The Professors Who Make the MOOCs

Paul Gries, of the U. of Toronto, has taught MOOCs on computer science.

By Steve Kolowich

What is it like to teach 10,000 or more students at once, and does it really work? The largest-ever survey of professors who have taught MOOCs, or massive open online courses, shows that the process is time-consuming, but, according to the instructors, often successful. Nearly half of the professors felt their online courses were as rigorous academically as the versions they taught in the classroom.

The survey, conducted by *The Chronicle,* attempted to reach every professor who has taught a MOOC. The online questionnaire was sent to 184 professors in late February, and 103 of them responded.

Hype around these new free online courses has grown louder and louder since a few professors at Stanford University drew hundreds of thousands of students to online computer-science courses in 2011. Since then MOOCs, which charge no tuition and are open to anybody with Internet access, have been touted by reformers as a way to transform higher education and expand college access. Many professors teaching MOOCs had a similarly positive outlook: Asked whether they believe MOOCs "are worth the hype," 79 percent said yes.

Princeton University's Robert Sedgewick is one of them. He had never taught online before he decided to co-lead a massive open online course titled "Algorithms: Part I."

Like many professors at top-ranked institutions, Mr. Sedgewick was very skeptical about online education. But he was intrigued by the notion of bringing his small Princeton course on algorithms, which he had taught for five years, to a global audience. So after Princeton signed a deal with an upstart company called Coursera to offer MOOCs, he volunteered for the front lines.

His online course drew 28,000 students when it opened last summer, but Sedgewick was not daunted. He had spent hundreds of hours readying the material, devoting as much as two weeks each to recording and fine-tuning videotaped lectures. The preparation itself, he said, was "a full-time job."

It paid off. By the time his six-week course was over, the Princeton professor had changed his mind about what online education could do. Mr. Sedgewick now classifies himself as "very enthusiastic" about virtual teaching, and believes that soon "every person's education will have a significant online component."

The Chronicle survey considered courses open to anyone, enrolling hundreds or even thousands of users (the median number of students per class was 33,000). About half of the professors who responded were still in the process of teaching their first MOOC, while the rest had led an open online course that had completed at least one full term.

Many of those surveyed felt that these free online courses should be integrated into the traditional system of credit and degrees. Two-thirds believe MOOCs will drive down the cost of earning a degree from their home institutions, and an overwhelming majority believe that the free online courses will make college less expensive in general.

The findings are not scientific, and perhaps the most enthusiastic of the MOOC professors were the likeliest complete the survey. These early adopters of MOOCs have overwhelmingly volunteered to try them—only 15 percent of respondents said they taught a MOOC at the behest of a superior—so the deck was somewhat stacked with true believers. A few professors whose MOOCs have gone publicly awry did not respond to the survey.

But the participants were primarily longtime professors with no prior experience with online instruction. More than two-thirds were tenured, and most had taught college for well over a decade. The respondents were overwhelmingly white and male. In other words, these were not fringe-dwelling technophiles with a stake in upending the status quo.

Therefore the positive response may come as a surprise to some observers. Every year the Babson Survey Research Group asks chief academic administrators to estimate what percentage of their faculty members "accept the value and legitimacy of online education"; the average estimate in recent years has stalled at 30 percent, even as online pro-

grams have become mainstream.

Professors at top-ranked colleges are seen as having especially entrenched views. For years, "elite" institutions appeared to view online courses as higher education's redheaded stepchild—good enough for for-profit institutions and state universities, maybe, but hardly equivalent to the classes held on their own campuses. Now these high-profile professors, who make up most of the survey participants, are signaling a change of heart that could indicate a bigger shake-up in the higher-education landscape.

Why They MOOC

Professors who responded to *The Chronicle* survey reported a variety of motivations for diving into MOOCs. The most frequently cited reason was altruism—a desire to increase access to higher education worldwide. But there were often professional motivations at play as well.

John Owens was drawn to MOOCs because of their reach. He also did not want to be left behind.

Mr. Owens, an associate professor of electrical and computer engineering at the University of California at Davis, liked the idea of teaching parallel computing, a method that allows computers to execute many tasks at once, to a global audience. Putting his course on Udacity's platform would be good for the 15,000 students who registered at no cost, he figured.

But it might also be good for him. It does not take a programming expert to decrypt the writing on the wall: No matter where you teach, online education is coming. "I would rather understand this at the front

end," said Mr. Owens, "than be forced into it on the back end."

