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Disruptor, Distracter, or What?

A POLICYMAKER'S GUIDE TO MASSIVE OPEN ONLINE COURSES (MOOCS)

Andrew P. Kelly



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INTRODUCTION

In the fall of 2011, a group of Stanford computer science professors opened up their in-person classes to anyone in the world with access to a computer and an Internet connection. The response was astounding. Hundreds of thousands of students from all over the globe signed up for the challenging classes. Sebastian Thrun and Peter Norvig's course on artificial intelligence (AI) attracted 160,000 students from 190 different countries, more than 20,000 of whom finished and received a letter certifying their accomplishment. In Andrew Ng's course on machine learning, more than 100,000 students signed up and 13,000 completed it. Shortly after the semester, Thrun, who would go on to found the online course provider Udacity, famously remarked, "I feel like there's a red pill and a blue pill, and you can take the blue pill and go back to your classroom and lecture your 20 students. But I've taken the red pill, and I've seen Wonderland."¹

So goes the creation myth of the massive open online course (MOOC), a new form of digital learning that has enthralled some, infuriated others, and changed the conversation about higher education in the United States and abroad. Creation myth may seem a weighty term to describe the origins of what amounts to a handful of new tech companies and an additional bell and whistle for some of the world's top universities. But the hype that has surrounded MOOCs—as well as the resulting backlash—has endowed them with rhetorical power that extends far beyond their actual impact on teaching and learning.

To some, MOOCs augur the dawn of a new era in human capital, one that will mean the end of college as we know it. *The New York Times* declared 2012 the "Year of the MOOC";² in the same newspaper, Thomas L. Friedman touted the "budding revolution in global online higher education," explaining:

“Nothing has more potential to lift people out of poverty. . . And nothing has more potential to enable us to reimagine higher education than the [MOOC] platforms that are being developed by the likes of Stanford and the Massachusetts Institute of Technology and companies like Coursera and Udacity.”³

Enthusiastic observers quickly likened MOOCs to other “disruptive innovations,” arguing that free online courses would send higher education the way of the newspaper and the record store. Nathan Harden wrote in *The American Interest*, “The future looks like this: Access to college-level education will be free for everyone; the residential college campus will become largely obsolete; tens of thousands of professors will lose their jobs; [and] the bachelor’s degree will become increasingly irrelevant.”⁴

Many people inside higher education have greeted this new development warily. Some faculty view MOOCs as a misguided push to commoditize and privatize American higher education while eliminating what makes it great—the immersive learning environment where students interact with faculty and their peers. When Amherst College rejected an opportunity to join edX, Harvard and MIT’s nonprofit MOOC effort, one professor asked rhetorically, “What makes us think, educationally, that MOOCs are the form of online learning that we should be experimenting with? On what basis? On what grounds? . . . 2012 was the year of the MOOCs. 2013 will be the year of buyer’s regret.”⁵ At San Jose State University, which is known for its pioneering partnerships with both Udacity and edX, the Philosophy Department refused to offer edX’s version of a popular Harvard course called Justice. “The move to MOOCs,” professors in the department wrote, “comes at great peril to our university. We regard such courses as a serious compromise of quality of education and, ironically for a social justice course, a case of social injustice.”⁶

The movement has caught the attention of policymakers from the statehouse to the White House. When President Obama promoted his college affordability proposals in August 2013, he specifically cited Georgia Tech and Udacity’s online computer science master’s degree as an example for others to follow.⁷ Democratic and Republican state legislators in California and Florida (respectively) have introduced bills that would allow students to transfer MOOC credit to state universities. California Governor Jerry Brown called MOOCs like Udacity’s a “key part of the solution” to the state’s higher education problems.⁸

These online courses have received so much attention, in part, because they stand in stark contrast to many of the deep-seated problems facing American higher education. At a time when rising tuition costs and student debt threaten to stifle college opportunity, MOOCs

provide free access to courses and career preparation.⁹ While public colleges have reduced course offerings and turned hundreds of thousands of students away in response to state funding cuts, MOOCs present an opportunity to serve huge numbers of students for a fraction of per pupil spending. And doubts about the state of student learning on college campuses have created an appetite for new modes of delivery that can improve teaching and learning without breaking the bank.

Reform-minded leaders have seized on MOOCs as the solution to all manner of thorny policy issues. College readiness problems? Fix them with a MOOC. College credits are too expensive? MOOCs again. Improving college lectures? MOOCs can do that! And so on. Critics, sensing higher education's vulnerability, have harped on low MOOC completion rates and warned about creating "Walmarts of higher education."¹⁰

The reality is, MOOCs are a tool, not a solution.

Lost in this polarizing debate is a clear assessment of how this new medium is actually affecting postsecondary education, if at all, and how it could be useful in the future. The reality is, MOOCs are a tool, not a solution. And like any tool, they are likely to be more useful for

some jobs than for others. What problems are low-cost online courses well designed to solve, and what problems may be better left to other strategies? How should policymakers employ MOOCs, and what reforms can encourage innovation? Without answers to these questions, MOOCs are cast as either a cure-all or a threat, as a lasting disruption or a passing fad.

Policymakers would be wise to reject these dichotomies and instead ask where massive online courses can expand educational opportunity, and where students may be better served by other educational models. In that spirit, this paper does not seek to produce a verdict on whether MOOCs are good or bad, disruptive or sustaining. Rather, the goal is to examine the early evidence and provide guidance on how this new tool could be deployed to solve some postsecondary problems.

Through this lens, the early years of the MOOC experiment reveal both opportunities and unresolved questions. MOOCs have attracted huge enrollments, but only a small percentage of those who sign up go on to complete a course. And despite early predictions that MOOCs would challenge traditional colleges' credit monopoly, there is little evidence that people are using them as a substitute for classes offered on campus.¹¹ In particular, efforts to use MOOCs for developmental education in math have disappointed.

But MOOCs do not have to replace colleges to have a lasting effect on postsecondary education. MOOC-enhanced hybrid courses, under way at many traditional colleges, may wind up reinventing the large, lower division lecture. MOOCs might also change the way Americans build occupational skills. Platforms like Udacity and Udemy have keyed into the so-called skills gap between what traditional colleges teach and what employers need, providing targeted technical training designed to fill that gap. Given the pace of technological change, such low cost online occupational training could well become a new route to career advancement in many fields.

What should policymakers take away from these early patterns? I argue that leaders should think about MOOCs as being more like health clubs than hospitals.

What should policymakers take away from these early patterns? I argue that leaders should think about MOOCs as being more like health clubs than hospitals. Providing free access to a gym will encourage lots of healthy, motivated people to use it and get healthier. And that would be a good thing; healthier people will avoid costly visits to the hospital and will live longer, more productive lives. At the same time, though, doctors do not expect that access to a gym will automatically improve the health of less motivated people, especially those with serious health problems. Some of these

patients likely need a personal trainer to show them the ropes and hold them accountable when they don't show up, but that kind of personal interaction entails additional costs. Those with more significant needs will require the kind of "high touch" care that doctors and hospitals provide.

Similarly, MOOCs produce learning that would not have occurred otherwise, and that learning benefits society at home and abroad. But policymakers should not assume that MOOCs will benefit all types of learners equally. Up until now, they have mainly helped the educated get even more educated. This is not a reason to abandon the idea, or even to change it dramatically. But it does have implications for existing gaps in educational attainment that reformers must acknowledge, a point I return to in the conclusion.

The first section of this report examines the MOOC movement, providing a snapshot of its origins and a sense of how the platforms work. The second section lays out the potential effects that MOOCs could have on higher education. The third section outlines some early lessons from the first two years of the movement. The fourth section discusses the implications of these early lessons for policymakers.

A PRIMER: WHERE DID MOOCS COME FROM AND HOW DO THEY WORK?

The creators of MOOCs did not invent online learning, nor were they the first to put courseware online for free. Online courses and programs have been available at existing colleges for more than a decade. The Sloan Consortium estimates that the percentage of students taking at least one online course grew from 10 percent in 2003 to 32 percent in 2011, from just fewer than 2 million to 6.7 million; 570,000 of that increase occurred from 2010 to 2011 alone. These enrollment numbers reflect significant growth in supply and demand. In 2002, 34 percent of colleges offered online courses and online degrees; by 2012 that number had grown to 62 percent.¹² On the demand side, the growth in adult students, many of whom work while attending school (so-called nontraditional students), has driven enrollment in online programs.¹³

Online education has boosted access to higher education for students who need flexibility. But the reality is that credit-bearing online courses and programs at traditional universities still look a lot like in-person ones. Students enroll in one institution and take a sequence of online courses there. Despite predictions that online learning would reduce tuition costs by taking advantage of economies of scale, data show that the vast majority of colleges charge the same tuition, or even more, for online courses and programs.¹⁴ In other words, most credit-bearing online efforts have simply grafted digital coursework onto the traditional “bundled” model of higher education.

