

Are Online Classes the Future of Higher Education?

Checking Linearity

SIZE	COST
1300	88 000
1400	72 000
1600	94 000
1900	86 000
2100	112 000
2300	98 000

IS THIS LINEAR ?

• YES

Many online professors follow Salman Khan's lecture method of writing on the screen while they explain concepts, as shown in this video from Udacity.

Taking College Out of the Classroom

BY TIM SABLİK

The structure of college hasn't changed much in the last century. Higher education is certainly more accessible today, allowing more graduates to earn a significant wage premium in the workplace. But tuition costs have increased steeply, prompting some students to search for alternatives. Over the last decade, the average published tuition at public four-year colleges rose by 5.2 percent per year after adjusting for inflation. Tuition at public four-year schools is now about 3.6 times higher in real terms than it was in 1982-1983; tuition at private four-year schools is about 2.7 times higher (see graph). Students have turned to loans to fund the growing expense of higher education, which has increased the debt burden new graduates carry with them into the workforce. (See "Debts and Default," *Region Focus*, Fourth Quarter 2010.)

Some educators have also begun to question whether this time-honored method of instruction is the most effective way to transfer knowledge. In their book *Academically Adrift*, Richard Arum and Josipa Roksa, professors of sociology at New York University and the University of Virginia, respectively, examined survey results from college students to quantify the amount of learning that goes on at American universities. The authors looked at data from the Collegiate Learning Assessment, which measures learning based on the results from a performance test and two analytical writing tests. They found very little improvement in critical thinking and writing skills in the first two years of students' college careers. From the start of their freshman year to the end of their sophomore year, students improved an average of 7 percentile points on the assessment, meaning a student that started college in the 50th percentile might have only advanced to the 57th percentile by the end of their second year. For nearly half of the students surveyed, there were no statistically significant gains, making it unclear whether most students

learned anything at all. And measured learning was not much higher by the time students graduated.

One new education platform purports to answer both concerns by offering top-notch training for a bargain price: the MOOC.

What is a MOOC?

The first online classes in the United States began appearing in the early 1980s, and even before that, researchers had discussed how computers might expand the reach of traditional teaching. Early efforts at online education tended to resemble physical classrooms transplanted to the digital world, but with less interaction. Teachers posted lectures in text form, and limitations in technology inhibited the sort of dialogue possible in a physical classroom.

Today's MOOCs — massive open online courses — promise to overcome the limitations of early online education. Providers of MOOCs are less interested in replicating the existing classroom infrastructure and more interested in creating their own. One of the pioneers in the modern MOOC movement is Salman Khan, who founded the non-profit Khan Academy in 2008. Through videos he records himself, Khan has taught more than 40 million students, making him one of the most wide-reaching teachers in history. The advancement of online video distribution and broadband internet access allows millions of students to virtually sit down one-on-one with Khan for brief lessons on a variety of topics. The price of admission? Zero.

Khan has inspired instructors in higher education to go online as well. In the fall semester of 2011, Sebastian Thrun, who at the time was a professor at Stanford University, taught a class on artificial intelligence with Peter Norvig, Google's director of research. The class was simultaneously offered online for free to anyone who wanted to register. In total, 160,000 enrolled. Students at Stanford who signed up

COURTESY OF UDACITY

for the physical class were also given the option to watch the content online rather than attend class, and the majority did so. Those students scored a full letter grade higher on average than students who had taken the traditional class in the past. After the experience of teaching the course, Thrun left Stanford to start his own for-profit MOOC, Udacity Inc.

In the beginning, Udacity was a garage company of sorts. “It was really just four people operating out of Sebastian’s guest house,” recalls David Evans, a professor of computer science at the University of Virginia who served as Udacity’s vice president of education. The site now offers over a dozen courses on topics ranging from computer science to building a startup, all for free. Evans taught one of the inaugural classes, Computer Science 101, which enrolled 94,000 students.

“Until recently, most online education has been sort of a pale substitute for in-person education,” says Evans. “It was trying to replicate the classroom experience of watching a long lecture and maybe having some synchronous discussion. And technology allows us to do more interesting things than that now.”

Of course, online classes still present some unique challenges. Providing individual attention to thousands of students is an impossible task, even with advancements in technology. Evans says the huge scope of MOOCs can actually help in that regard.

