

print version

Wired News

Search:

[Text](#) [Sm](#) [No](#) [La](#) [La](#) [\[Home\]](#) [\[Technology\]](#) [\[Culture\]](#) [\[Business\]](#) [\[Politics\]](#) [an error occurred while processing this directive]  
[an error occurred while processing this directive]  
[an error occurred while processing this directive] [\[Wired\]](#) [\[Animation\]](#)

[Issue 11.09](#) - September 2003

## MIT Everywhere

**Every lecture, every handout, every quiz. All online. For free. Meet the global geeks getting an MIT education, open source-style.**

*By David Diamond*

Lam Vi Quoc negotiates his scooter through Ho Chi Minh City's relentless stream of pedal traffic and hangs a right down a crowded alley. He climbs the steep wooden stairs of the tiny house he shares with nine family members, passing by his mother, who is stooped on the floor of the second level preparing lunch. He ascends another set of even steeper steps to the third level and settles on a stool at a small desk, pushing aside the rolled-up mat he sleeps on with one of his brothers. To the smell of a chicken roasting on a grill in the alley and the clang of the next-door neighbor's metalworking operation, Lam turns on his Pentium 4 PC, and soon the screen displays Lecture 2 of Laboratory in Software Engineering, a course taught each semester on the campus of the Massachusetts Institute of Technology. "Here," he says, pointing at the screen. "This is where I got the idea to use decoupling as a way of integrating two programs."

In a huge brick house that Evan Hoff shares with three other guys in Nashville, the 20-year-old brings up the MIT Web site and connects to the same material Lam is studying halfway around the world. "This is the lecture on data abstraction," Hoff explains. "I went over this in community college, but that class only took it so far. This teaches you about the three different specification conditions, the things you put in documentation to let future programmers know how to use it. In community college we covered only two of them."

When MIT announced to the world in April 2001 that it would be posting the content of some 2,000 classes on the Web, it hoped the program - dubbed OpenCourseWare - would spur a worldwide movement among educators to share knowledge and improve teaching methods. No institution of higher learning had ever proposed anything as revolutionary, or as daunting. MIT would make everything, from video lectures and class notes to tests and course outlines, available to any joker with a browser. The academic world was shocked by MIT's audacity - and skeptical of the experiment. At a time when most enterprises were racing to profit from the Internet and universities were peddling every conceivable variant of distance learning, here was the pinnacle of technology and science education ready to give it away. Not the degrees, which now cost about \$41,000 a year, but the content. No registration required.

"It's a profoundly simple idea that was not intuitive," recalls Anne Margulies, the former Harvard assistant provost and executive director of information systems who was hired to be OpenCourseWare's executive director. "At the time, the world was clamping down on information, limiting it to those who could pay for it." Soon foundation money was gushing in to support the initiative. MIT earned the distinction as the only university forward-thinking enough to open-source itself. To test the concept, the university posted 50 courses last year.



Peter Lau

## Lam Vi Quoc

Ho Chi Minh City, Vietnam

Smart and upbeat, Lam, 22, is the first member of his family to attend college. He is the youngest of six children of Chinese-Vietnamese parents who are retired from the business they ran making cartons. A student in the information technology department of Vietnam's

**Natural Sciences University, in Ho Chi Minh City, he received a \$500 scholarship to buy his computer and a \$100 scholarship toward his studies. Lam, who spends six days a week at school, was introduced to Laboratory in Software Engineering - aka 6.170 - when one of his professors downloaded the course materials onto the university's server and made it required reading. As leader of his software lab team, Lam helped create a program that allowed city residents to find bus routes by destination. After graduation, he hopes to continue his studies in either Singapore or England, but to do so, he'll need another scholarship - something he says is unlikely unless he is one of three students chosen to be a graduate assistant at his own university. If that doesn't happen, he'll shoot for an IT job in Vietnam. "Maybe if I work for three years," Lam says, "I will be able to have my own house and a car."**

In September, as students arrive on the Cambridge campus for the start of school, MIT will officially launch OpenCourseWare with 500 courses, offerings like Nuclear Engineering Course 22.312: Engineering of Nuclear Reactors, and Political Science 17.251: Congress and the American Political System. (Like everything else at MIT, classes are typically referred to by number.) The school expects to add the remaining 1,500 courses over the next three years. If the pilot program is any indication, students from Nepal to Nebraska will be diving into the material.