But the Massachusetts Institute of Technology created a different form of online learning in the early 2000s. In 2001, with financial support from the Hewlett and Mellon Foundations, MIT began putting some course materials online for anyone to access, and the “open

courseware” (OCW) movement was born. OCW courses are not interactive; professors simply post syllabi, reading lists, assignments, and videotaped lectures, and interested students can use them to learn on their own. MIT eventually made the vast majority of its courses available, and hundreds of other universities have joined the open courseware coalition.¹⁵ OCW was an important forefather of MOOCs; it made open access courses a hallmark of elite colleges.¹⁶

Massive versions of open online courses share some common traits with both traditional online learning and OCW, but they are a decidedly different medium. First, they are delivered at unprecedented scale, are open to anyone, and are either free or low cost. Second, despite their large scale, most MOOCs are interactive and provide those who finish with proof of their learning. Students complete assignments and exams that are graded—either by computer or by their peers in the course—and those with passing scores receive certificates of completion, again for little or no cost. Third, and most important, MOOCs are unbundled, or *à la carte*, allowing users to take individual courses in the subject areas they choose. Unbundling creates opportunities for new models of aggregation, certification, and customized credentialing.

Where did MOOCs come from? The name dates to an experimental course at the University of Manitoba in 2008. Professors George Siemens and Stephen Downes opened up their 25-student in-person course, *Connectivism and Connective Knowledge*, to 2,200 additional students via the Internet. The course was what Downes calls a cMOOC—the c stands for “connectivist.” The goal was to use the Internet to create an extended network of learners who generate content and learn from one another. In Siemens’s words, “Our cMOOC model emphasizes creation, creativity, autonomy and social networking learning.”¹⁷

The MOOCs born in the fall of 2011 embrace a more traditional pedagogical model. In courses on the “big three” MOOC platforms—Coursera, edX, and Udacity—instructors impart content and instruction to individual learners via video lectures, quizzes, assignments, and assessments. The main pedagogical tool is the lecture, which is often broken down into short segments and interspersed with interactive quizzes and activities. Many of these MOOCs also require students to post on discussion boards, and some facilitate in-person study groups. But this model—what Downes calls an “xMOOC”—tends to look a lot like the traditional, lecture-based model of higher education where professors transmit content to individual students who then use it to complete assignments. The open online platform allows instructors to deliver courses to a much larger group of students, and advances in Web design and assessment enable them to measure what students have learned and provide feedback. But as Siemens has written, “prominent MOOCs enshrine, optimize, and instantiate the education system of the past.”¹⁸

This should not be a surprise, as most of these new courses are the creation of university-based academics. Coursera and edX rely on professors at elite partner universities to generate the content available on their platform. Universities first join the platform, at which point faculty members are eligible to work with Coursera or edX designers to develop online courses and host them on the site. Udacity is a bit different in that it does not function as a platform for university partners. Instead, the firm develops courses in house with help from industry experts and university faculty. On all three platforms, courses feature graded assessments and certificates of completion, and each firm now provides opportunities to take verified exams for a fee.¹⁹

Though you might not know it from reading *The New York Times*, MOOCs are not solely the domain of elite colleges and professors. Platforms like Udemy, Peer to Peer University (P2PU), Canvas.net, and CourseSites offer thousands of courses taught by university faculty, industry professionals, K–12 teachers, and others, and many of them are entirely free. Saylor.org, which does not consider itself a MOOC platform, provides free access to courses that fulfill the basic requirements for 15 areas of study and are built from open educational resources. Saylor courses are asynchronous and available at any time.

The term MOOC has quickly become a catch-all to describe all sorts of unbundled online learning, but there are clearly a number of different models under the umbrella. So what qualifies as a MOOC? To cover as much ground as possible, this paper uses a generous definition:

- MOOCs are open to anyone and can accommodate large numbers of students.
- MOOCs are provided online.
- MOOCs are free or very low cost.

There are many entrants in this market, but this paper focuses on the largest providers.²⁰ The sidebar provides short descriptions of the most prominent platforms.

THE BIG THREE

The “big three”—Udacity, Coursera, and edX—emerged from Stanford and MIT in the fall and winter of 2011–12. The Stanford professors behind the first computer science MOOCs started the for-profits Udacity and Coursera early in 2012, while MIT created MITx in late 2011 before launching edX with Harvard in the spring of 2012.

- Udacity, founded by Stanford research professor Sebastian Thrun, focuses mainly on skills required for employment in the tech industry. The firm offers 36 courses in mathematics, computer science, and engineering. Udacity develops courses in house with a team of people (often an instructor, an instructional designer, and an engineer). Though many Udacity courses are the work of university-based faculty, the company does not rely on partnerships with elite universities to produce content. Udacity's open courses are asynchronous, meaning students can start at any time, and self-paced. Students who pass courses receive a Udacity certificate, and proctored exams are available for a fee. Its new “full courses” provide coaching, feedback, and verified certificates for a fee, and have a cap on class size. As of fall 2013, Udacity had 1.6 million total enrollments.
- Coursera, founded by Stanford professors Daphne Koller and Andrew Ng, operates through a network of 108 university partners—108 of the top institutions in the world—and boasts a large set of courses (more than 600) on a wide array of academic topics, from the humanities to social sciences to science and math. Coursera functions as a platform for faculty at partner universities; professors work with Coursera instructional designers and engineers to develop online versions of their courses. Universities sign a revenue-sharing agreement with Coursera, and the courses bear the brand of the university they came from. The courses are synchronous—they have a start date, deadlines, and a fixed length (often six to ten weeks), though some course materials remain available after the course ends. Students who complete assignments and exams receive a Coursera certificate. There is also a “signature track” option, whereby students can pay a fee to take a proctored exam and receive a verified certificate. Coursera had attracted 6.7 million users as of early this year.
- edX is a nonprofit consortium of 32 top American and international universities founded by MIT and Harvard. Like Coursera, edX is a platform for faculty from partner institutions to design and host an online course with help from edX staff (some edX partners also work with Coursera). Topics range from engineering and computer science to literature and history—more than 125 courses in all (though only a portion of those are on offer at any given time). Courses are synchronous, typically lasting between six and ten weeks. Students who complete course objectives can receive an “honor code” certificate for free or they can elect to pay a fee to take a verified exam. edX has placed a high priority on its research capability and created an open source version of its platform. As of December 2013, edX had an estimated 1.6 million users.

BEYOND THE BIG THREE

- Udemy is a for-profit marketplace for online courses that predates much of the MOOC mania of the past two years. Udemy functions like Apple's App Store. Anybody can develop a course, decide what they want to charge for it, and host it on Udemy's platform (conditional on passing a basic review). More than 7,000 instructors have created 12,000 courses serving more than 2 million students in 200 countries. Instructors who wish to offer a tuition-free course can do so at no cost to themselves. Those instructors who charge a fee must share any revenues with Udemy. Udemy's courses tend to focus on occupational skills in industries like marketing, design, and Web development. Most instructors are practicing professionals in these industries.
- Saylor.org, a nonprofit, does not consider itself a MOOC platform. Saylor courses are open access and entirely self-paced, and the content is open source. Saylor set out to create free online courses that cover the requirements for the most popular college majors. The foundation now has more than 275 courses covering 15 areas of study. The organization contracts with outside faculty members to identify the courses, topics, and competencies that are common to particular majors across institutions. The faculty advisers then assemble courses using open educational resources. Saylor has articulation agreements with Excelsior College and Thomas Edison State College, and the National College Credit Recommendation Service has approved some of its credits.
- Peer to Peer University is a nonprofit organization funded by the Hewlett Foundation that is more in keeping with cMOOCs. The emphasis is on creating a community of learners who share knowledge with one another in online courses, study groups, and "challenges" (group projects). Courses are free, and anyone can create a course or study group. P2PU does not work with university partners, but students in its school of webcraft can earn "badges" for completing courses.
- Canvas.net and CourseSites are platforms created by the learning management companies Instructure and Blackboard, respectively. Both allow educational organizations to build online courses and utilize the open platform for free. Canvas.net boasts professors and courses from a diverse array of organizations, including Seattle Community College, Marquette University, and Flatworld Knowledge. Most courses are free, but those that are eligible for credit at the home institution cost a fee. Most offerings are synchronous.
- CourseBuilder grew out of Google's MOOC, Power Searching with Google. After attracting 150,000 students to the free course, Google decided to share its code and tools with anyone who wanted to bring a course online. CourseBuilder will now become part of the Mooc.org project developed by Google and edX.

