FOOTNOTES

Relying solely on journal articles to evaluate computer-science professors for promotion and tenure is a mistake.

So says a statement released this month by the Computing Research Association, based in Washington. It urges academe to place as much weight on papers written for conferences—and on the "artifacts," such as software, created by professors—as on published articles.

"Relying on journal publications as the sole demonstration of scholarly achievement, especially counting such publications to determine whether they exceed a prescribed threshold, ignores significant evidence of accomplishment in computer science and engineering," says the statement, called "Best Practices Memo: Evaluating Computer Scientists and Engineers for Promotion and Tenure."

Among the top computer-science departments, the shift away from a sole reliance on journal articles has already happened, says David A. Patterson, a professor of computer science at the University of California at Berkeley. He helped draft the statement, and says it is intended to pass on the "best practices" to computer-science and engineering departments at a time when both the number and size of such programs are growing.

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Professors in computer science and engineering are generally divided into two types: those who do theoretical research and those who do experimental research.

The theorists are more easily evaluated by academe's traditional emphasis on journal articles than are the experimentalists, the association's statement says, adding: "For experimentalists conference publication is preferred to journal publication, and the premier conferences are generally more selective than the premier journals."

Anecdotal evidence suggests that experimentalists are not getting promoted on campuses where tenure committees or administrators place too much emphasis on a scholar's published articles, says Lawrence Snyder, a professor of computer science and engineering at the University of Washington and one of the authors of the statement.

Says Mr. Patterson: "Our conferences, unlike many other fields, are refereed, have a very low acceptance rate, and involve relatively long papers. Given that our field has taken this approach to publication, for our people to be accepted in academe, we need to give visibility to these practices."

Hence the statement. It was crafted by Mr. Patterson, Mr. Snyder, and Stanford University's Jeffrey D. Ullman, and was approved by the association in August.

The statement has been published in the September issue of *Computing Research News*, and can be found on the World-Wide Web (http://www.cra.org/reports/tenure_review.html).

THE FACULTY

Computer Scientists Flee Academe for Industry's Greener Pastures

Universities face severe faculty shortages at a time of booming undergraduate enrollments

BY ROBIN WILSON

JUST AS HE PREPARED to leave Cornell University last spring to help start a new high-technology company, Thorsten von Eicken got word that the computer-science department at Cornell had voted to grant him tenure.

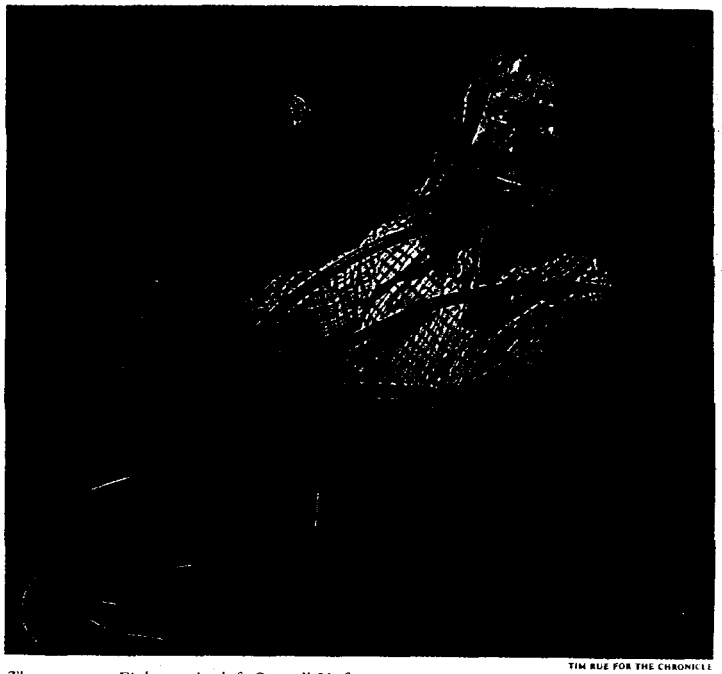
He left anyway.