And MIT will learn a few things, too, just as it did during OpenCourseWare's first year. One lesson of the beta test revolved around access, which in some parts of the world is costly and slow. A second issue: lack of assistance to Web-based students. Even the most brilliant university course can falter without the kind of intensive teaching support provided at a school like MIT. Then there are the nagging intellectual property headaches. How, for example, do you police Third World scam artists from hawking MIT degrees as if they were Calvin Klein knockoffs?

Like many other universities, MIT had ambitions for making money in the distance-learning business. It called in a consultant to scope out the terrain, and in 2000, Booz Allen Hamilton reported that MIT had missed the wave. That's when a group of faculty members and administrators - Hal Abelson, Steven Lerman, Toby Woll and Dick Yue - hit upon the idea of posting all courses online, free and available to all. MIT President Charles Vest signed on, but persuading the faculty was difficult. Some professors complained the program would burden them with extra work. Others worried that unpolished lectures would reflect poorly on the institution. Faculty authors were concerned that they would be giving away intellectual property and thus hurt sales of their textbooks. "This was probably the most widely discussed decision at MIT," recalls Abelson. By making the project voluntary for professors, most objections melted away.

The idea quickly attracted outside funding. The William and Flora Hewlett and the Andrew W. Mellon foundations ponied up a total of \$11 million for the first two-year phase. (MIT

kicked in another \$1 million.) Those organizations are likely to continue supporting the initiative, which is expected to require an additional \$20 million or so before the rest of the courses are posted by the end of 2006. The money will underwrite everything from helping faculty develop and digitize their materials to designing Web sites and hosting servers.

In some academic circles, MIT was viewed as making a masterful PR move. If so, the scheme worked brilliantly, because most of the world applauded; when I explained OpenCourseWare to a Turkish journalist, his immediate response was, "They should give the Nobel Prize to whoever came up with that idea."

One of the most popular offerings turned out to be Laboratory in Software Engineering, aka 6.170, a tough requirement for electrical engineering and computer science majors. Lam Vi Quoc, a fourth-year student at Vietnam's Natural Sciences University, relied on 6.170 lectures to supplement a software lab he was taking, and Evan Hoff, a software developer in Nashville, followed the course to improve his coding skills. In Karachi, Pakistan, a group of 100 students and professionals met weekly to study 6.170. In Kansas City, five members of the Greater Kansas City Java Professionals Association gathered monthly to take the course. In Mauritius, a tiny island nation in the Indian Ocean, Priya Durshini Thaunoo used 6.170 to prepare for a master's degree program at the University of Mauritius. Saman Zarandioon, an Iranian refugee living in Vienna, studied it to continue an education that was stalled by the Iranian government. And software developer Rahul Thadani in Birmingham, Alabama, took it to sharpen his skills.

These and countless others called up a Web site, [ocw.mit.edu](http://ocw.mit.edu), that is well organized and easy to navigate. The 6.170 home page, which displays a photo of a computer lab, contains key details about the course, including a syllabus. The left-hand side of the screen has links to various course elements - from quiz reviews to online resources. By clicking on lecture notes, for example, students access a chronological list indicating each lecture number, date, and topic; they can quickly link to each lecture's PDF file. (Some courses offer video lectures.) Assignments are presented in HTML and include links to online resources, such as software tools and supplemental texts. The final project in 6.170 requires students to design, document, build, and test a program that plays *Gizmoball*, a version of pinball, and the site provides links to tips, FAQs, and tools - everything needed to complete the project.

Extensive though it is, the site is built around lessons from a previous term - material that already might be slightly out of date. But that's a small part of why OpenCourseWare can't come close to replicating the resources available to Irene Lee, an MIT student who took 6.170 on campus last spring. Most nights, Lee logged on to a PC in the computer lab and worked through problem sets. Even at 3 am, she had ready access to help via Zephyr, MIT's internal messaging system. "If I have a question or a problem I don't understand, I can send an instant message to a teaching assistant or a lab assistant," Lee tells me. "I can usually get an answer right away." Each of the 10 teaching assistants for 6.170 was available several hours per week. In addition, at least one of the six lab assistants was on call to sit down with students or respond to IMs. And then there was

the give-and-take of interacting live with a professor - a boon not just to students but also to faculty. Michael Ernst, who taught Lee's 6.170 class, says, "When I'm in a lecture, I look around to see people's faces. I can see when they're nodding off and change my approach, even if there are 200 people in the room."