COURSE DEVELOPMENT, COURSE CONTENT, AND BUSINESS MODELS

Open online course platforms differ dramatically from one another in how they develop their courses, who is eligible to create and teach a course, and whether individual courses are part of a coherent sequence of content. They have also gravitated toward different business models. These distinctions have implications for policy; some MOOC models may be better suited to particular problems and poorly designed for others. I explore each dimension below.

Who can create courses and who owns the content?

Platforms vary considerably in terms of who is allowed to create and teach online courses. At this point, Coursera and edX are largely “closed platforms”—to create a course, you must be a faculty member at one of their partner universities. (edX’s collaborative project with Google—Mooc.org—will open the platform to a broader range of instructors.)

This approach implicitly assumes that elite colleges are the best place to find elite teachers. Other platforms—including Udemy, P2PU, and Canvas.net—operate under a different logic, allowing a much wider array of individuals to design and teach courses. Udemy is particularly open. Anyone can create a course, host it on the platform, and charge what he or she wants for it. According to Dennis Yang, Udemy’s president and chief operating officer, beyond a basic screening process on the front end, the market is what enforces teaching quality on the platform.²¹ Professors whose courses get positive reviews are rewarded with more students, and highly reviewed courses are displayed prominently on the website and in search results. Last year, Udemy’s top 10 instructors (in terms of enrollment) earned a collective \$5 million. Victor Bastos, a freelance Web developer in Lisbon, had the highest earnings. His Web development course has served 7,000 students since late 2011 (netting him more than \$450,000 in about 18 months, excluding Udemy’s cut of the tuition).²²

Udacity’s course development process is more centralized; the firm develops courses in house using a team approach. The team decides which courses to create and host on the platform, and courses are built to fit into a broader curriculum. Instructors, who typically come from universities or technology firms, are paired with Udacity’s course designers to create an engaging online course. Interestingly, instructors and designers are typically given equal billing on the course webpages. Udacity does not appear to limit its faculty to a particular set of universities or firms—a perusal of the roster shows instructors from San Jose State University, Rutgers University, Google, and Autodesk.

The platforms also differ in regards to who owns the content and intellectual property. At Coursera, either the professor or the university owns the intellectual property. They then grant Coursera a nonexclusive license to host it. Udemy's professors also own the content and the intellectual property. There is typically joint ownership between Udacity and any outside instructors who participate in the development of a course. Saylor's courses are constructed out of open educational resources (OER), and users are therefore free to remix or redistribute them.

As many people have noted, most MOOCs are “open access,” in that anyone can take them for free, but they are rarely “open” in the OER sense.²³ In OER, open refers to educational materials that are free and openly licensed such that users other than the original creator can use and repurpose them without permission.²⁴ MOOC content is usually not openly licensed, meaning the courses cannot legally be broken up and remixed by other faculty.²⁵ Proponents of OER argue that MOOCs could have much greater impact if they were openly licensed. However, openness also poses a challenge to for-profits like Coursera and Udacity, which must use some combination of their platform, content, and services to earn revenue.

Stand-alone Courses Versus Sequences and Curriculum

Most MOOCs function as individual courses rather than units in a broader sequence like a major or a specialization. But stand-alone courses may be less useful to students in search of a credential, and some providers offer sequences of courses that come together in a coherent whole. For instance, because the Saylor Foundation aims to generate low-cost pathways for degree-seeking students, it has built complete academic majors made up of its free online courses. Using faculty advisers, the foundation has isolated the most common courses and topics in 15 areas of study, and each course it creates fits into one of these sequences.

Udacity's courses are also organized into sequences, though they are much shorter than college majors. According to Clarissa Shen, the vice president of strategic business and marketing, the company's goal is to “build curriculum”: “We're not just putting any random set of courses online, and in fact we've turned down opportunities to put many different kinds of courses online. And that's because we want to build a pathway for our students.” The pathway reflects input from industry and university partners about what students need to know, but Udacity builds the curriculum itself. The firm's 36 courses cover a limited number of topics (computer science, Web development, data science, basic math) and are organized into levels (beginner, intermediate, advanced).

In contrast, the majority of courses at Coursera, edX, and Udemy are stand-alone, though this is starting to change. In September 2013, edX announced the creation of what it calls “xSeries certificates,” designed to “reimagine the building blocks that structure teaching.”²⁶ Students can earn an xSeries certificate after they have taken a specified sequence of courses and passed verified exams. To start, edX is offering series in aerodynamics (two courses), the foundations of computer science (seven courses), and supply chain management (three courses), all taught by MIT faculty. Similarly, Udemy hosts a number of “certification tracks” in various information technology, accounting, and business operation specialties. Coursera features a limited number of sequences, including a series of pre-M.B.A. courses from Wharton and a set of courses for teacher professional development.²⁷ But sequences are still the exception rather than the rule on these platforms.

Business Models

One consistent early criticism of Coursera, edX, and Udacity was that they lacked a sustainable business model. MOOC platforms can raise revenue by selling their courses or credentials directly to consumers; by selling access to the platform, services, and content to existing universities; or by selling services and access to private and nonprofit firms. Early evidence suggests that survival will lie in a mixture of these strategies. Each of the big three has developed some variation on the “freemium” model, whereby consumers can access basic courses and assessments for free but must pay for additional services like exam proctoring, coaching, and feedback. For instance, Coursera reported that its “signature track” service, whereby students pay for a verified certificate, brought in \$1 million in about a year. Udacity’s new “full-course experience” is similarly designed.

Beyond the freemium approach, the three major platforms seem to be gravitating toward different business models. Coursera has developed a service provider model, where the firm contracts with colleges and university systems to create online offerings. For instance, in May 2013, Coursera announced partnerships with 10 state university systems—including the State University of New York, the University of Colorado System, the University System of Georgia, and the University of Kentucky—to build credit-bearing online courses for students enrolled in these systems. An analysis of the contract with Kentucky by *The Chronicle of Higher Education* shows that Coursera will earn revenue from fees for course development as well as a portion of the tuition dollars from enrollments in Coursera-assisted courses (either existing Coursera courses “adopted” by the system or those created with the platform’s help).²⁸

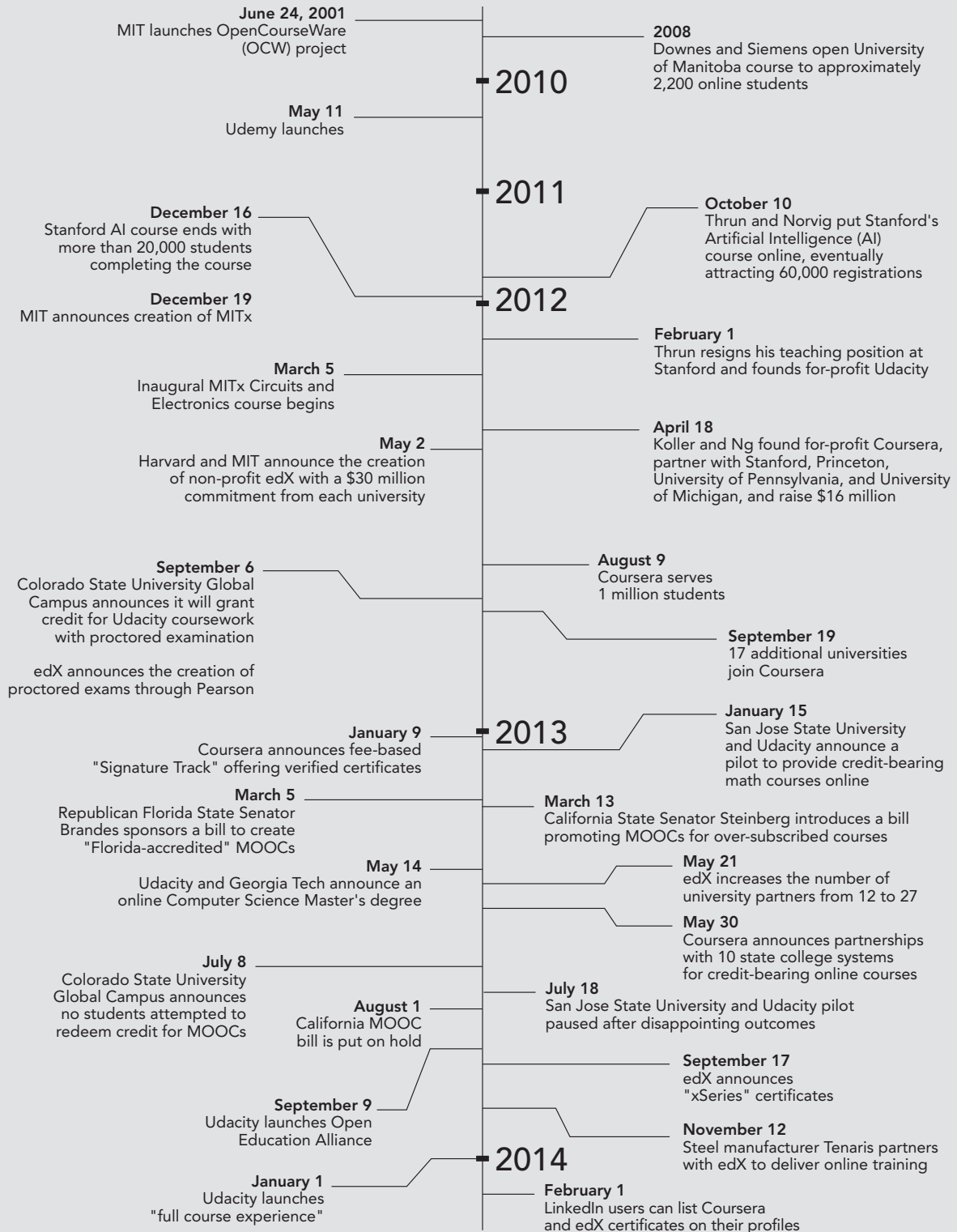
Similarly, edX will raise revenue by providing content and services to existing campuses. But it has also created an open-source platform—Open edX—that developers outside of partner universities can access and build on. And a new collaboration with Google, Mooc.org, will allow a wide array of organizations and individuals to develop online courses using the open platform—what edX President Anant Agarwal described as “a YouTube for courses.”²⁹ This open platform is not limited to universities; in 2013, edX partnered with Tenaris, a global steel manufacturer, to develop digital training courses for employees that will run on the open edX platform.³⁰

