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Larry Johnson & Samantha Adams Becker[A]

Introduction

The term "massive open online course," (MOOC) although coined in 2008 by Stephen Downes and George Siemens, really came into broad use in 2012. Since then, MOOCs have gained public awareness with a ferocity not seen in some time. World-renowned universities, including MIT and Harvard University (edX) and Stanford University (Coursera), as well as innovative start-ups such as Udacity, jumped into the marketplace with huge splashes, and have garnered a tremendous amount of attention — and imitation. Designed to provide high quality, online learning at scale to people regardless of their location or educational background, MOOCs have been met with enthusiasm because of their potential to reach a previously unimaginable number of learners. The notion of thousands and even tens of thousands of students participating in a single course — working at their own pace, relying on their own style of learning, and assessing each other's progress — has changed the landscape of online learning.

A number of respected thought leaders, however, believe that the current manifestation of MOOCs has significantly deviated from the initial premise outlined by George Siemens and Stephen Downes when they pioneered the first courses in Canada. They envisioned MOOCs as ecosystems of connectivism — a pedagogy in which knowledge is not a destination but an ongoing activity, fueled by the relationships people build and the deep discussions cat-

alyzed within the MOOC. That model emphasizes knowledge production over consumption, and new knowledge that emerges from the process helps to sustain and evolve the MOOC environment.

Despite their philosophical distinctions, one aspect that both early and contemporary MOOCs have in common is that there is little common ground in any of this landscape. Each MOOC example puts forth its own model of how online learning should work at scale. Some MOOCs leverage a multitude of emerging pedagogies and tools, including blended learning, open educational resources, and crowdsourced interaction; others follow a fairly traditional lecture-based model, using studio-produced videos. The technologies that enable the workflow of MOOCs vary in different models, but in its early conceptions, the bias was toward tools that were readily available and easy to use. Early MOOCs drew upon cloud-based services such as Wikispaces, YouTube, and Google Hangouts, among many others, to foster discussions, create and share videos, and engage in all the other activities that have become essential to teaching and learning in a modern online learning environment.

While extremely promising, the more current MOOC models differ from those connectivist models, and largely mirror traditional lecture formats. Coursera, for example, is centered around video lectures led by renowned educators from prestigious universities in popular areas such as microeconomics and artificial intelligence. Stu-

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dents watch these videos and demonstrate what they have learned via quizzes and papers. Although the quality of the video and related content provided is high, this delivery model is very much based in traditional models of instruction, and does not include the notions of openness and connectivism outlined by Siemens and Downes. Indeed, the content on each of the major sites is not "open," as pervasive copyright notices make clear.

Coursera, edX, and Udacity, the three major players in the MOOC space, have put a lot of money and effort into developing high quality proprietary content, which is housed in learning environments that each bring their own unique and proprietary "secret sauce." A variety of forms of machine intelligence have been developed as part of these systems to assess student performance. The social structures of the major MOOC projects are essentially similar, with students participating in online forums, study groups, and in the case of Coursera and Udacity, organized student meet-ups. Content-wise, Coursera emphasizes video, with students watching recorded lectures from field experts as the main substance of the courses. At the time of publication, Coursera had over four million students enrolled in 400 courses, while edX and Udacity had reached 1.75 million students, across 60 courses and 30 courses, respectively.

In response to what many see as problems in the pedagogical, financial, and other models of the high profile MOOC providers, a curious form of social commentary has emerged — the "Anti-MOOC," a term coined by Audrey Watters that refers to online courses that are specifically positioned as experiments in online learning that, in well-defined ways, do not ascribe to the models used by the Courseras, Udacities, and other large providers.