MIT administrators and professors are quick to note that the Web is no substitute for the experience of learning in a top-tier academic setting. "OpenCourseWare is a snapshot of the way a particular subject in a particular discipline was taught at one period in time at MIT," says project director Margulies. "It isn't an MIT education."



Nick Ruechel

## **Evan Hoff**

Nashville, Tennessee

Hoff, a 20-year-old software developer and college dropout, is the son of a former DEC computer repairman. He divided his childhood between his father's double-wide trailer in the Missouri countryside and his grandmother's house in the Kansas City suburbs. Soft-edged and bantam-weight, Hoff has been programming since he was 13. He signed on with Aegis Commerce while he was still attending a small Christian high school. (With just four members in his graduating class, it "was more like home schooling," he says.) Last year, shortly before moving from Missouri to Nashville, Hoff took 6.170 on his own, studying into the night in his apartment. Now he has a list of clients in the Christian music business. MIT's 6.170, he says, has "allowed me to write simpler code, less code, and be more efficient and more productive with my time." He recently wrote a program that synchronizes Aegis products with Peachtree Accounting software. (And if you go to the Web site of Christian rock band Mercy Me - [www.mercyme.com](http://www.mercyme.com).)

**mercymelive.com - you can find the function he created that enables visitors to locate any radio station in the country that plays the group's music and conveniently request one of its songs.) Hoff hasn't decided whether he'll move to Aegis' Philadelphia-area headquarters or stay in Nashville and go full throttle into consulting. Either way, he says, he'll enroll part-time in college. "I definitely want to get my bachelor's degree. That's my goal."**

OpenCourseWare's pilot run was wildly successful, drawing visitors from 210 countries and territories. In addition to students, the material appeals to countless educators at other universities. Zhivko Nedev, a computer science professor at Wilfred Laurier University in Waterloo, Ontario, turns to 6.170 material to help him prepare lectures for his programming course. "It is the best thing I have ever seen in computer science," he says. Ludmila Matiash, at the Kyiv Mohyla Business School in Ukraine, draws on OpenCourseWare to design educational and training programs. Kathy Mann, manager of the biology lab at Truckee Meadows Community College in Reno, Nevada, uses Biology 7.012: Introduction to Biology to teach students how to create lab reports and record information from science experiments. "It's really well done," she says. "Why reinvent the wheel?" The Fulbright Economic Teaching Program at the University of Economics in Ho Chi Minh City makes its own content available online to any interested learners - and indicates on its site that it is taking a cue from OpenCourseWare. "Part of our stated mission is to be more than just a project at MIT," says Margulies, "to evolve into a movement, to help other universities develop a model."

All this success has bred a few problems. For starters: profiteering. I show Margulies an email from Thailand. "A group of us here are considering opening a University devoted solely to 'e-learning courses from MIT!'" writes the sender, who says he hopes to offer "Bachelor of Science degrees in MIT Studies."

"He can't do that!" she shrieks.

Soon, the budding entrepreneur is sent a stern reply stating the guidelines: People are free to use, modify, translate, and distribute OpenCourseWare as long as they don't try to make a buck from it.

The promise of the first year only underscores the hurdles still to clear, some of which are beyond MIT's control. A United Nations Educational, Scientific and Cultural Organization forum last year considered OpenCourseWare's potential impact in the developing world and concluded that much of the planet isn't sufficiently wired to benefit from the program. MIT dishes out its content via more than 200 servers in Akamai's global network. This takes the burden off the university's infrastructure and eases bottlenecks, but the big remaining obstacle is the last mile into people's homes. In places like Vietnam, university systems mirror MIT's servers, making the material available via internal networks. In Lam's case, he downloaded lecture notes from his school's server onto a CD. An entrepreneur in Ghana is also burning content to CDs, which he sells,

without profit, to educators.

MIT is working hard on other ways to extend OpenCourseWare's reach. In January, Universia, a Madrid-based consortium of universities, approached MIT about translating the material into Spanish and Portuguese. MIT signed a deal to authorize and vet the translations, and the first 25 courses will be available this month. The university has received similar requests from the Middle East, Ukraine, and Mongolia, but it won't forge any more official partnerships until it sees how the Universia deal goes.