In contrast to the more academic MOOCs, Udacity and Udemy are both focused on closing skills gaps through targeted career and technical education. Udacity founder Sebastian Thrun recently summed up the problem the company seeks to solve: “The U.S. graduates more bachelors in psychology than engineering, when companies need technical talent. And in five-to-10 years, education expires, and everything is new again. There can’t be a single stage of education anymore. Learning should happen over the course of your life.”³¹ Udacity’s Open Education Alliance and its online computer science master’s program with Georgia Tech will use online courses, built with input from large employers, to target skills gaps.³² Likewise, most of Udemy’s courses cater to lifelong learners who wish to advance in their careers. These skills gap business models generate revenue by selling coursework and services to consumers and to firms. Individual consumers can pay for access to occupational coursework, proctored assessments, and any additional services. But firms can also contract with providers to develop low-cost training modules for current and prospective employees. For instance, Udemy earns money through the tuition paid by individual students and through Udemy for Organizations (UFO), where employers pay to offer courses that are not open to the public.

These questions—about who creates courses, how they are sequenced, and how providers make money—have implications for policy. What MOOC providers charge and who pays for the service will shape which firms survive and are able to expand. Sequences of courses may be more useful to degree-seeking students than stand-alone courses, and courses designed by industry professionals may be more useful for career preparation than those designed by faculty. Because it is too early to answer these questions with certainty, policymakers should be careful to avoid building policy around one specific MOOC provider.

FIGURE 1

THE EVOLUTION OF MOOCs



MOOCS IN THEORY: HOW MASSIVE OPEN ONLINE COURSES COULD IMPROVE EDUCATION

Leaders have projected many different higher education goals onto this new tool. For instance, while policymakers and wonks are drawn to things that can be counted—MOOC certifications, for instance—practitioners caution that such a measure can ignore much of the learning that takes place.

Nonetheless, these policy goals will shape the way MOOCs are deployed and implemented. Four potential effects stand out: increasing access to education, creating low cost pathways to college credit, improving teaching and learning, and providing skills necessary for success in the labor market.

INCREASING ACCESS TO EDUCATION

Massive enrollments in MOOCs are an indicator of demand for access to higher education both within the United States and abroad. The first study of HarvardX and MITx courses found that upwards of 27 percent of registrants in some MITx courses were from India alone. Given these massive enrollments, the authors argue, low completion rates still translate to large amounts of learning and significant numbers of completers.³³ Hundreds of thousands of students have used MOOCs to earn formal certifications, and millions more have accessed course materials, fostering learning that may not have taken place otherwise.

It is important to note the difference between these opportunities and what policymakers typically refer to as higher education “access.” In conventional policy discussions, access means access to the various components of the college experience: courses and material, faculty, peers, student support services, and so on. MOOCs provide access to one critical piece of that equation—the courses—but are otherwise “low touch.” It follows that the types of students who seek out, learn from, and pass MOOCs are likely to be self-selected, motivated individuals. While these types of students often lack educational opportunities, especially abroad, they are also likely to be quite different from the marginal American student who could benefit from access to higher education. This is not to downplay the opportunities that MOOCs create or the learning they produce, but to point out that the online model may be a better match for some students than others.

CREATING LOW-COST PATHWAYS TO COLLEGE CREDIT

MOOCs clearly provide new opportunities to learn. But so do public libraries. For degree-seeking students, it is the translation of learning into college credit that endows it with value. Earning college credits on campus has become increasingly expensive. The sticker price of in-state tuition and fees at public four-year universities has increased 27 percent over the past five years (after adjusting for inflation).³⁴ Cuts in state funding have also made it harder for enrolled students to get access to the courses they need; in California's community colleges, for instance, the number of course sections declined by 21 percent between 2007 and 2012.³⁵

In theory, MOOCs could serve as a cost-effective substitute for courses at a traditional university. Students could earn a collection of low-cost certificates that they could then transfer to a brick-and-mortar school and use toward their degree. On the supply side, allowing students to substitute online courses for in-person courses that are oversubscribed could help them stay on track to graduate and increase institutional productivity.

To do all this, MOOCs will have to fulfill three basic criteria. First, platforms must be able to verify student identities to ensure that the students who receive the credit are the individuals who actually take the exams and complete the assignments. This is no small feat when courses serve hundreds of thousands of students all over the world. Second, degree-granting colleges must agree to accept MOOC credits for transfer. And third, MOOCs must attract degree-seeking students in search of college credit. As the section on early lessons will indicate, MOOCs have struggled to satisfy the last two criteria.

IMPROVING TEACHING AND LEARNING

MOOC providers could also play an important role in ongoing efforts to improve college teaching through technology. Traditionally, higher education advocates have simply assumed that college courses produce student learning, and avoided measuring it. But in the largest study to date of student learning at four-year colleges, the sociologists Richard Arum and Josipa Roksa found that 36 percent of students did not make significant gains in critical thinking skills after four years of college.³⁶ Research on remedial courses designed to prepare students for college-level work have produced similarly disappointing results.

In response, reformers have sought to combine some of the innovations that MOOCs currently employ—digital delivery of instruction, embedded assessments, and back-end data and analytics—with the interaction of an in-person course. Early research on hybrid courses suggests that they can improve learning outcomes and lower costs in introductory and remedial courses.

PROVIDING SKILLS NECESSARY FOR SUCCESS IN THE LABOR MARKET

It is also possible that MOOCs will establish an entirely new set of signals to the labor market, perhaps enabling students to make an end run around existing colleges altogether. If MOOC certificates become a credential that employers recognize and respect, then they could become a new path to labor market opportunity. Likewise, employers may have incentive to contract with MOOC platforms for low-cost technical training that they could then use to recruit and retrain employees.

There is certainly an opportunity here, as traditional college coursework does not seem to be preparing graduates for the world of work. Research from the New York Federal Reserve has shown that the underemployment rate of college graduates has increased steadily since the early 2000s, reaching 44 percent in 2012.³⁷ In a 2012 survey by *The Chronicle of Higher Education*, 53 percent of employers surveyed reported that it was difficult or very difficult to find qualified graduates to fill jobs.³⁸ A study by McKinsey found that just four in 10 graduates could get jobs related to their major, and more than half said they would choose either a different major or a different school if they could do it over again.³⁹ If MOOCs can fill even a part of this void, they could eventually challenge colleges' credentialing monopoly.

MOOCS IN PRACTICE: FOUR EARLY LESSONS

MOOCs have the potential to change education, which is reason enough for policymakers to pay attention. But what does the early history of these courses suggest about their likely effect on education? Where have optimistic predictions been borne out and where have obstacles come to the fore? Four lessons stand out.