“One nice thing about a class like this is the class scale and the diversity of students means that almost all questions get answered quickly by other students in the class, often within 15 seconds of a question being posted in the discussion forums,” says Evans.

If the initial response is unsatisfactory, other students will soon chime in with their own answers, says Evans. And the professors can get involved as well. When Udacity first launched the Computer Science 101 class, all of the students took the same units together, allowing Evans and his teaching assistants to hold virtual office hours to answer questions from students. Many students in MOOCs have also formed in-person study groups at coffee shops and libraries with classmates who live in their area.

Major universities have started to recognize the growing demand for education alternatives too. Coursera partners with 62 universities that offer free courses taught by their faculty. The Massachusetts Institute of Technology and Harvard University founded edX as an outlet for their free online courses, and they have since been joined by nearly a dozen other major universities.

Moreover, technology enables individual instructors to create and host their own MOOCs at low cost. Tyler Cowen and Alex Tabarok, economists at George Mason University who co-author the blog Marginal Revolution, started their own online source for economics education called Marginal Revolution University in September 2012.

“The main driver of blogging and Marginal Revolution University is the desire to communicate ideas to a broader audience,” says Cowen. “We think that if we have the best economic content, sort of like the ‘Khan Academy of

economics,’ we’ll have a role in the future of education.”

The MOOC movement has captured a lot of attention, but will it transform traditional higher education?

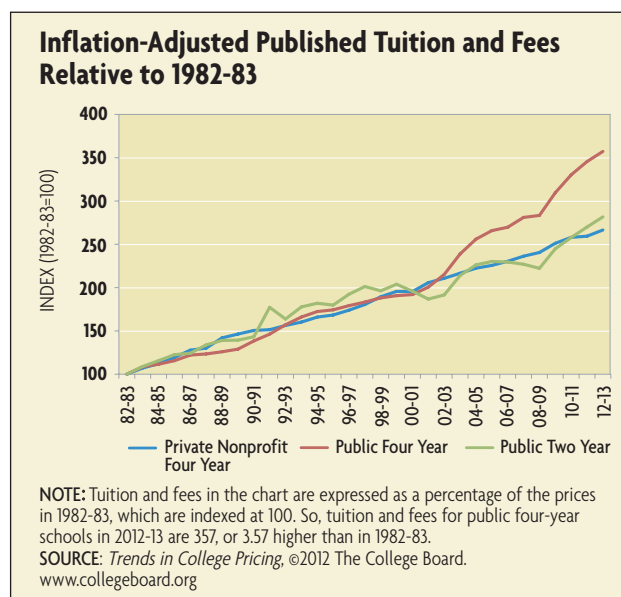
Building a Better Classroom

To be competitive, online education must suit the needs of students seeking an alternative or supplement to traditional education. On this front, studies are promising. Ithaka S+R, a nonprofit consulting and research group focused on studying the use of technology in education, conducted a randomized experiment in which they assigned some students to traditional college classrooms and others to hybrid classes where students learned mostly online but also met for one hour each week face-to-face with the instructor. On average, the researchers found no significant differences in learning — in terms of course completion, grades, and performance on a standardized test of course material — between the two groups of students.

“This seemingly bland result is in fact very important,” noted the researchers. It suggests that transferring most classroom education online does not impair student learning. In another review of several studies on online education, the U.S. Department of Education (DOE) found that, on average, students in online classes performed as well or even slightly better than students in traditional classrooms. Students in hybrid classrooms, like the ones studied by Ithaka S+R, performed even better, according to the DOE.

These findings are encouraging for the future of MOOCs. Modern technology allows teachers like Thrun, Evans, or Cowen to reach many times the number of students they might see in a lifetime of classroom instruction. If these students can learn the same material just as successfully, then the upside to MOOCs could be very high.

While MOOCs have certainly proven that they can attract large audiences, the number of students who actually completed courses is another matter. Evans’ initial Udacity class had 94,000 students enroll, but only 9,700 finished.



“Certainly you would like to have much more than 10 percent of students starting a class successfully finish it,” says Evans. “On the other hand, because the costs of getting started were so low, that is a pretty reasonable rate.”

Evans notes that many students never even watched the first video, since registering is free and requires only a few minutes. He says that after the initial drop-off, most students left after the fourth unit out of seven.

“That’s where it gets into some of the deeper computer science ideas,” says Evans. “It may be something that is less compelling for people who just wanted to understand a little bit about programming.”