Mr. von Eicken is part of a stampede of bright, young Ph.D.'s in computer science who are abandoning academe for the corporate world.

High-paying, fast-paced jobs in the computer industry are attracting both seasoned academics and newly minted Ph.D.'s who, in the past, would have opted for careers in higher education. The upshot: Computer-science and computer-engineering departments are suffering a serious shortage of professors at a time when undergraduate enrollments are booming.

Many departments are losing professors faster than they can hire them. The University of Illinois at Urbana-Champaign recruited five new professors in electrical and computer engineering to start this fall, but lost five others who were already on its faculty. The University of Washington recruited four scholars to its department of computer science and engineering but lost five. Cornell hired three but lost six. Among the departed was Mr. von Eicken, who moved to Santa Barbara, Cal., to help start Expertcity.com, which offers on-line technical advice on how to operate computers.

Mr. von Eicken is on a two-year leave from Cornell, but he is not keen on returning: "It is not obvious that academic research has the most impact."



TIM RUE FOR THE CHRONICLE

Thorsten von Eicken, who left Cornell U. for a start-up company, says his new post is less stressful than the old: "The academic job is too many jobs all in one."

UNFILLED OPENINGS

Other scholars apparently feel the same way, and even top-ranked institutions such as Carnegie Mellon and Princeton Universities have faculty openings they can't fill. Some universities are extending twice as many job offers as they have openings, knowing that they will be lucky to lure even half of the candidates.

"The feeling in most computer-science departments is that we have an infinite number of openings," says David Dobkin, the chairman at Princeton, which made four offers last academic year but drew only one taker. This year, the university was more successful: It made four offers and hired three professors.

The situation at some lower-tier institutions is even bleaker. Saginaw Valley State University has been trying to hire a faculty member in computer science for two years, but has received only a handful of applications. In 1997, only five people applied. When the university tried to interview the two candidates whom it deemed suitable, it found they had already taken jobs elsewhere. Last year, the department received three applications, but two were from foreign professors whom the department could not afford to bring in for interviews. The third was from a candidate who had not yet finished his dissertation.

A surplus of faculty openings may sound like an enviable problem to scholars in other parts of academe, particularly in the humanities, where many Ph.D.'s have been unable to land tenure-track positions. But a report released this summer by the Washington-based Computing Research Association called the faculty shortage in computer science "severe." It said competition for Ph.D.'s from the private sector may pose a significant threat to the health of university departments.

"Some people are concerned about a seed-corn problem: that the high industrial demand for I.T. workers is siphoning off too many graduate students and faculty from the universities, leaving an insufficient number to educate the next generation of I.T. workers," said the report, called "The Supply of Information Technology Workers in the United States." All but 39 of the association's 187 members are Ph.D.-granting departments of computer science and computer engineering.

As a barometer of the demand for computer scientists, the association has seen revenue from employment advertisements in its bimonthly newsletter more than double in the last two years. The January 1999 issue of the newsletter, *Computing Research News*, carried employment ads from 91 colleges and universities, many of which listed multiple faculty openings. Last year, the January issue carried ads from 65 institutions.

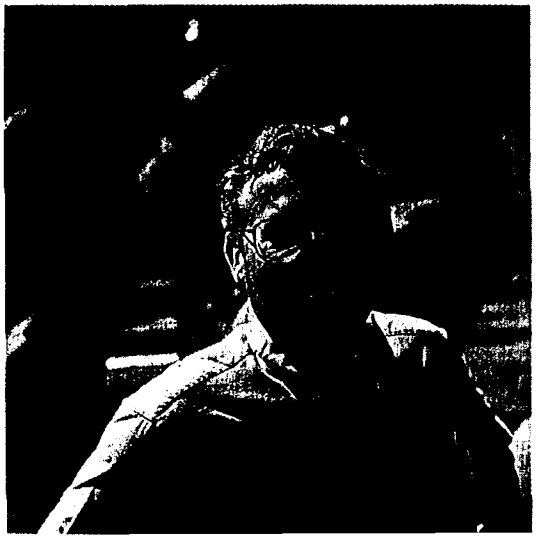
DEMAND AND SUPPLY

The flight of computer scientists could not come at a worse time for universities, given two trends now colliding in academe: a surge in undergraduate enrollment in computer-science courses and an inadequate supply of Ph.D.'s in the field.

