

# Come the Revolution

THOMAS L. FRIEDMAN Palo Alto, Calif. May 15, 2012, The New York Times

**Andrew Ng** is an associate professor of computer science at Stanford, and he has a rather charming way of explaining how the new interactive online education company that he cofounded, **Coursera**, hopes to revolutionize higher education by allowing students from all over the world to not only hear his lectures, but to do homework assignments, be graded, receive a certificate for completing the course and use that to get a better job or gain admission to a better school.

"I normally teach 400 students," Ng explained, but last semester he taught 100,000 in an online course on machine learning. "To reach that many students before," he said, "I would have had to teach my normal Stanford class for 250 years."

Welcome to the college education revolution. Big breakthroughs happen when what is suddenly possible meets what is desperately necessary. The costs of getting a college degree have been rising faster than those of health care, so the need to provide low-cost, quality higher education is more acute than ever. At the same time, in a knowledge economy, getting a higher-education degree is more vital than ever. And thanks to the spread of high-speed wireless technology, high-speed Internet, smartphones, Facebook, the cloud and tablet computers, the world has gone from connected to hyperconnected in just seven years. Finally, a generation that has grown up on these technologies is increasingly comfortable learning and interacting with professors through online platforms.

The combination of all these factors gave birth to Coursera.org, which launched on April 18, with the backing of Silicon Valley venture funds, as my colleague John Markoff first reported.

Private companies, like Phoenix, have been offering online degrees for a fee for years. And schools like M.I.T. and Stanford have been offering lectures for free online. Coursera is the next step: building an interactive platform that will allow the best schools in the world to not only offer a wide range of free course lectures online, but also a system of testing, grading, student-to-student help and awarding certificates of completion of a course for under \$100. (Sounds like a good deal. Tuition at the real-life Stanford is over \$40,000 a year.) Coursera is starting with 40 courses online — from computing to the humanities — offered by professors from Stanford, Princeton, Michigan and the University of Pennsylvania.

*"The universities produce and own the content, and we are the platform that hosts and streams it," explained Daphne Koller, a Stanford computer science professor who founded Coursera with Ng after seeing tens of thousands of students following their free Stanford lectures online. "We will also be working with employers to connect students — only with their consent — with job opportunities that are appropriate to their newly acquired skills. So, for instance, a biomedical company looking for someone with programming and computational biology skills might ask us for students who did well in our courses on cloud computing and genomics. It is great for employers and employees — and it enables someone with a less traditional education to get the credentials to open up these opportunities."*

M.I.T., Harvard and private companies, like Udacity, are creating similar platforms. In five years this will be a huge industry.

While the lectures are in English, students have been forming study groups in their own countries to help one another. The biggest enrollments are from the United States, Britain, Russia, India and Brazil. "One Iranian student e-mailed to say he found a way to download the class videos and was burning them onto CDs and circulating them," Ng said last Thursday. "We just broke a million enrollments."

To make learning easier, Coursera chops up its lectures into short segments and offers online quizzes, which can be auto-graded, to cover each new idea. It operates on the honor system but is building tools to reduce cheating.

In each course, students post questions in an online forum for all to see and then vote questions and answers up and down. "So the most helpful questions bubble to the top and the bad ones get voted down," Ng said. "With 100,000 students, you can log every single question. It is a huge data mine." Also, if a student has a question about that day's lecture and it's morning in Cairo but 3 a.m. at Stanford, no problem. "There is always someone up somewhere to answer your question" after you post it, he said. The median response time is 22 minutes.

These top-quality learning platforms could enable budget-strained community colleges in America to "flip" their classrooms. That is, download the world's best lecturers on any subject and let their own professors concentrate on working face-to-face with students. Says Koller: "It will allow people who lack access to world-class learning — because of financial, geographic or time constraints — to have an opportunity to make a better life for themselves and their families."

When you consider how many problems around the world are attributable to the lack of education, that is very good news. Let the revolution begin.