

CAREERS

Online Education Expands and Evolves

In a tight job market, engineers find it pays to stay current

BY SCOTT KARIYA

When Peter Robinson, a 39-year-old doctor, decided to get into the emerging field of bioinformatics, he knew he'd need some computer coursework to complement his medical training. But with a full-time job as a researcher and teacher, plus a newborn and a three-year-old, he also knew he'd have to make every minute count. He liked the idea of enrolling in the computer science program at Columbia University in New York City, where he'd earned a B.S. in math in 1985. Problem was, Robinson lives 6400 km away, in Berlin, where he works at Humboldt University's Charité Hospital.

Quitting his job and uprooting his wife and kids were out of the question. Instead Robinson turned to distance learning. Several nights a week, after his children are in bed, Peter goes to his book-crammed home office, logs onto his computer, and intently studies the latest lecture on computational architecture, recorded earlier and streamed to his PC via a broadband connection. "When I attended Columbia for my bachelor's, I took some courses now offered on CVN [Columbia Video Network], so I know the quality," he says.

Robinson's experience is fairly typical of the estimated one million college and post-graduate students worldwide who complete courses and degrees while rarely, if ever, setting foot inside a classroom. Convenience has always been a big draw of distance courses, but with the prolonged recession, engineers and other professionals are turning to online courses to maintain their job skills and their employability.

Corporations have likewise embraced



In Columbia University's distance learning studio, professor Dan Rubenstein reviews the fundamentals of network engineering. The lecture will be recorded, edited, and stored on the studio's servers for later viewing on students' PCs.

distance learning to keep their employees trained and motivated. In fact, 84 percent of U.S. colleges now offer such courses, according to investment firm ThinkEquity Partners (San Francisco). That translates into an annual market of US \$4.5 billion, expected to grow to \$11 billion by 2005.

At a recent conference on engineering education, Andy DiPaolo, executive director of the Stanford Center for Professional Development (SCPD) and senior associate dean of the engineering school, noted that online education's "continued evolution in all sectors of engineering education around the world is irreversible."

"Stop the lecture and feed the cat!"

Given their technical bent, engineering students seem to take to online courses. At Stanford, most of the 150 or so master's degrees earned online each year are in EE or computer science. "For engineering, the content and presentation lend themselves

quite well to distance learning," notes Kamal Basri, associate director of CVN and an MSEE recipient of the program.

The online classroom can resemble the studio for the "The Tonight Show," with cameras, monitors, and microphone-equipped seats for students who prefer to attend in person [see photos, above and next page]. "The faculty is aware that half their students aren't in class," says Tim Peters, a wireless applications engineer at Agilent Technologies Inc. (Palo Alto, Calif.), who has taken online EE classes at both the University of Southern California and Stanford. "They make comments to the camera like 'I know most of you are watching this online because it's raining out.'"

Flexibility is another attraction of distance learning for the working professional. Peters "attended" lectures at Stanford even while traveling in Scotland. "I kept up with lectures via a high-speed connection," he recalls. "But I had to get a two-day exten-

sion on my homework because I was on a plane and couldn't fax it in."

Given her packed workweek, Sandy MacDonald, an applications development manager at AT&T Corp.'s Tampa, Fla., facility, figures that taking courses at CVN is the only way she'll earn her M.S. in computer science. "I can stop if I've had a rotten day and redo it the next night," she says. "If I

don't understand something, I can roll the lecture back and pound it into my brain."

Engineers say that the lessons learned often find immediate application on the job. Through an online course at Iowa State University, Josephine Delsey, a software quality engineer at Intel Corp.'s Chandler, Ariz., facility, learned about agile programming, which aims to free

programmers from time-consuming activities, the better to write code fast and allow for design changes. "One of the programming teams here at Intel wanted to use it," she recalls. "Because I had already discussed the pros and cons in class, I was able to make some key decisions."

Choosing when and where

With broadband connections proliferating, both at the office and at home, streaming media has become the fastest-growing method for delivering educational content. Those without high-speed connections often opt for courses on videotape or DVD.

Taking courses via streaming media on a PC can be a startling experience for mid-career professionals who still equate higher learning with teeming lecture halls. The Columbia CVN setup, for example, features a multi-windowed interface. The main window typically shows the professor's notes and graphics—anything from a PowerPoint slide to scribbles on a whiteboard or notepad. The professor, mean-



Behind the scenes, video technicians operate studio cameras and microphones. The online lecture will have multiple views of the professor and his lecture notes.

while, is visible in a smaller corner window.

The recorded and edited lecture resides on a CVN server. Just as a music lover might stream a song file from an Internet radio station, the online student logs onto the CVN Web site and streams the lecture's audio/video file to a PC. Most students use one of the free media players, such as Windows Media Player or RealOne Player, to watch and hear the lecture.

Onscreen buttons allow the student to pause, fast-forward, and jump through the lecture. Although the video sometimes flickers, the quality is acceptable, and the audio is clear and constant. (For demos of CVN's courses, see <http://www2.cvn.columbia.edu/preview/preview.asp>.)

For the prospective online student, there's an overwhelming number of courses, degrees, and programs. All the top engineering schools offer online courses and degrees, and some of them, such as Stanford, Columbia, Drexel, Auburn, and the Rochester Institute of Technology, have been offering distance learning for years.

Then there's the all-virtual National Technological University, an accredited school that offers courses from over 50 universities and 19 master's programs. Consortiums similarly pool courses from related schools; one of the most comprehensive for EE and CS is Learnon.org, administered by the American Society of Engineering Education (Washington, D.C.).

Many companies will reimburse tuition expenses, and some form partnerships with universities to develop company-specific content. Stanford's SCPD, in fact, accepts only students who work for one of its 450 member companies and government organizations.

At General Motors Corp. (Detroit), technical courses are delivered to GM offices worldwide from an international roster of universities, including Carnegie Mellon, China's Shanghai Jiao Tong University, and Sweden's Chalmers University of Technology. Diane Landsiedel, GM's manager of academic services, says that classes are scheduled at the beginning or end of the workday, although students can access the lectures independently as needed.

Not lost on companies is the fact that their workers actually like learning online. "Distance learning allows employees a good work-life balance," says Alan Fisher,

Intel's corporate extended education program manager. "It really does help them."

Acing online

Being a successful online student still requires diligent study, hard work, time, and motivation. Just as in regular courses, poor time management and lack of effort can lead to a failing grade or an incomplete. "Ease of access does not equal ease of learning," warns Fisher.

For professionals whose college days are now a hazy memory, this is especially true. Says AT&T's MacDonald, "The way you learn as you get older changes. I needed much more repetition. The flexibility in taking classes also means that it's easy to get behind—you can just let the tapes stack up." Even so, she says the effort is worth it. She now boasts a 3.8 grade point average and is considering going for her Ph.D.—online, of course. ●