In that sense, the flexibility of online classes is a plus, allowing students to learn as much or as little as they like or dabble in new fields of study with little upfront cost or commitment. On the other hand, some argue that the economies of scale made possible by online education are a mixed blessing. “It’s not the ‘O’ in MOOC that worries me, it’s the ‘M,’” says economist Arnold Kling, who formerly taught at George Mason University and served on the staff of the Fed’s Board of Governors. He now teaches economics and statistics at the Melvin J. Berman Hebrew Academy in Rockville, Md. Kling wrote an article in *The American* in which he was critical of placing too much faith in MOOCs as the solution to improving higher education.

“I think online education has a role. But my basic view is that students are different. The more an educational technology is adapting to the individual student, the more productive it is,” says Kling.

Taking a one-size-fits-all approach of simply posting videos online, as many MOOCs have, is not likely to yield great results, argues Kling. He advocates a “many-to-one” approach, in which courses are more adaptive and tailored to the individual student. He notes that this is already starting to happen, as Khan has championed a “flip the classroom” approach, where students watch lecture videos at home and then use class time to work on problem sets and receive help where they are struggling.

“It’s great because you have students working on problems with each other,” says Kling, who has used the method in his classes. “Their thought process is the thought process of someone who’s learning, so that’s better than just getting my thought process as someone who has done this for years.”

Valuing Digital Degrees

Even if digital classrooms are effective, the for-profit MOOCs still must find a way to translate free classes into a sustainable business model. And even the nonprofit ones are likely to thrive only if they create economic value for students. But how does higher education create value?

It is clear that for the median graduate, college does pay. According to a 2010 study from the College Board Advocacy and Policy Center, the median college graduate with a bachelor’s degree makes nearly \$22,000 more per year working full-time than the median high school graduate, roughly

a 65 percent wage premium. What is less clear is where this value comes from. One view is that college graduates learn valuable knowledge and skills in the course of obtaining their degree and this makes them more productive members of the labor force. As a result, employers are willing to pay them a higher wage for their higher productivity. If knowledge accounts for most of the value of a college degree, then the evidence on the efficacy of online education is encouraging for the future of MOOCs. Online education appears to provide a comparable level of learning for a fraction of the cost, which would make it an attractive option for students.

So what has prevented college students from leaving campuses in droves to sign up for free MOOCs? Signaling theory may provide the answer. That theory posits that the value of college education comes primarily from the information it imparts to potential employers. Workers have varying levels of ability, which potential employers cannot easily discern. A college degree provides a signal for employers that a worker possesses certain abilities, and under signaling theory it is the credential that matters most — and an online education without a credential to validate the student’s ability would have little value in the job market.

The jump in wage premium enjoyed by college graduates versus those with only some college education suggests that there is significant value in holding a degree (see chart). That value also seems to diminish as workers are better able to signal their ability through work experience. Andrew Hussey, an economist at the University of Memphis, looked at students in Master of Business Administration (MBA) programs. Many of these programs require candidates to have some work experience, but the amount of prior experience varies greatly among students. Hussey postulated that if signaling does not matter, then the returns from the MBA program should be roughly the same for students after controlling for their years of work experience. He found that the wage premium from an MBA diminishes for students with more work experience, suggesting that students who have worked longer have already signaled their abilities and thus earn less value from the signaling provided by the MBA.

“I think if the credential is what matters and online education cannot offer an equivalent credential, then it’s just not going to go anywhere,” says Kling.

The evidence is not clear-cut, though, as other studies have pointed to skills gained in college having a larger impact on the wage premium. What seems more likely is that the value from higher education stems from a combination of learning and signaling. Thus, in addition to looking at ways to improve how they teach, MOOCs have begun to address the need for credentials.

In February, the American Council on Education (ACE) approved five courses offered on Coursera as eligible for college credit. Students pay fees to take a proctored exam and receive a transcript from ACE that they can use to apply for credit at a physical school. Two of those courses are offered by Duke University, which has also announced that it will collaborate with other schools on a new online platform

to offer courses that Duke students can take for college credit. Udacity has partnered with Pearson VUE to allow students to take independently proctored certification tests, for a fee. It has also partnered with a number of companies in the computer industry, such as Google, and offers a service to share student resumes with potential employers.