LESSON 1: REDEEMING MOOCS FOR COLLEGE CREDIT IS RARE

Platforms, policymakers, and foundations have taken pains to facilitate the use of MOOCs for credit. On the assessment front, providers have partnered with proctoring firms to create verified assessments that students pay a small fee to take. Students in courses with Udacity and edX can take in-person proctored exams at one of 450 Pearson VUE testing centers around the world. Coursera has partnered with ProctorU, an online proctoring service that uses a mixture of webcams, microphones, and screen sharing to keep an eye on exam takers remotely.⁴⁰

On the credit transfer front, individual colleges like Georgia State University, Colorado State University Global Campus, and University of Maryland University College have all pledged to accept some MOOC credits for transfer. More recently, the American Council on Education (ACE), higher education's largest membership group, received a grant from the Bill & Melinda Gates Foundation to evaluate a set of MOOCs for its College Credit Recommendation Service (CREDIT). The CREDIT program translates learning done outside of a college campus—through the military, corporate training, or a MOOC—into college credit.⁴¹ Currently, more than 2,000 colleges accept some ACE-approved credits, meaning ACE-certified MOOCs should be highly portable. Cathy Sandeen, who directs the CREDIT program, describes the pilot MOOC effort as a chance to “kick the tires and see how [transfer of credit] might work” in this new area.

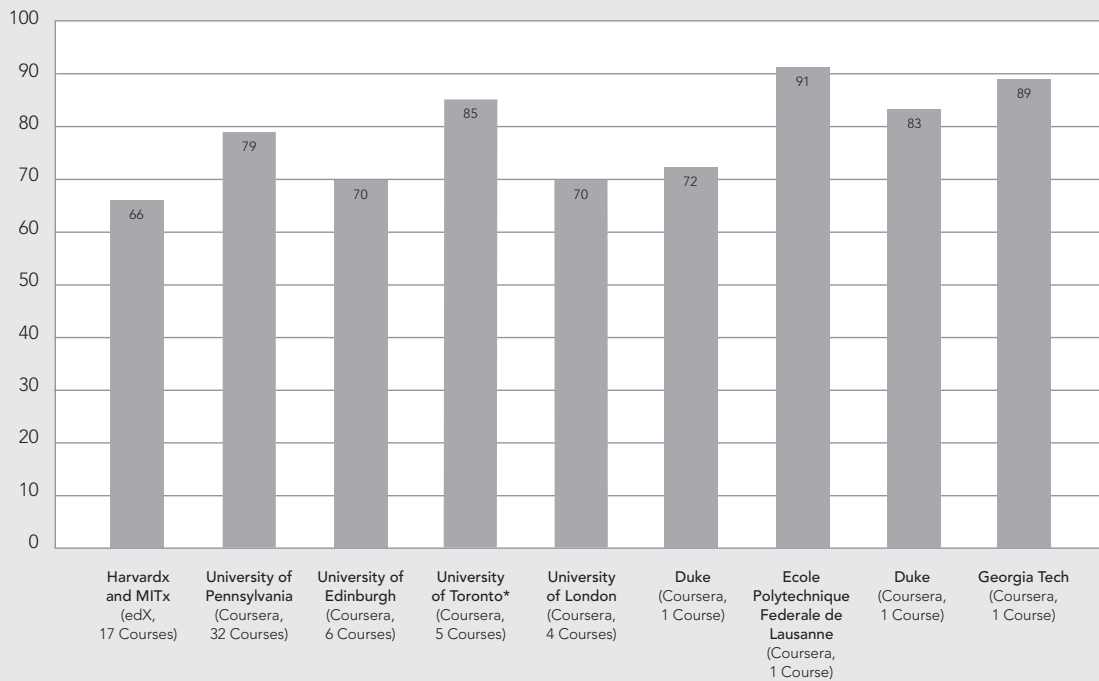
Finally, state policymakers have tried to create MOOC-to-credit pathways. In California, the state Senate’s top Democrat, Darrell Steinberg, introduced legislation that would allow students on the waitlist for gateway classes to use online courses like MOOCs as a substitute for the oversubscribed classes. In Florida, Republican State Senator Jeff Brandes proposed a bill that would empower the state to approve MOOCs for credit. The goal was to have state education officials formally identify a set of “Florida-accredited” courses that could be transferred to state universities.

Despite all this activity, MOOC-to-credit has not yet taken off. As Sandeen explains, “Frankly, we expected the MOOC-to-credit market to just explode, and it really didn’t yet. It is not really happening quickly on its own. I think part of it is the skepticism and a little bit of backlash against MOOCs.” In August, a *Chronicle of Higher Education* reporter summed up the early evidence on MOOC-to-credit: “Stalled efforts to push MOOCs through the institutional membrane that surrounds higher-education credentialing have cast doubt on whether large-scale free courses will end up disrupting anything.”⁴² What explains this early outcome?

First, there seems to be a mismatch between supply and demand. Simply put, most students using MOOCs are not looking for college credit, and most students looking for college credit are not using MOOCs. As Julia Stiglitz of Coursera explained: “About 80 percent of our students have an undergraduate degree and 40 percent have a graduate degree, so it’s a pretty highly educated population. For most of our students, credit is not that important. It’s not something they really care about.” Udacity’s Clarissa Shen described a similar set of users: “Most of our enrollments are what you would call ‘young professionals,’ with average ages between 22 and 36. So from that you can already tell it is mostly people who have work experience or are starting to work.” Dennis Yang says Udegy’s clientele is a “fairly educated crowd,” mostly “working professionals who are looking to train to stay relevant in their job.”

Early empirical studies of MOOC users have generally found the same (see Figure 2). Researchers at the University of Pennsylvania studied enrollments in 32 Coursera MOOCs and found that 79.4 percent of respondents already had a bachelor’s degree, and 44.2 percent had a graduate degree. Sixty-one percent reported taking the course to either advance in their current job or learn a skill to get a new job. Just 13 percent said they were there to “gain knowledge to get my degree.”⁴³ Results from MOOCs offered by the University of Toronto and University of London are similar. The first study of HarvardX and MITx courses revealed a larger proportion of students with no more than a high school degree (one-third), perhaps reflecting differences in the course offerings across the two platforms.⁴⁴

FIGURE 2

PERCENTAGE OF MOOC REGISTRANTS WITH A COLLEGE DEGREE⁴⁵

* Harrison, 2013; asterisk means statistic was estimated from a graph in original report.

Officials at colleges serving nontraditional students see the mirror image. Their clientele are not seeking out MOOCs for credit. Colorado State University Global's provost, Jon Bellum, has led two efforts to create MOOC-to-credit pathways at his institution. On both, Bellum said, "nobody took us up on the offer . . . Every time we've been working with MOOCs, it just doesn't necessarily match our student base." Karen Vignare, an associate provost at University of Maryland University College, told a similar story during a panel discussion at ACE: "We are tracking whether any student has brought MOOC credit to us for credit, and the answer is no. They either aren't taking MOOCs or don't realize that they can get credit for it."⁴⁶

It is likely a bit of both. Udemy's Dennis Yang pointed out how advanced many of the courses at Coursera, Udacity, and edX are: "How many people can pass an artificial intelligence class from a Stanford professor?" Furthermore, the ACE credit option has not been particularly well advertised. Coursera's Julia Stiglitz reported that the ACE-approved credits are "not something that we've heavily marketed. If you went onto our site right now, I don't know if you'd be able to find the ACE-recommended classes."

Second, policymaking efforts have run up against faculty resistance and other barriers. Regarding both the California and Florida MOOC bills mentioned above, faculty opposition was steadfast. The leader of Florida's faculty union told *Inside Higher Education* that “feverish and intense” resistance from faculty groups forced legislators to revise the Brandes bill. Senator Brandes downplayed the role of the union, but did admit, “We’re not there yet. Let’s not force it. We’re only two years in, so let’s try to create a pathway to 2018 or 2020, when this stuff is more mainstream.” A heavily revised version of the bill eventually passed.

In California, the debate hinged on whether state policymakers had the power to tell higher education institutions which courses they had to accept for transfer, an idea that faculty rejected. Dean Florez of California's 20 Million Minds Foundation said the original idea “went nowhere” because “the entire university system banded together and said ‘No, this is not where we’re going, we don’t think MOOCs should be offered for credit.’” As Florez explained, California colleges have the final say as to which credits will transfer, making it politically difficult to push credits from outside providers.

Similarly, state policies around the authorization of online providers can also present an obstacle. In theory, state licensure procedures help protect consumers. But in practice, they can also encourage academic protectionism that keeps out competitors. Minnesota made headlines when it told Coursera that it was not allowed to enroll state residents in free courses, because the firm lacked state authorization. The state government later revised its position, but the incident illustrates how state policies can shape and stifle attempts to use MOOCs for credit.