Student demand for information-technology courses and majors has led universities to try to bulk up on faculty members to handle the teaching load. Since 1995, undergraduate enrollment in such courses has doubled nationwide.

At Ohio State University, the number of computer-science majors has climbed from 850 to 1,300 in the last four years, and professors in computer and information science are teaching about 35 per cent more credit hours than they did in the past.

The university's computer-science department tried to hire seven new professors for the current academic year to deal with the student demand, but it attracted



TED RICE FOR THE CHRONICLE

Stuart H. Zweben, of Ohio State U.: "It has been somewhat of a war" to get graduate students to stay on.

ROBERT BAUMGARDNER FOR THE CHRONICLE

Doug Burger, of the U. of Texas at Austin, says the dearth of graduate students is "a nightmare."

only four. Meanwhile, the department lost two professors, one to another university and one to industry.

In recent years, so many students have been clamoring to major in computer science at the University of Washington that it has been able to accommodate only a quarter of them. Right now, the cap is set at 160 new majors a year. To keep up with demand, the university has been trying to expand the number of faculty members in its department of computer science and engineering from 29 to 34, but instead the roster has shrunk to 28. Now, with the state Legislature providing money to add new undergraduate programs in the field, including computer graphics and animation, the department figures it will need as many as 14 additional professors.

A DECLINE IN DOCTORATES

Complicating the hiring process, too many employers are chasing too few Ph.D.'s. The number of new Ph.D.'s in computer science and computer engineering peaked in 1992, at 1,113, and dropped to 933 by 1998, according to the Computing Research Association. Because of the booming job market in the computer industry, fewer people are enrolling in doctoral programs. And many of those who do enroll are jumping ship before their degrees are completed to accept job offers from corporations.

"It has been somewhat of a war trying to get students here and get them to stay here," says Stuart H. Zweben, chairman of computer and information science at Ohio State. "Students come and get a master's, and they feel that is enough of a ticket. They are reluctant to stay on for a Ph.D."

It is hard to persuade students to sweat out a doctoral education that lasts from five to seven years when people with only bachelor's and master's degrees are making boatloads of money in the computer industry. Two years ago, the University of Washington introduced a course in software entrepreneurship, only to see three Ph.D. students who had taken the course leave before finishing their degrees. They headed off to the business world to put their new skills to work.

Sometimes the pull comes even earlier. This month, a student who had signed up to enter the graduate program at Princeton contacted the university to say that the start-up company he works at is doing so well that he'd decided to stay put.

At the University of Texas at Austin, the number of people graduating with doctorates in computer science has fallen from 24 in 1991 to just 17 in 1998. As a result, some faculty members do not have enough graduate students to stock their own research groups, says Doug Burger, an assistant professor of computer science. "It's a nightmare," he says.

Elsewhere, research and teaching fellowships for graduate students either are going unused or are being given to students who intend to earn only a master's degree.

When doctoral students are hired by computer companies before they have fulfilled all of their academic responsibilities, faculty members are often left holding the bag. Bruce Hajek, a professor of electrical and computer engineering at the University of Illinois at Urbana-Champaign, says one of his star students got a job on Wall Street soon after completing his dissertation. The student—who during his last few weeks at Illinois could be heard fielding telephone calls from his new clients—left the university before he could submit journal articles on the ideas his dissertation had generated.

"We have contracts that fund the research, and we have to publish papers to get the money," says Mr. Hajek. "After he left, it took me two years to have time to go carefully through his thesis and abstract things and submit papers to a journal."