Anti-MOOCs have a unique role as counterpoint to the more high-profile online learning projects. As massive open online courses continue their high-speed trajectory, many educational leaders and theorists feel that there is a great need for reflection — especially that which includes frank discussions about what a sustainable, successful model looks like. In this context, many Anti-MOOCs are high-level experiments in online learning created expressly to generate a counterpoint to MOOCs and a basis for social interaction and commentary. In some ways, this may reflect the view of many experts that the pace at which MOOCs are developing is too rapid for genuine analysis; alternatives need to be created to provide comparison points. Others maintain that MOOCs are not the disruptive technology initially touted, and that the current landscape is uniquely (and probably only temporarily) open to new ideas in online learning.

When MOOCs were Young

When Stephen Downes and George Siemens coined the term in 2008, massive open online courses were conceptualized as the next evolution of networked learning. The essence of the original MOOC concept was a web course that people could take from anywhere across the world, with potentially thousands of participants. The basis of this concept is an expansive and diverse set of content, contributed by a variety of experts, educators, and instructors in a specific field, and aggregated into a central repository, such as a website. What made this content set especially unique is that it could be "remixed" — the materials were not necessarily designed to go together but became associated with each other through the MOOC. A key component of the original vision is that all course materials and the course itself were open

source and free — with the door left open for a fee if a participant taking the course wanted university credit to be transcripted for the work.

Except for a few notable exceptions, such as the compelling DS106 from the University of Mary Washington, this constructivist model has not found much traction among MOOC designers. Early MOOCs leveraged a multitude of established and emerging pedagogies and tools, including blended learning, open educational resources, and crowd-sourced interaction. The technologies that enable the workflow of early MOOCs varied, but the common thread has been that these sorts of tools were readily available and easy to use. The first MOOCs drew upon cloud-based services such as WikiSpaces, YouTube, and Google Hangouts, among many others, to foster discussions, create and share videos, and engage in all the other activities that have over the last five years or so have become essential to teaching and learning in a modern online learning environment.

While the influence of these early MOOCs on online pedagogy has been significant, it is important to remember that online learning is not new. The category encompasses any learning that takes place through web-based platforms, whether formal or informal, and online learning providers have been toiling in these fields for more than 20 years. What has made the topic new is the recent and unprecedented focus on providing learning via the Internet that has been stimulated by the tremendous interest in massive open online courses.

MOOCs received their fair share of hype as they exploded onto the education landscape in 2012. Big name providers including Coursera, edX, and Udacity count hundreds of thousands of enrolled students, totals that when added together illustrate their popularity. One of the most appealing promises of MOOCs is that they offer the possibility for continued, advanced learning at zero cost, allowing students, life-long learners, and professionals to acquire new skills and improve their knowledge and employability all of the time. MOOCs have enjoyed one of the fastest uptakes ever seen in higher education. Yet critics loudly warn that there is a need to examine these new approaches through a critical lens to ensure they are effective and evolve past the traditional lecture style pedagogies.

MOOCs as Big Business

In 2012, the Federal Reserve Bank of New York reported that Americans owe over $900 billion in student loans. At the same time, 40% of university students across the nation do not complete a degree within six years. There is a growing number of students concerned about what they are actually getting in exchange for the tremendous costs of their education. As inexorably as Moore's Law has governed the shrinking size of transistors and chips, higher education budgets seem to be following a sort of inverse of the law, in which costs rise year upon year, with tuition rates rising even faster as public support dwindles.

This is the environment in which MOOCs have prospered. More than any idea that has come along in years, university presidents and boards of trustees see a new business model in these large-scale courses, and as such, have invested a great deal of efforts in exploring their potential. In October 2012, Stanford University President John Hennessy referred to the incredible pace of development in MOOCs as a tsunami. "I can't tell you exactly how it's going to break, but my goal is to try to surf it, not to just stand there," he said in a panel discussion on the changing economics of education.

The major players are all well known: Coursera, started by two computer science professors at Stanford University; Udacity, which emerged from a Stanford University experiment in which Sebastian Thrun and Peter Norvig put their class on artificial intelligence online, with tremendous results; and edX, the lone nonprofit, based in Cambridge, Massachusetts that was founded and is jointly governed by MIT and Harvard. Each has invested millions in their own online learning platforms. The main difference between them is the courses they have to offer and the structure and style of delivery of these courses.