Opportunities

If policymakers want to promote MOOC-to-credit, they must ensure that colleges will accept the course credits and that students will seek those credits out. One potential route could be to use MOOCs in conjunction with existing credit-by-exam and prior learning assessments. Credit-by-exam is not a new idea; programs like the College Board's Advanced Placement (AP) and College Level Examination Program (CLEP) and Excelsior College's UExcel exams all allow students to earn transferable credit by passing an assessment. Currently more than 2,900 colleges accept CLEP credit, and the College Board reports that over 4,000 four-year colleges accept AP scores for credit or for course placement.⁴⁷ UExcel exams cost \$95 and count for six credits that are listed on an official Excelsior transcript. Competency-based programs that award credit by “direct assessment” open up the possibility of earning an entire degree through a series of assessments.⁴⁸

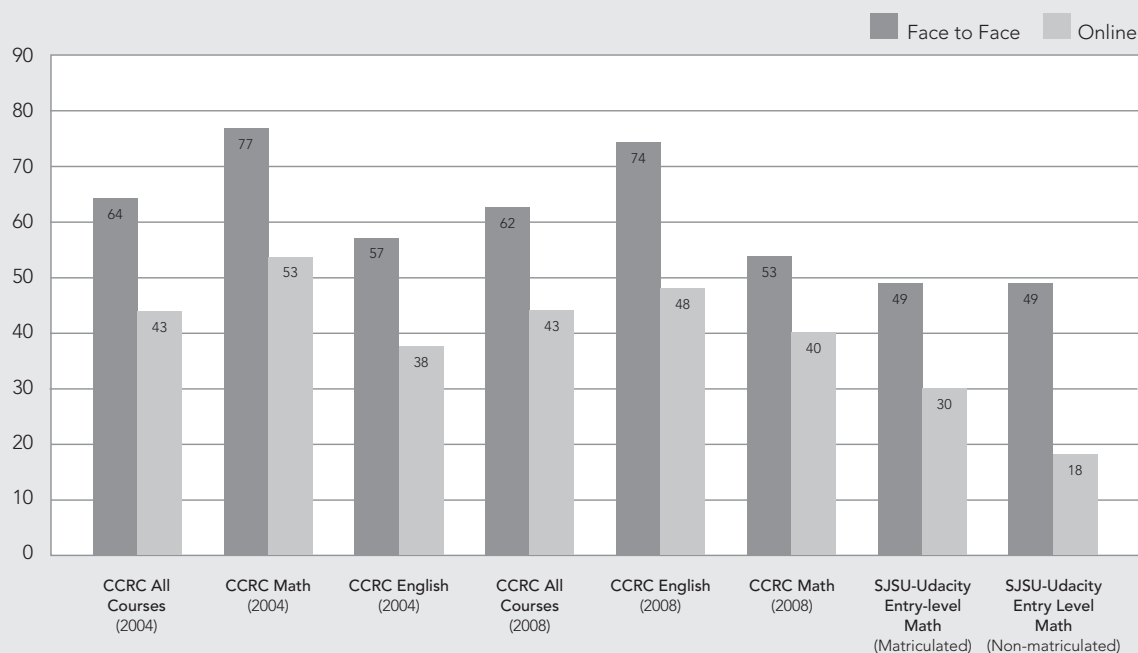
If MOOC content were aligned with these third-party exams, or if new exams were designed with particular MOOC sequences in mind, students could use free online courses to prepare for exam-based credit. A student who takes a MOOC, then passes a CLEP or Excelsior exam, and then transfers the credit to a four-year college will pay less for a degree. A new partnership between Excelsior, Saylor, and the low-cost course provider StraighterLine might serve as a model. Students who take Saylor's free online courses can take an aligned exam through Excelsior (and receive college credit) or through StraighterLine (and receive ACE credit redeemable at colleges).⁴⁹ A similar model with a MOOC platform as the main content provider could draw credit-seeking students and pave the way for credit transfer.

LESSON 2: PURE MOOCS MAY NOT BE READY FOR COLLEGE-READINESS

Policymakers and foundations have taken an interest in using MOOCs to improve remedial education. In its revised form, Florida's MOOC bill called for the use of online courses to serve pre-college students with remedial needs. Ohio Governor John Kasich has proposed using Udacity MOOCs to provide online instruction in math to such students.⁵⁰ In 2012, the Gates Foundation awarded 10 grants designed to encourage community colleges to partner with MOOC platforms to create online remedial courses.⁵¹ The results of these efforts are not yet known.

But policymakers should be forewarned. Existing research suggests that academically underprepared students tend to struggle in courses delivered entirely online. In the largest-scale observational studies of online education, researchers at the Community College Research Center found that community college students in Virginia and Washington State who enrolled in online courses fared worse than their peers enrolled in in-person courses. The differences were most evident among students with weak academic backgrounds and low GPAs, who did significantly worse in online courses.⁵² Outcomes for online remedial courses were particularly low (see Figure 3). In contrast, the Virginia study found that students in hybrid courses did about as well as those in the traditional courses overall (though completion rates in hybrid remedial math courses were significantly lower).

FIGURE 3

DEVELOPMENTAL COURSE COMPLETION RATES⁵³

Udacity's partnership with San Jose State University provided a first test of remedial MOOCs, and the results were far from encouraging. In early 2013, Udacity and SJSU created three online math courses that students could take for credit—remedial math, algebra, and statistics. The project purposely enrolled students from within and outside the university. The first cohort included a sizable group of high school students and a number of on-campus students who had failed the relevant math course in a prior semester. It is important to note that these courses featured additional services not usually present in MOOCs, including access to support staff and opportunities for video chats.⁵⁴

Even with these extra supports, the results were disappointing. Just 18 percent of the non-matriculated students passed the remedial math course; 12 percent passed the algebra course. Pass rates for non-matriculated students in the statistics course were higher; still, fewer than half passed (49 percent). The results for enrolled students were also mediocre. 30 percent of these students passed remedial math, half of them passed algebra, and 54 percent passed statistics. Overall, just one-third of the students passed the courses.⁵⁵ Summer session results revealed much higher rates of success, but that cohort featured far fewer at-risk students.

Observers proposed one likely explanation. The first generation of MOOCs lacks the interpersonal supports that are necessary to serve students with acute academic needs. Julia Stiglitz of Coursera said that college readiness is an area “we haven’t really explored much,” but also suggested the limits of the MOOC model: “Most of our students have succeeded in school and are really motivated. I think that [MOOCs] could play a big role with at-risk students, but I also think the personal touch of a teacher and being able to motivate students is enormously important, and I don’t think we’re quite there yet.” Dean Florez of 20 Million Minds agreed: “The challenge for MOOCs is to personalize what they’re doing, if they’re interested in the remedial space at all. I’m not sure they are.”

Opportunities

Policymakers who wish to leverage technology to improve college readiness should distinguish between two goals: using MOOCs to create better remedial courses, and using them to help students avoid remediation entirely. The former casts MOOCs as a potential substitute for existing courses, a tough row to hoe given existing research and political barriers. In contrast, the latter adopts the logic of prevention: Providing students with inexpensive opportunities to diagnose their academic needs prior to placement tests can help them avoid placement into remediation. In California, for instance, the California State University System’s Early Assessment Program tests high school students between their junior and senior year to diagnose their likelihood of placing into remediation at a CSU campus. They are then provided with a menu of options, including an online tutorial, designed to help them achieve college readiness. Evaluations of the program have found that it reduces the likelihood of placing into remediation.⁵⁶

MOOCs present an opportunity to do this diagnostic and tutorial work at a lower cost and on a larger scale. Imagine MOOCs for basic math and English that were open to all students in a state and aligned to the material on placement tests. Students would take a pre-assessment to diagnose their needs, receive access to instructional modules targeted to those needs, and then take an assessment to see whether they have met the college-ready standard. States with sufficient buy-in from colleges could use a verified approach to the assessments and allow students to submit scores as a substitute for existing placement exams. It is important to note that some students will still need remediation, and many will not self-select into a college-ready MOOC. But as long as the cost of developing the MOOC and providing the assessments is sufficiently low, every additional student who avoids remediation will reduce the amount spent on face-to-face remediation, boosting productivity and benefiting taxpayers.