A number of the professors in the survey said they hoped to use MOOCs to increase their visibility, both among colleagues within their discipline (39 percent) and with the media and the general public (34 percent).

This opportunity was not lost on Mr. Sedgewick, the Princeton professor. "Every single faculty member has the opportunity to extend their reach by one or two or three orders of magnitude," he said.

For heavyweights like Mr. Sedgewick, who co-wrote a popular textbook on algorithms, allowing somebody else to beat him to the punch on that opportunity would be risky. By volunteering for duty, he was, in part, defending his roost. "I wouldn't want anybody else's algorithms course to be out there," said Mr. Sedgewick. He was one of the few professors in the survey who recommended that students buy a textbook—his own.

Nevertheless, most professors did not seem to think that a MOOC-related boost to their professional profile would equate to a payday. Just 6 percent were looking to increase their earning power, and only one hoped that his MOOC work would help him get tenure.

Learning From Online

In May 2012, when the presidents of Harvard University and the Massachusetts Institute of Technology announced that they would enter the MOOC fray with $60-million to start edX, they were emphatic that their agenda was to improve, not supplant, classroom education.

"Online education is not an enemy of residential education," said Susan Hockfield, president of MIT at the time, from a dais at a hotel in Cambridge, "but an inspiring and liberating ally."

This has become a refrain for traditional universities that have been early adopters of MOOCs, and many of the professors in *The Chronicle* survey seem to have taken the message to heart. Thirty-eight percent of those surveyed said one motivation was to pick up tips to help improve their classroom teaching.

Among them is M. Ronen Plesser, an associate professor of physics at Duke University, who saw the challenge of captivating a vast, fickle audience as a way to reassess his own teaching techniques. "I found that producing video lectures spurred me to hone pedagogical presentation to a far higher level than I had in 10 years of teaching the class on campus," he said.

The result was an online class that he describes as "significantly more rigorous and demanding than the on-campus version."

A key way professors are learning new teaching tricks is by taking cues from their MOOC students. Coursera, edX, and Udacity all track the interactions each student has with the course materials, and with one another, within a given course. Each platform then gives professors the ability to see data that could tell them, for example, which methods and materials help students learn and which ones they find extraneous or boring.

The idea is to glean insights from the online courses that professors can apply in the traditional classroom, where such data are hard to come by.

Michael J. Cima, a professor of materials science and engineering at

MIT, used data from his MOOC to do a side-by-side analysis of learning outcomes for the students in his massive online chemistry course and the ones taking the traditional version on campus.

"I have evidence that the online measurements of outcomes may be better than what we have been doing in class," Mr. Cima said. "This surprised me and caused me to challenge some of my assumptions about how well we do assessment in a residence-based class."

He is thinking about bringing some of the automated assessment tools from his MOOC into his traditional course when it starts up again in the fall. He likes the idea of constantly drilling students with online quizzes that they can take at their own pace. But there would have to be one key difference for his MIT students, he said: The students would have to work on their quizzes in a physical classroom, with a proctor.

Price of Free Teaching

The insights that come with teaching massive online courses, however, come at a price. Many professors in the survey got a lot out of teaching MOOCs, but teaching MOOCs took a lot out of them.

Typically a professor spent over 100 hours on his MOOC before it even started, by recording online lecture videos and doing other preparation. Others laid that groundwork in a few dozen hours.

Once the course was in session, professors typically spent eight to 10 hours per week on upkeep. Most professors managed not to be inundated with messages from their MOOC students—they typically got five e-mails per week—but it was not unusual for a professor to be drawn into the discussion forums. Participation in those forums varied, but most

professors posted at least once or twice per week, and some posted at least once per day.

In all, the extra work took a toll. Most respondents said teaching a MOOC distracted them from their normal on-campus duties.

"I had almost no time for anything else," said Geoffrey Hinton, a professor of computer science at the University of Toronto.

"My graduate students suffered as a consequence," he continued. "It's equivalent to volunteering to supply a textbook for free and to provide one chapter of camera-ready copy every week without fail."

Mr. Owens, at Davis, had a similar experience. He spent 150 hours building his MOOC, "Introduction to Parallel Programming," for Udacity. More than 15,000 people registered. Once the course started, he spent about five hours per week on it, posting frequently on the discussion forums.