Ultimately, MIT officials know, OpenCourseWare's success depends on the emergence of online communities to support individual courses. Margulies says MIT is eager to find third parties to create tools that would enable learners or educators to easily organize and manage discussion groups using OpenCourseWare content. "We'd like to see self-managed OpenCourseWare communities," says Margulies. "Our vision is to have this open source software on the site, as well as information that helps people build a learning community, whether it's in Namibia, Thailand, wherever."

For a firsthand look at OpenCourseWare's power, you need only travel the back roads of western Kentucky to Murray State University, which bills itself as "Kentucky's Public Ivy University." That's where I met James Humes, a likable, articulate 25-year-old who has flunked out of various colleges three times. After a stint teaching in Shanghai, Humes enrolled at Murray State, where, he says, "people start to get nervous if you talk about evolution."

Now Humes is getting a 4.0. He's more motivated, sure. But he also has a secret weapon.

We enter his two-room duplex and sit down in front of his computer. "My friend's dad turned me on to OpenCourseWare," he says. "At first I didn't want to use it. It looked too advanced." But then he had a physics professor who couldn't spark his interest. So Humes checked out Physics 8.02: Electricity and Magnetism. "This MIT guy giving the video lecture was incredible," he says. "It's like you want to hear the next word. It's such a rich experience that I would get done with one lecture and find myself clicking on the next one immediately."

To demonstrate, Humes brings up a video presentation in which a disheveled and highly animated professor, Walter Lewin, is demonstrating how an EKG test works. "First of all, he's a great speaker. He does demonstrations. We never had that. Our class was all tedious derivations. Every day he impressed the heck out of me. He relates it all to things you know. Look at these kids laughing. They give him a standing ovation at the end of each lecture! We never had a moment of levity in our class."

Humes was so stoked by the physics class that he also reviewed the OpenCourseWare version of calculus and has since moved on to linear algebra. Now he prepares for exams at Murray State by practicing with OpenCourseWare quizzes covering the same material.

"I do fine and feel great, and then when I take my test the problems are easier," he says. "There's a lot of satisfaction that comes from being able to understand the MIT classes."

"Check this out," he says, clicking to an early lecture in linear algebra. Soon he is transfixed by the famous mathematician Gilbert Strang. He finally turns to me, displaying the most amazing grin - that of someone who's just discovered the joys of learning.

It's a Nobel Prize-worthy grin.

### Top 10 OpenCourseWare Classes

1. **Philosophy 24.00:** Problems of Philosophy
2. **Electrical Engineering and Computer Science 6.170:** Laboratory in Software Engineering
3. **Electrical Engineering and Computer Science 6.071:** Introduction to Electronics
4. **Earth, Atmospheric, and Planetary Sciences 12.409:** Hands-On Astronomy: Observing Stars and Planets
5. **Mathematics 18.06:** Linear Algebra
6. **Mathematics 18.013A:** Calculus with Applications
7. **Nuclear Engineering 22.00J:** Introduction to Modeling and Simulation
8. **Physics 8.02:** Electricity and Magnetism
9. **Electrical Engineering and Computer Science 6.281J:** Logistical and Transportation Planning Methods
10. **Management 15.810:** Introduction to Marketing

Source: MIT. Ranked by hits per page and based on a two-month period ending June 30, 2003.

### Top 10 OpenCourseWare Nations\*

Rank	Nation	Hits
1.	Canada	3,886,197
2.	Germany	3,576,071
3.	Brazil	3,170,362
4.	South Korea	3,254,259
5.	France	3,012,102
6.	Japan	3,095,913
7.	United Kingdom	3,099,713
8.	China <sup>1</sup>	2,563,446
9.	India	2,512,267
10.	Australia	1,372,052

\* Outside the U.S.

<sup>1</sup> Includes nearly 600,000 hits from mainland China, where the government denied access to OpenCourseWare until February 2003, and nearly 2 million hits from Hong Kong.

Contributing writer David Diamond (ddiamond@well.com) interviewed Linus Torvalds in Wired 11.07.

Copyright © 1993-2004 The Condé Nast Publications Inc. All rights reserved.

Copyright © 1994-2003 Wired Digital, Inc. All rights reserved.