The only good news in all of this for universities is that when their students persevere and complete their Ph.D.'s, the job opportunities are bountiful. Every doctoral recipient can count on at least a half-dozen job offers, and many get more than that.

COMPETITION FROM INDUSTRY

By watching the career trajectories of their own Ph.D.'s, universities can easily see that their chief competition in the labor market comes from the computer industry. According to the Computing Research Association, 50 per cent of the new Ph.D.'s in computer science in 1996 took positions in industry. Only 26 per cent took faculty jobs. (The remainder secured postdoctoral positions or joined non-profit groups or other organizations.)

In the corporate world, new Ph.D.'s have a growing number of opportunities. Small start-up companies are popping up like dandelions. Established corporations, like Microsoft and Lucent Technologies, have founded basic-research groups in the last few years and have been stocking them with scholars. Microsoft's research group, founded in 1991, employs 400 people, the bulk of whom hold Ph.D.'s.

Henry F. Korth heads one of dozens of small research departments at Lucent Technologies that he says are "aggressively expanding." Mr. Korth himself left U.T.-Austin eight years ago to join the corporate world. "I did enjoy the academic life style," he says. "But where I am right now, I'm able to see the challenges of the real world and have the resources to do something about it."

He also stands to make much more money than he did in academe. For new Ph.D.'s in the field, starting salaries in higher education run about $65,000 to $70,000 for nine months' work. That's well above the average for new assistant professors in the humanities, but not nearly as attractive as starting salaries in industry, which are closer to $100,000 a year. More important are the stock options and other perks common in the high-tech sector.

According to Edward Lazowska, chairman of the University of Washington's computer-science-and-engineering department, people working in his state's software industry earn an average of $295,000 a year. That figure includes their paychecks and the value of exercised stock options.

"There ain't nothing going to happen at the University of Washington to cause people to start making $295,000 a year," he says. "There's nothing we can do to compete, so this had better be a fantastically fulfilling occupation, or people are going to start doing something else."

There's the rub. With more undergraduates to teach, fewer Ph.D. students to help on research and teaching, and an unstable cadre of colleagues with whom to share ideas, universities are hard-pressed to look attractive to job candidates.

"This fury of entrepreneurial activity is draining the very best talent" away from universities, says Kenneth P. Birman, a professor of computer science at Cornell. "It is cannibalizing many of the researchers who would have produced the next generation of major innovations."

The trouble is, he says, "if your work isn't exciting enough that industry is begging you to work with them, then you're probably not working on the right problem." But if your work is that exciting, you are probably headed out of academe.

For job candidates who are committed to staying in academe, so many universities are gunning for them that the stakes can get pretty high. To lure candidates, institutions offer to lighten the teaching load, pay a summer salary, and commit several graduate students to help with research. They also offer equipment and facilities that can push the value of a start-up package for a new computer-science professor to $500,000.

But for Thorsten von Eicken, perks like that weren't enough. He says it may be difficult to believe, but his new job at Expertcity.com is less stressful than his post at Cornell.

"The academic job is too many jobs all in one with too much responsibility," he says. "I had a research group to run with four or five graduate students, a number of undergraduates to worry about, while constantly being concerned about writing papers for publication. At the same time, I've got courses and I'm running after grants." At Expertcity.com, he says, "it's much simpler. What doesn't happen today will happen tomorrow."

One of Mr. von Eicken's colleagues at Cornell has also decided that life on the other side is brighter. Srinivasan Keshav left Cornell for good this summer to be chief technical officer of Ensim Corporation, a Silicon Valley company that assists Internet-service providers. He was expecting to earn tenure this academic year, one of his lifelong goals, but he decided it was worth sacrificing.

"It is like if you were a painter" during the Renaissance, Mr. Keshav says, "you had to be in Florence.

"If you are in computer science, in networking, you have to be out here in the Valley." ■