Coursera was founded in 2011 and publicly launched its proprietary platform in April 2012. More than 80 institutions, including Yale, Northwestern, and Stanford, offer some 400 courses. The company claimed more than four million students in late 2013. Among the major players, Coursera has generated the most funding, with more than $65 million invested so far. In January 2013, the company launched a new service that it said could be its biggest source of revenue: selling "verified certificates" that authenticate students' identities and offer a more valuable credential. Titled "Signature Track," the new program garnered 25,000 signups and earned $1 million in revenue by September 2013.

Udacity, founded in 2012, famously began as a hugely successful experiment by Stanford University professors, Sebastian Thrun and Peter Norvig, who put online their class on artificial intelligence. Thrun is the inventor of Google's self-driving car and one of the forces behind Google Glass. Unlike EdX and Coursera, Udacity produces courses in its own studio, rather than distributing content created by universities; their 30 courses are taught by faculty from at least five universities, plus private partner companies such as Google, NVIDIA, Micro-

soft and Autodesk. As of the end of 2012, the company reported more than 750,000 students. Udacity raised $21.1 million in capital by December 2012, and the number of courses doubled in 2013, with high-profile partnerships announced with the Georgia Institute of Technology (Georgia Tech) and San Jose State. However, the company has experienced challenges in 2013; in January, San Jose State was signed as a major partner, with a major for-credit course experiment planned, but early results were mixed, and in July, the effort was put on hold. Georgia Tech is currently working with Udacity in an online master's degree that gives students a real economic incentive.

As *The New York Times* noted, when Georgia Tech's master's degree in computer science is launched in January 2014 using Udacity's platform, they will do it for a fraction of the on-campus cost, a first for an elite institution. If it even approaches its goal of drawing thousands of students, it could signal a change to the landscape of higher education. The online degree will cost students $6,600, far less than the $45,000 that the same program would cost on campus.

EdX, the sole not-for-profit entity in the top three, was founded in May 2012, and has grown to include 28 institutions in what is called the xConsortium. The organization offers about 60 courses on its open source platform, and claimed one million registered users in June 2013. Led by co-founders MIT and Harvard, plus Berkeley and Cornell, EdX has $60 million in funding from Harvard and MIT in startup money, along with another $1 million from the Bill and Melinda Gates Foundation. In February 2-13 and then again in May, EdX doubled its university partners and expanded abroad.

The early success of the major players, and the tremendous attention they have drawn, both in terms of student interest and funding, created a firestorm in both the ed-

ucational and financial press. By the end of 2012, MOOCs were the topic of discussions at the highest levels at virtually every major university.

With the tremendous focus and attention on the phenomenon, inevitably the hype began to build. Traditional universities were doomed, so the conventional wisdom went, condemned to irrelevance by an onslaught of MOOCs. According to Wired, in early 2012, Udacity's Sebastian Thrun mused that ten might survive.

MOOCs in Transition

Barely a year later, the tide has turned. What education experts and journalists once lauded as innovative and exciting has now become the subject of criticism in a stream of news stories and blogs that questioned how far apart the promise and reality have been. After a year of hype and curiosity, concrete data on the results of the early MOOC offerings finally surfaced, and the results have added fuel to the critical fire.

Even Sebastian Thrun, Udacity's founder, has adopted a new perspective based on the initial findings. In a comment to The Chronicle of Higher Education, he said, "A medium where only self-motivated, web-savvy people sign up, and the success rate is 10% doesn't strike me quite yet as a solution to the problems of higher education."

Thrun's shift in stance is significant, and signals a new view of MOOC s that is more critical and less willing to be supportive of MOOCs in general. As Jonathan Rees quipped on his More or Less Bunk blog, "Anti-MOOC really is the new black."