Reformers seeking to improve remediation should look to existing hybrid and MOOC-like programs for guidance. The Carnegie Foundation’s Quantway and Statway remedial math sequences, which pair in-class instruction with online exercises and homework, have improved student outcomes. Carnegie’s study of Quantway at eight community colleges found that the program “almost tripled the success rate in half the time” when compared with standard remedial courses.⁵⁷ Carnegie recently partnered with NovoEd to convert Quantway and Statway courses into developmental MOOCs that will be used at 30 community colleges next year.⁵⁸

LESSON 3: MOOC-ENHANCED HYBRID MODELS ARE PROMISING

Critics have cited MOOC completion rates, which rarely exceed 10-15 percent, as evidence that open online courses are hardly an improvement over traditional in-person courses.⁵⁹ Setting aside whether completion rates are an appropriate measure of success—and there are good arguments that they are not—the critics ignore the role that MOOCs could play in hybrid models.⁶⁰ A 2010 Department of Education meta-analysis examined 45 studies of online and hybrid models in K-12 and higher education and found that hybrid models produced stronger learning outcomes than face-to-face instruction.⁶¹ Case studies from the National Center for Academic Transformation, which uses technology to redesign courses at traditional colleges, have also found that hybrid courses typically outperform the lecture-based format.⁶² A recent randomized evaluation of hybrid introductory courses by Ithaka S+R found that students did no better or no worse in the hybrid model, but that the use of technology could lower costs.⁶³

Hybrid courses may be where MOOC platforms and content will have their biggest impact on higher education. Cathy Sandeen of ACE argued that all of our attention to MOOC “exporters” (that is, elite campuses) has led us to pay less attention to potential “importers,” those institutions that might benefit from “taking pieces of the content and combining it with an in-class experience to create a hybrid experience.” Results from early blended MOOCs are promising. San Jose State’s engineering department used edX’s first course—Circuits and Electronics—to create a hybrid section of one of its own engineering courses. The results were encouraging: 91 percent of students in the blended section passed, compared with 55 percent and 59 percent in two traditional sections.⁶⁴ In a blended learning pilot at Vanderbilt University, professors found that students reported high levels of satisfaction with a hybrid computer science course that used material from an analogous Coursera course.⁶⁵

Opportunities

MOOC-enhanced blended learning will expand as edX and Coursera take on new projects with existing campuses. edX's successful hybrid courses at San Jose State University have led to an expanded experiment at additional California State campuses and prompted San Jose to establish a Center for Excellence in Adaptive and Blended Learning.⁶⁶ Beyond California, edX is working with community colleges in Massachusetts, universities in China, and the higher education ministry of France to use its platform in blended learning models. Mooc.org will create opportunity for a much larger number of educators to develop a "flipped classroom" that benefits from edX's and Google's expertise.⁶⁷

In announcing its partnership with 10 public university systems, Coursera highlighted how the new partnerships would enable faculty "to adapt existing MOOC content, which they can then incorporate into their own classrooms."⁶⁸ Julia Stiglitz shared some of the questions Coursera hopes to answer: "What is the best way for a local institution to create or potentially adopt courses? What sort of blended models work? What should the flipped classroom model look like?" These new projects will provide ample opportunity for further research on hybrid courses.

LESSON 4: MOOCS ARE WELL DESIGNED TO ATTACK THE SKILLS GAP

MOOC providers like Udacity and Udemy are targeting the skills gap with a vengeance, in part because four-year colleges have typically resisted calls to provide job training. Writing in 2011, the president of the Association of American Colleges and Universities, Carol Geary Schneider, rejected "a narrow call to give priority to degree programs that are tied directly to labor-market needs and business investment. . . students' long-term success does not depend on short-term business cycles or the technical demands of the latest 'hot industry.'"⁶⁹ Interestingly, it is precisely because colleges have little interest in this market that the "MOOC to employer" pathway is likely to be far less controversial—and therefore potentially more fruitful—than MOOC-to-credit efforts.

Udacity has pursued the market for technical training aggressively. As Clarissa Shen explained: "We actually don't work with as many academic institutions as industry partners compared to Coursera and edX and some of the other players. We've partnered with industry because we're trying to help translate [between] academia and industry." Udacity and Georgia Tech's low-cost, massive online master's degree in computer science is a case in point. Observers focused on the price of the degree (less than \$7,000) and the revenue model for Udacity (tuition is split between the firm and Georgia Tech). But equally interesting was the role of AT&T, which is

funding the 2014 pilot of the program. As Shen pointed out, AT&T has “16,000 engineers as part of their workforce, so every time a new technology comes along, they’re not going to let go of 16,000 engineers and find 16,000 new ones who know the new skills.” The online computer science degree will help AT&T recruit new engineers and provide current employees with a low-cost way to retool.

Udacity is attempting to take this model to scale with the Open Education Alliance, a coalition of tech firms and education providers designed to “bridge the gap between what employers need and what traditional universities teach.”⁷⁰ The goal is for alliance members like Google, Intuit, Invidia, and Autodesk to work with education providers like Udacity, Kahn Academy, and Georgia Tech to create courses that are mapped to the skills they need. According to *The Wall Street Journal*, firms that join the alliance are expected to create one course each, at a cost of \$250,000.⁷¹

Udemy also contracts directly with firms to create and host private training courses on its platform. With UFO, firms pay a monthly fee to host their own customized training courses on a private site on Udemy’s platform (a site that accommodates between 250 and 1,000 users costs \$999 a month). Dennis Yang pointed out that UFO also allows firms to “curate” Udemy’s existing public content to make select courses available to employees on the private site.

Other platforms have shown some interest in this market, though their efforts are still emerging. edX is jumping into the technical training business via its new partnership with Tenaris to train the company’s 27,000 employees. And it is possible that its xSeries certifications will serve as credentials in particular industries. Coursera’s play is harder to decipher. The firm created a fee-based career services option early on, but it is unclear whether it has been successful, and Coursera has not yet partnered directly with any private sector employers.

It is worth noting an important structural difference among the various platforms that has implications for each firm’s success in this space. Because the skills gap reflects space between what colleges teach and what industry needs, providers that rely on university-based academics for MOOC content (Coursera and edX) may not be able to keep up with changes in industry. In contrast, providers that rely on industry professionals to develop courses (Udemy and Udacity) may be more aware of industry demands and more nimble in adapting to them.

Opportunities

With the possible exception of edX's new partnership with Tenaris, technical training MOOCs have tended to focus on highly skilled jobs—software and Web development, data science, engineering. These jobs are important drivers of the innovation economy, but they are also limited in number. An important question is whether the MOOC model can also teach the so-called middle skills that are critical for jobs in high-tech manufacturing, allied health professions, aerospace, and other growing industries. These middle-skill jobs require some training beyond high school but less than a four-year degree, and make up the largest swath of the economy. If MOOC-like models could provide online technical training at scale, they could create significant opportunities for American workers.

Though career and technical education often conjures images of students working with heavy machinery, online providers of such training already exist. For instance, Indiana-based 180 Skills builds virtual environments to teach manufacturing skills for firms like Boeing and Harley Davidson. Students spend eight weeks working in the online environment before moving on to in-person instruction and internships. It seems plausible that the online portion of such a model could be delivered as a MOOC, after which students could pair up with a local employer to fulfill their practicum. The MOOC could serve as both an instructional tool and a recruitment device, helping to queue workers for subsequent in-person training.

IMPLICATIONS FOR POLICYMAKERS

Clearly, MOOCs have created opportunities for higher education reform that were not available even three years ago. But where there is promise, there are also pitfalls. The most important overarching lesson for policymakers to keep in mind is that some types of learners are more likely to benefit from first generation, low touch MOOCs than others. Returning to the health care analogy, massive open online courses function more like health clubs than hospitals. It is a great tool if the goal is to provide self-selected, motivated individuals with low-cost opportunities to build skills and knowledge. And doing so is a worthy objective. Just like society benefits when the healthy get healthier, so society can benefit when MOOCs create opportunities for learning among the well-educated. Gifted students in countries with few postsecondary options are especially likely to benefit from MOOCs.

But just as health policymakers must recognize that access to a gym will do little to help the unmotivated or the sick, education policymakers must not assume that low touch MOOCs will benefit learners with academic needs. Layering additional services onto the low touch model—adding the MOOC equivalent of a personal trainer or a wellness coach—could give online courses broader appeal. But these services cost money, and charging user fees changes the openness that has made MOOCs so attractive to policymakers. The benefit of these additional services may outweigh the cost, but policymakers must make their own calculation.

In isolation from other reforms, then, MOOCs may widen existing gaps in education rather than narrow them, as the most educated access new opportunities to get even smarter while the less educated do not. To be clear, this is not an argument against MOOCs; opportunities for high-achieving individuals will help drive the innovation economy. But policymakers and

advocates who wish to leverage this new tool would be wise to acknowledge this tension and propose solutions as reform efforts move forward.

