communication, William Asprey, Indiana University, July 2005.

Figure 3. A global perspective of CSTA membership.

Concentration of U.S. and non-U.S. CSTA membership as of June 30, 2005.





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months ago, computer science was the only academic discipline within the U.S. high school curriculum without national professional representation.

To give you an idea what CSTA is trying to do to further the CS cause, here is the list of its existing committees: Curriculum, Equity, Finance, Funding Development, Governance, Membership, Policy and Advocacy, Professional Development, Publications and Communications, Research, and Standards and Certification (see csta.acm.org for details on all these groups and much more). I am particularly interested in the Equity committee, for I've long suspected that the drop in women CS majors was related to the initial unattractive impression of our field when high schools started teaching CS in the 1980s.

Although it only began in January, CSTA already has more than 2,000 members, and these members come from all over the world. Figure 3 illustrates that CSTA members represent more than 60 countries and all 50 states in the U.S.

The map also clearly reflects that many are concerned about pre-college CS education. At the recent National Educational Computing Conference, panel speakers from Canada, Israel, Scotland, and South Africa described their current CS curriculum for students ages 12 to 18 and the issues that surround its implementation. They all emphasized the importance of supporting CS education as a means for ensuring the economic futures of their countries.

While all of the countries noted their efforts to implement a new national curriculum were initially hampered by issues such as lack of funding or insufficient time for teacher training, no point about the need for well-trained teachers was made more poignantly than by Michael Chiles from South Africa. He told the audience that the HIV/AIDS pandemic is taking the lives of so many teachers that it is becoming almost impossible to replace them. Not only are the teachers themselves dying, so many people in business are dying that industries looking for technically skilled workers are luring the healthy CS teachers away from the classroom.

This panel discussion led to a CSTA project to

create a white paper that will provide an international perspective on successful models for CS curriculum development and implementation. Judith Gal-Ezer, the panel speaker representing Israel, serves as an international director to the CSTA Board.

What can you do to help? First, please try to counteract the widespread impression that the CS field is not a good one for the future. For example, you can help publicize real employment data and the results of ACM's upcoming outsourcing study.

Second, if you know pre-college teachers, please suggest they consider joining CSTA. Studies of teachers belonging to such organizations suggest they gain important knowledge and psychological support as well as establish networking relationships that provide opportunities to share curricula. The resulting reform is also more widespread and long lasting.

CSTA could also use specific help on some of their committees. The Research committee is looking for volunteers to assist on statistical analysis of surveys. The Standards and Certification committee needs volunteers to create a database of teacher certification requirements in different regions. It could also use more practicing teachers on its Curriculum committee. Finally, if you really care about the issue of pre-college education, join CSTA.

It's difficult to imagine a more important topic for our future than trying to change public opinion about career opportunities in CS and to improve pre-college education, so thanks in advance for your help. ■

REFERENCE

1. Vegso, J. Interest in CS as a major drops among incoming freshmen. *Computing Research News* 17, 3 (May 2005); www.cra.org/CRN/articles/may05/vegso.

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