

## TECHNOLOGY

# Udacity Says It Can Teach Tech Skills to Millions, and Fast

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“I’m the least experienced person on my engineering team at Google,” Kelly Marchisio, a 25-year-old computer programmer, told me recently. “I frankly might be one of the least experienced engineers at Google, period.”

Ms. Marchisio was not assuming false modesty. Like many Googlers, she has an enviable academic background, including a master’s degree from Harvard. But her degree, from Harvard’s Graduate School of Education, had to do with the interactions between neuroscience and teaching, a field far removed from software engineering. In 2013, Google hired Ms. Marchisio as a customer service representative, a job that paid the bills but failed to ignite her intellectual passions.

What she really wanted to do was code. Ms. Marchisio had taken several computer science classes at Harvard, sparking her interest in programming — which happens to be one of the economy’s most in-demand skills. But how does someone with a master’s in education move from customer service to coding as an occupation?

“I’m superexcited with efforts to get girls and young people into coding, but for a long time I’ve thought, ‘What about me?’ ” Ms. Marchisio said. “I’m here now, I’m already in the work force. You can have me tomorrow if you just train me.”

Economists and technologists agree that in the future, just about everyone's job will involve more technology. During the last few years, many local and online schools have popped up to teach people how to code. They offer a vast range of prices and techniques. Some, like Codecademy, are free, while others can cost thousands or even tens of thousands of dollars. Some offer more personalized coaching, while others leave students to figure things out on their own.

Now Udacity, a four-year-old online teaching start-up, believes that after years of trial and error, it has hit on a model of vocational training that can be scaled up to teach millions of people technical skills. Udacity's founder, Sebastian Thrun, a specialist in artificial intelligence at Stanford University who once ran Google X, the search company's advanced projects division, said that the "nanodegree" program that the firm created last year will result in vastly lower education costs and wider accessibility. Early data suggests the program is efficient and reliably results in new jobs — including for Ms. Marchisio, who began working as a software developer at Google after taking Udacity's "full-stack developer" course this spring.

The nanodegree works like this: Last year, Udacity partnered with technology companies to create online courses geared toward teaching a set of discrete, highly prized technical skills — including mobile programming, data analysis and web development. Students who complete these courses are awarded the nanodegree, a credential that Udacity has worked with Google, AT&T and other companies to turn into a new form of workplace certification.

"We can't turn you into a Nobel laureate," Mr. Thrun told me. "But what we can do is something like upskilling — you're a smart person, but the skills you have are inadequate for the current job market, or don't let you get the job you aspire to have. We can help you get those skills."

If predictions about the potential for technology to substantially improve education smell to you like Silicon Valley peyote, I don't blame you. Computers have long been held up as a magic bullet for learning, and they've constantly failed to deliver; higher education has only become more expensive and less accessible alongside the rise of digital technology.

Udacity itself has been beached on the shores of unrealized optimism. In 2011, after discovering wide interest in online learning when he put his Stanford artificial-intelligence lectures online, Mr. Thrun founded Udacity as one of the first for-profit MOOCs — for “massive open online courses.” The idea that MOOCs would pose an existential threat to the elite universities gained cultural cachet. “Nothing has more potential to lift more people out of poverty,” Thomas L. Friedman, the New York Times columnist, wrote in 2013.

Actually, that didn’t happen. Mr. Thrun now says that in its first incarnation as a MOOC that tried to offer students a broad, general-purpose education, Udacity attracted many people to its classes, but just about everyone failed to complete the work. So in 2013, Mr. Thrun began reimagining Udacity not as a replacement to universities, but as a more practical vocational school that offered highly structured lessons to help people find jobs.

In an economy constantly riven by technological change, Mr. Thrun says he believes periodic vocational training will become increasingly important in the job market. “It’s a mistake to think that a single college education can carry you for a lifetime,” he said. “To keep pace with change, your education has to be done throughout your life.”

So far, Udacity’s new model shows a glimmer of success. A year after the program’s start, the company has 10,000 students enrolled in its nanodegree courses, and the number is growing by a third every month. Udacity charges \$200 a month for the courses (students can take as little or as much time as they want to finish). When they successfully complete a course, Udacity gives back half the tuition. The company says that a typical student will earn a nanodegree in about five months — in other words, for around \$500.

Because students take several months or longer to complete their degrees, it is too soon to tell exactly how many will finish. So far, Udacity estimates the graduation rate to be about 25 percent. Thousands of workers have earned degrees, and hundreds have found new jobs as a result.

Mr. Thrun attributes part of the success to the course material, which was developed in conjunction with companies to teach skills that they look for in

employees. For instance, Udacity's Android course is staffed by instructors from Google, which developed the mobile operating system. Udacity's model also puts a premium on one-on-one coaching, mentorship, career counseling and job-interviewing skills, all of which keep students more invested in their work.

The absence of human interaction has long bedeviled online education, but Mr. Thrun has found a way to offer personalized teaching systems on a wide scale while keeping costs low. He does so using a proven Internet trick — online outsourcing. Udacity has a network of paid graders across the world who are well versed in each of its courses; when students submit their projects, one of these graders picks up the work and quickly assesses it, including detailed comments about the student's progress. The graders can earn \$50 to \$100 an hour.

“With what I earned last month, I can take a trip to Europe,” Aparna Sridhar, a Udacity grader in Chennai, India, told me.

Despite these costs, Mr. Thrun said Udacity achieved profitability in July. He said the start-up had since decided to push its profits back into developing more coursework. Udacity raised \$35 million from investors last year, and it now has about 150 employees, he said.

I spoke to several students who described Udacity as life-changing. One was Dan Haddigan, 28, who graduated from art school with a degree in printmaking and worked for several years at an art gallery in Philadelphia. Last year, he contemplated going back to graduate school for art but heard about Udacity and decided coding was more practical. The nanodegree was challenging. For several months, he said, “I would wake up, work on projects for Udacity, go to work at the gallery, come home, then try to get more work on my projects.” The course — in web development — took about five months, costing him \$500. But Mr. Haddigan said the work proved rewarding. After finishing his degree, he found a listing for a job at IntuitSolutions, a web development agency.

He hesitated in applying. “I thought, who am I?,” he said. “I just took an online course and I'm applying for these full-time jobs. They're going to laugh me out of the interview.”

They didn't. He got the job.

**Correction: September 16, 2015**

*An earlier version of this article misstated Google's relationship to the mobile operating system Android. Google developed Android after buying the start-up in 2005; it did not create it.*

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