What other ideas should leaders keep in mind?

DEPLOY MOOCS STRATEGICALLY TO IMPROVE THE EDUCATIONAL PIPELINE

As the early results for remedial MOOCs and online learning in community colleges reveal, some students are likely to be better served by the MOOC model than others. The things that seem to make for successful remedial coursework—academic supports, coaching, student cohorts, and structure—are rarely present in a pure MOOC.⁷² Meanwhile, gifted high school students looking for advanced classes and enrichment opportunities may benefit tremendously from a MOOC. Strategic use of the MOOC model, coupled with realistic expectations, can pay dividends both in remediation and in gifted education.

For remedial students, develop preventative MOOCs

Policymakers should call on their colleges and universities to create online courses that provide opportunities for state residents to diagnose their academic needs and brush up on areas of concern before they take placement tests. Development of free assessments, combined with instructional modules in math and English, could help students avoid remediation, resulting in cost savings that could be invested in other areas.

Use MOOCs to create enrichment opportunities for gifted students

States should allow and encourage high schools to award credit for MOOCs in order to create new enrichment options for students. MOOCs could be particularly useful in providing access to subjects that may not be available at some high schools.⁷³

FACILITATING MOOC-TO-CREDIT: ARTICULATION POLICIES AND SUBSIDIES

Arcane credit transfer policies and deep-seated faculty skepticism are obstacles to MOOC-to-credit efforts. Even in systems with formal articulation agreements, students still have trouble transferring all their credit from one college to another, let alone bringing credits in from outside.

MOOC-to-credit may also be stunted by the fact that verified assessments cost money, but exam-based credit programs are not eligible for financial aid. Even though fees are low, students must pay these fees out of pocket. In a choice between a MOOC with a proctoring fee and an in-person course they can pay for with federal dollars, the latter option may be “cheaper” to the end user.

Policymakers who wish to make low cost credits (not just those earned in MOOCs) portable and attractive must play an active role here.

Adopt common course numbering and universal articulation

Policymakers should push their state systems of higher education to adopt common course numbering and guaranteed transfer agreements. Common course numbering in states like Florida and Texas ensures that Political Science 101 taken at X State University will count for Political Science 101 at Y State University, reducing uncertainty. Such a system lays the groundwork for low cost course transfer by solving the initial coordination problem of convincing each individual campus to approve particular courses for credit. From there, leaders could adopt a “coalition of the willing” approach and work with campuses that are open to accepting MOOCs. The acceptance of MOOC credits in place of commonly numbered courses would put pressure on campuses outside the coalition to accept those credits as well.

Ensure that publicly funded MOOCs are aligned to student needs

When public institutions invest taxpayer dollars to build MOOCs, policymakers should work to ensure that these courses are aligned with the needs of degree-seeking students. The current crop of MOOCs are only occasionally aligned with what degree-seeking students need—that is, gateway and general education courses. When public institutions partner with MOOC providers, policymakers should insist that the courses produced fulfill basic degree requirements.

Create small grants for low-cost credits

To ensure that low-cost course options compete on a level playing field, policymakers at the state and federal levels could consider carving out a portion of existing education funding to pay for small grants that would cover the cost of online courses and proctored exams. From the perspective of state policymakers, it is likely less expensive, in terms of state subsidies, to

have students transfer low-cost credits into public institutions than it is to have them enroll in those credits on campus. Federal policymakers also have an interest in making existing financial aid investments go further.

Create space for exam-based credit and competency-based programs

Policymakers should also look for opportunities to link MOOCs to existing credit-by-exam and competency-based programs. Most states feature institutions that accept credit-by-exam, though it is not clear how well advertised those options are. Likewise, many states have begun experimenting with competency-based models, but these are still on the periphery. Identifying MOOCs that are aligned to exams or competencies could provide an additional route to credits.

**CHALLENGE CAMPUSES TO ADOPT HYBRID MODELS
AND USE THEM TO IMPROVE AFFORDABILITY**

Hybrid models can improve productivity and student success, and MOOCs could present a particularly cost-effective source of content and instruction for such courses. But these models will work only if colleges have incentives to adopt them. While leaders are fond of pointing at the latest innovation, the truth is that policymakers can use both the bully pulpit and competitive grants to further incentivize the development of hybrid models.

Publicly challenge institutions to lower tuition prices

State and federal policymakers who want to promote the use of hybrid courses (MOOC-enhanced or otherwise) should use the bully pulpit to challenge their institutions in the same way Texas Governor Rick Perry did in 2011, when he called on the state university system to create \$10,000 bachelor's degrees. Institutions responded by creating pathways that utilized online delivery, partnerships with community colleges, and credit-by-exam options. Other states have now adopted the challenge. In future scenarios, leaders could establish a competition among campuses to create the most cost-effective degree program. Winners could be eligible for additional grant or research money and would receive statewide attention.

Use competitive grants to fund course development in exchange for tuition freezes

Many colleges are eager to get into the MOOC game. States and the federal government should use this to their advantage, enticing colleges to sign on to tuition freezes in exchange for course-development grants. The federal Race to the Top program illustrated how responsive states can be to relatively small pots of federal money. States could use a similar model to award MOOC development grants to interested institutions, limiting grant funds to those who pledge to use new online offerings to keep tuition low.

EXTEND MOOCS TO OTHER OCCUPATIONAL TRAINING

States and regional economies often have a need for skilled workers, but tight public budgets have recently reduced capacity at the community colleges that typically fulfill these labor market demands. There is appetite for low-cost alternative routes to workforce training and certificates in fields where workers are in high demand. MOOC platforms could work with states and employers to develop sequences of technical courses that are tailored to local industry needs.

Workforce development MOOCs

Federal workforce development programs should look to massive online training modules as a complementary approach to traditional job training programs. Some portion of existing federal workforce development dollars could be used experiment with MOOCs that teach basic skills before students move on to in-person instruction and apprenticeships. At the state level, workforce boards could explore the potential for MOOC providers to develop targeted courses aligned with the needs of local employers.

COPYRIGHT AND INTELLECTUAL PROPERTY ISSUES

As state systems and public institutions move toward partnerships with MOOC providers to build online and hybrid courses, policymakers should keep an eye on copyright and intellectual property issues.

At the federal level, forthcoming discussions of the “safe harbor” provisions of the Digital Millennium Copyright Act (DMCA) could impact MOOC providers. Under DMCA, Internet platforms are subject to a “notice and takedown” rule, which allows them to avoid copyright violations for user-generated content as long as it is taken down quickly. As MOOCs generate

more user content and open their platforms to anyone who wishes to host a course, these safe harbor provisions will become increasingly important.⁷⁴ Likewise, as more colleges begin to build MOOC content into hybrid models, questions as to whether instructors have permission to adapt and remix materials created by others will come to the fore.

Clarify ownership of publicly funded content

To maximize the bang for the public buck, leaders should work to ensure that MOOC content created with public dollars is openly licensed and eligible for reuse and remixing by other institutions within the state. In the event that state appropriations fund the creation of MOOC content, policymakers should ensure that the course content remains open to state residents in perpetuity.

Maintain MOOC safe harbors

As discussions of the DMCA safe harbor provisions heat up, policymakers should be mindful of how these provisions relate to MOOCs. A weakening of the safe harbor provisions could make it more difficult for MOOCs to monitor user-generated content, leading to higher compliance costs and potentially raising the cost for students.

CONCLUSION

For all of the hype, policymakers would be wise to remember that MOOCs are an experiment, and like any education experiment, they can teach us about how to improve schooling. Where possible, policymakers, employers, and philanthropists should encourage rigorous research and development that could help inform teaching and learning everywhere. This particular research and development is ongoing, and the openness of these courses and the Internet poses significant methodological obstacles to the kind of controlled experiments that are common in educational research.

But this research agenda also raises questions about the appropriate way to measure MOOCs' effects. Should researchers really compare MOOCs with traditional in-person courses? Or is the correct comparison between MOOCs and nothing at all, which is likely the alternative for many MOOC students? These questions are important for both methodological and philosophical reasons; if MOOCs produce opportunities for learning that did not exist before, then our typical measures of attainment—degrees and credentials—may not capture all that online courses provide.

MOOCs have changed the conversation about higher education reform and, if deployed strategically, they could change much more.

Regardless of how researchers measure their impact, it seems clear that MOOCs are neither the cataclysmic disruptor that advocates predicted nor the flash in the pan their critics were hoping for. MOOCs have changed the conversation about higher education reform and, if deployed strategically, they could change much more.

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