In July 2013, the end of San Jose's State University's high profile MOOCs-for-credit experiment with Udacity after just six months marked the turning point for many. The pendulum of public fascination began to swing back with a vengeance, and an outpouring of articles and commentaries suggested that MOOCs, far from being the "Single most important experiment in higher education," as *The Atlantic* put it in July 2012, are increasingly under a very critical microscope. That same month, George Siemens' observed on his ELEARNSPACE blog that, "Critiquing MOOCs is now more fashionable than advocating for them."

Some thought leaders, on the other hand, view the initial disappointing data spawned by MOOCs as unsurprising, and symptomatic of higher education in general. Jonathan Tapson detailed these viewpoints as falling into two rather succinct perspectives: first, many advocates of the status quo argue that a high-quality student-teacher or student-peer interaction is all but impossible on the web. Second, as MOOCs have very low completion rates (from 5 to 16%), they are quid pro quo not effective substitutes for real education.

Tapson counters this last point, by noting "a small percentage of a very large number is still a large number. When 14% of the 160,000 students who signed up for Udacity's Introduction to Programming passed, that added up to 23,000 completions." He went on to observe that across the four universities in which he had worked, this common freshman course probably had fewer than 10,000 completions in those institutions entire history. Udacity managed this in three months, he observed, with a staff of less than a dozen, and on a budget far less than the sum those four university departments probably spent on it combined.

Others, including Doug Guthrie at Forbes, are very concerned about the ongoing revelations of poor test results, high dropout rates, and disgruntled university instructors. He partly attributes these outcomes to a lack of innovation in higher edu-

cation pedagogy, and from that perspective, thinks it is clear that MOOCs are not the panacea for 21st Century higher education that their proponents claimed they would be. "MOOCs have turned out to be only a minor achievement in pedagogy, " he noted, "and an expensive one at that." In Guthrie's view, MOOCs were largely online lecture halls, yet "nobody in the business of instructional design feels that lecture halls, whether on campus or online are a good way to teach students."

Not all the news is critical. As Tamar Lewin of The New York Times wrote, since the first free artificial intelligence course from Stanford enrolled 170,000 students two years ago, MOOCs have drawn millions of people to sample learning from the world's top universities. There have been heart-warming results, such as the perfect scores of Battushig, a 15-year-old Mongolian boy, in a rigorous electronics course offered by MIT.

Nonetheless, as Lewin goes on to note, while there is justifiable excitement around the reach of these courses, MOOCs have not delivered on the expectation of profound change, in his view because they offer no credit and do not lead to a degree. Levin feels that the decision of Georgia Tech to offer a MOOC-based online master's degree in computer science for $6,600 could be a game-changer. The dean of the Georgia Tech's College of Computing, Zvi Galil, expects that the program could attract up to 10,000 students. Noteably, the program may be a response to declining international enrollments as well. "Online, there's no visa problem," he said in Lewin's The New York Times article.

The prospect of a low-cost degree from a world-class institution has generated tremendous interest. Some, Lewin writes, think the leap from individual non-credit courses to full degree programs could signal the next phase in the evolution of MOOCs

and bring real change to higher education. While some believe in potential of MOOCs and others see the movement as all hype, there is a middle ground; the fact that the topic is being discussed so intensely means that it has the opened doors to new ideas. MOOC have catalyzed countless conversations about how to improve online learning— what is working and what is not.

"Perhaps Zvi Galil and Sebastian Thrun will prove to be the Wright brothers of MOOCs," said S. James Gates Jr., a University of Maryland physicist who serves on President Obama's Council of Advisors on Science and Technology. "This is the first deliberate and thoughtful attempt to apply education technology to bringing instruction to scale. It could be epoch-making. If it really works, it could begin the process of lowering the cost of education, and lowering barriers for millions of Americans."

Even for those who recognize vast potential in MOOCs, it is still challenging to discern what will happen next and which efforts will be successful. Georgia Tech's Dr. Galil is primarily concerned with breaking new ground.