Although Mr. Owens did not ask for relief from his normal teaching load to make time for his MOOC, he doubts that he would have gotten it if he had asked.

"It's out of 'my own' time, which is quite limited," Mr. Owens reported. "So, yes, other areas of my job suffered."

Most colleges do not yet have a protocol for integrating their instructors' work on MOOCs into normal faculty work flow. But if the survey responses are any indication of how much work goes into a MOOC, institutions may soon have to figure out how to help professors fit them into their professional lives.

"It takes an immense amount of work to produce an adequate MOOC," said Armando Fox, a professor of electrical engineering at the University of California at Berkeley who has co-taught three MOOCs for Coursera, "and a staggering amount of work to produce a really good one."

Mr. Owens, for one, said he did not plan to teach another MOOC until his bosses reduce his classroom teaching load to give time for it. The continuing participation of top faculty members in massive online courses, he said, will depend on whether their colleges are willing to let MOOCs distract them from their traditional duties.

At that point, Mr. Owens said, campus officials will need to ask themselves whether they want to give that faculty time to online students, "99 percent of whom who are not at their universities."

Cutting College Costs

Most of the professors whose MOOCs had completed at least one term reported the number of students who had "passed" the courses. The average pass rate was 7.5 percent, and the median number of passing students was 2,600.

In lieu of credit toward a degree, most professors offer certificates to students who complete massive online courses. Three-quarters of the professors surveyed said they offered some sort of document certifying that a student had completed a MOOC.

It remains unclear, however, how seriously those certificates are being taken by employers. College degrees are still seen as the coin of the realm.

Perhaps the biggest question surrounding MOOCs is how they might integrate with the current credentialing infrastructure in a way that makes college degrees less expensive.

The American Council on Education, a group that advises college presidents on policy, recently endorsed five MOOCs from Coursera for credit, and it is reviewing three from Udacity.

If colleges yield to the council's judgment, it could mean that students who are clever enough to pass a MOOC could redeem their learning for credit toward a traditional degree. There would be fees in the process, but no tuition.

Most professors who responded to *The Chronicle's* survey said they believed that MOOCs would drive down the cost of college; 85 percent said the free courses would make traditional degrees at least marginally less expensive, and half of that group said it would lower the cost "significantly."

As far as awarding formal credit is concerned, most professors do not think their MOOCs are ready for prime time. Asked if students who succeed in their MOOCs deserve to get course credit from their home institutions, 72 percent said no.

However, it's worth noting that more than a quarter of the professors felt that their successful MOOC students do deserve credit. Those respondents include faculty members at Penn, Princeton, Duke, and Stanford. Most of them led courses that were oriented to math, science, and engineering.

Robert W. Ghrist, a professor of mathematics and electrical and systems engineering at the University of Pennsylvania, is among them. His

MOOC, "Calculus: Single Variable," is one of the five Coursera courses that ACE has recommended for credit.

Fitting his assessments into the parameters of Coursera's auto-grading system has been somewhat limiting, but no more than the math placement exams that Penn already uses, said Mr. Ghrist, who previously oversaw those tests.

"I would, of course, prefer it if I could read over their work carefully and follow their logic," he said. But that is a technology problem that Coursera will soon solve, he believes.

The Penn professor built his course with the express intention of mimicking, as closely as possible, the version he had taught on campus for eight years.

"Some MOOCs that I've sampled seem to be a bit watered down for the sake of mass appeal," said Mr. Ghrist. "My course is definitely not like that."

In some disciplines, the number of creditworthy MOOCs might depend on the priorities of professors and their institutions more than the limitations of online technology. Some professors might choose to build their courses with formal credit in mind; others might have a different agenda.

Mr. Ghrist, for one, hopes to see the number of creditworthy MOOCs go up as massive online courses proliferate. And he hopes that, as they do, universities like Penn will begin conferring transfer credits on students who enroll with several MOOCs already under their belts—allowing them to finish their degrees more quickly, for less money.

"I have four kids who are going to have to go to college," said Mr. Ghrist. By the time they do, the professor fully expects that MOOCs will be an important component of their applications.

Correction (3/21/2013, 5:29 p.m.): This article originally identified inconsistently the MOOC company that hosts a course led by John Owens, of the University of California at Davis. It is Udacity, not Coursera. The article has been updated to reflect this correction.