“One potential business model is to have companies sponsor classes,” says Evans. “They get a lot of value from this in terms of students learning to use their technology. The business model would have students take a set of courses through us and build up something comparable to an academic transcript. We will have a very detailed record of the student’s performance in the class as well as their social contributions, and employers would pay a recruiting fee for these referrals.”

Credentialing could offer a path for MOOCs to be financially sustainable, but only if the credentials are accepted in the marketplace. Although Cowen says MRU is financially stable since it is small and its costs are low, he suspects some form of accreditation will be necessary for larger-scale operations to thrive.

“My guess is, if those courses are accredited by legitimate schools, people will pay, and those companies will make money,” says Cowen. “If not, people won’t pay enough to keep that whole thing up and running.”

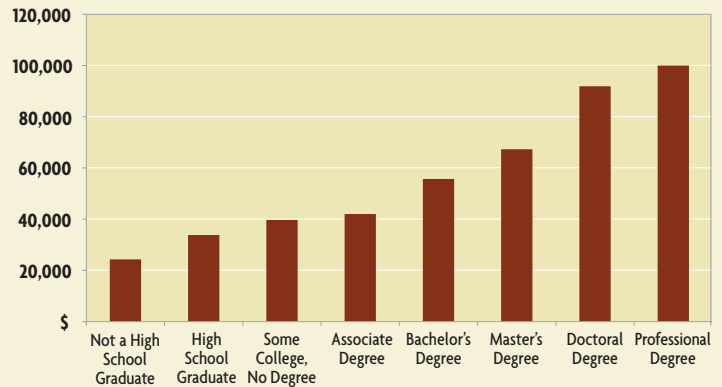
You Say You Want a Revolution?

If MOOCs can provide accepted credentials and develop sustainable business models, then aren’t brick and mortar schools hurting themselves by partnering with them? Most of those involved in the movement don’t see it that way.

“I don’t think we’ll ever replace face-to-face education,” says Cowen, noting that George Mason has been very supportive of MRU. “I think smart schools will move toward hybrid models. They’ll hire fewer instructors of particular kinds, but I’m not sure the demand for instructors has to go down. What the instructor does has to change. It will be more about motivation and less about just repeating lectures, which I think is actually how it should be.”

Evans agrees that online education is more likely to augment brick and mortar schools than replace them. “But at the same time, there’s a huge population that is not being served by the traditional universities today, and if the success of open education makes traditional universities question some of the things they do, I think that would be a great thing,” he says.

Median Pretax Earnings of Full-Time Workers Ages 25 and Older



SOURCE: *Education Pays*, ©2010 The College Board. www.collegeboard.org

The broad reach and open access of MOOCs have been particularly valuable for students in developing countries. For example, schools in India have turned to the videos on Khan Academy to supplement their shortage of teachers and textbooks.

“Online classes are gaining popularity in India,” says Satyakam, a 31-year-old master’s student at the National Institute of Technology in Kurukshetra, India, who is taking a class on Udacity. “Recently my friend visited one of the premiere engineering colleges in India on a recruitment drive for his company and some of the students used these courses as a main source of learning.” Satyakam plans to use the material from online courses to help him start an Internet company.

For students with little access to quality education, MOOCs could be a “lifeline,” says Cowen. But to get the most out of education, he feels some in-person instruction is needed. “The naive idea that you just put it up and then the world soaks up all this knowledge, I don’t think is where it’s at. There’s some percentage of people who do great with that, but that’s a minority. There’s another much larger group that needs this hybrid model, with good teachers and care and motivation, and we cannot do that for the whole world. Other educational institutions have to pick up the ball and run with it.”

In the United States, online education seems more likely to supplement traditional classrooms, which could be what traditional universities are counting on. Even so, the hybrid classrooms of the future may not so closely resemble those of a century ago.

“We’re optimists,” Cowen says.

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READINGS

Bowen, William G., Matthew M. Chingos, Kelly A. Lack, and Thomas I. Nygren. “Interactive Learning Online at Public Universities: Evidence from Randomized Trials.” Ithaca S+R Research Paper, May 22, 2012.

“Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.”

U.S. Department of Education, September 2010.

Hussey, Andrew. “Human Capital Augmentation versus the Signaling Value of MBA Education.” *Economics of Education Review*, August 2012, vol. 31, no. 4, pp. 442-451.

Kling, Arnold. “Many-to-One vs. One-to-Many: An Opinionated Guide to Educational Technology.” *The American*, Sept. 12, 2012.