"This is all uncharted territory, so no one really knows if it will go to scale," Dr. Galil said. "We just want to prove that it can be done, to make a high-quality degree program available for a low cost." In response, Lewin asked, "Would such a program cannibalize campus enrollment?"

"Frankly, nobody knows," answered Galil, and it is still far from certain if the degree program will be sustainable. While a single pilot effort may be successful, expanding to include more for-credit MOOCs across institutional offerings poses its own set of problems, requiring a larger financial investment for more instructional design, scaffolding, and staff. Some are skeptical that tuition for fee-based MOOCs can remain as low as they are in the Georgia Tech model.

"The whole MOOC mania has got everyone buzzing in academia, but scaling is a great challenge," said Bruce Chaloux, who until his recent untimely death was executive director of the Sloan Consortium, an advocacy group for online education. "I have to believe that at some point, when the underwriting ends, to keep high quality, Georgia Tech would have to float to more traditional tuition rates."

Even if providers find ways for the costs of for-credit MOOCs to remain modest, there is still the lingering question of whether the degrees will ever be valued as highly as those from brick-and mortar institutions — or at all.

"Georgia Tech is exceptionally important because it's a prestigious institution offering an important degree at very low cost with a direct connection to a Fortune 100 corporation that will use it to fill their pipeline," said Terry W. Hartle, the senior vice president of the American Council on Education. "It addresses a lot of the issues about universities that the public cares about. But how good and how transferable it is remain to be seen."

Students on MOOCs

For students, the promise of MOOCs is very appealing at the surface. Many current models present opportunities for learners to freely experiment with a variety of subjects and acquire new skills that may not be associated with a degree plan at brick-and-mortar institutions. An English major, for example, could enroll in an edX course on the foundations of computer graphics or circuits and electronics.

One such student, 21-year-old Feynman Liang, has completed 36 massive open online courses through Udacity and Coursera — while simultaneously pursuing majors at both Amherst College and Dart-mouth University. He believes the combination of face-to-face and online courses have given him a more well-rounded education. "A big reason why I'm able to have taken so many MOOCs is because I'm fortunate to be in an environment which enables it," Liang reported to TheGoodMOOC.com. "Professors and other students provide me with an intellectual community I can go to whenever I have questions about things being covered in MOOCs."

At the same time, Liang notes a concern. "I find MOOCs to particularly excel when it comes to lectures and assignments requiring little creativity," said Liang. "Traditional classrooms are superior to MOOCs when it comes to personalized mentoring and uniform standards, which make assigning creative assignments particularly difficult."

While Liang does not believe that the quality of MOOCs will surpass that of traditional, face-to-face learning experiences, he recognizes their promise. "By shifting the lecture and homework part of the classroom to an online platform, professors can focus on adding value through personalized mentoring and open-ended projects."

Liang's balanced perspective is an important part of the ongoing conversation around MOOCs, and points to a future in which MOOCs have an understood and valuable role to play in concert with more formal education approaches. Others see a need to move to new models, informed by the MOOC experiments, but which include other elements, including more personalization and interactivity, along with improved engagement strategies.

Enter the Anti-MOOCs

In this mix, some institutions are calling an end to MOOC mania, and making impassioned arguments for more measured

approaches. The administration at American University has issued a "moratorium on MOOCs," according to The Chronicle of Higher Education. "America is purposely avoiding experimentation before it decides exactly how it wants to relate to the new breed of online courses. I need a policy before we jump into something,'" said Scott A. Bass, the provost, in an interview.

Larry Cuban, in an article for the Washington Post, noted that MOOCs have attracted advocates, of course, but also a growing number of skeptics and agnostics, and these two groups are fueling the anti-MOOCs response in a variety of ways. Skeptics, for example, include those who question the premise of learning online as opposed to face-to-face in lecture halls and seminars. Cuban references a recent poll in which nearly 60 percent expressed "more fear than excitement" for expanding online courses. Some of the more active skeptics are urging faculties to take action, lest computer screens replace professors.

Agnostics, Cuban argues, question the hype of MOOCs revolutionizing higher education while seeing both pluses and minuses to virtual learning. They know that approaches such as offering lectures to hundreds of undergraduates are themselves cost-saving strategies. Hybrid teaching practices might indeed be pedagogically superior to large lectures.

Respected blogger Audrey Watters, who may be considered part skeptic and part agnostic on this point, coined the term "Anti-MOOC" in a post about a consortium of ten universities. The group announced a program offering online, for-credit courses in which any students at their respective schools could enroll. Called "Semester Online," the program includes Brandeis University, Duke University, Emory University, Northwestern University, University of North Carolina at Chapel Hill, University of Notre Dame, University of Rochester, Vanderbilt University, Wake Forest University, and Washington University in St. Louis. In this case, the "anti" was aimed at the notion of massiveness — enrollments would be capped at around 20 per course section, a direct rejection of one the pillars of the large-scale offerings. The University of Maine at Presque Isle is another institution attempting this kind of an anti-MOOC approach: a free online offering that is more like the "high-touch" experience of a conventional online course which Michael Sonntag, the provost, calls a "LOOC" — a "little" open online course.

A partnership between the New Media Consortium (NMC), ISTE, and Hewlett Packard is packaging anti-MOOCs into a comprehensive strategy to deliver professional development to science, engineering, and mathematics teachers at the HP Catalyst Academy. While still building a model that is intended to scale, their notion is to focus primarily on pedagogical innovation, using the medium itself to help deliver the learning. A course on social media, for example, is conducted entirely in Facebook.

Probably the definitive Anti-MOOC can be found in Digital Storytelling 106, a very popular online course better known as "DS106". The online digital storytelling course at University of Mary Washington (UMW) is one of the few that adhere to the original connectivist notion of a massive online course, open to all, but one must be a registered student at the university to receive credit. Their course also differs from the current MOOC scene because there is no one assigned faculty member to teach it. For the past several years, DS106 has also been taught at several other institutions, and UMW is currently exploring how to give credit to other state college students as well as incoming high school students..

Responses such as these are explicitly citing how what they intend to do is not what MOOCs do — and that is the essence of the Anti-MOOC. One of the founders of the MOOC movement, George Seimens, shared recently on his ELEARNSPACE blog, with some cynicism, "If 2012 was the year of the MOOC, 2013 will be the year of the anti-MOOC." Siemens feels that by and large, faculty do not like MOOCs, and details reasons such as elite university models, poor pedagogy, and blindness to decades of learning sciences research.

Whither, From Here?

Wherever one stands on MOOCs, one thing is clear: online learning has "come of age." The vast scope of articles in the recent press, and even the focus of most research in to online learning in the past two years has been on the MOOC phenomenon. Authors and researchers are no longer asking if online learning is effective. We know it can be if well-constructed. More and more, the design of online learning is specifically intended to encompass the latest research, the most promising developments, and new emerging business models in the online learning environment. At many institutions, online learning is an area newly ripe for experimentation — some would argue it is undergoing a sea change, with every dimension of the process open for reconceptualization. On campuses around the globe, virtually every aspect of how students connect with institutions and each other to learn online is being reworked, rethought, and redone — but it will be some time yet before ideas coalesce enough to be validated by research and implemented broadly.

In many current models, massive open online courses present opportunities for learners to freely experiment with a variety of subjects and acquire new skills that may not be associated with a degree plan at brick-and-mortar institutions. A Neurology major, for example, could enroll in a Udacity course on artificial intelligence. Learners are not stuck on a single pathway.

Related advances in both classroom and online learning are emphasizing personalized learning, and if massively open online courses could both scale globally and yet cater to individual learning styles, it would be a very exciting combination. In their current forms, MOOCs already allow learners of all ages, incomes, and levels of education to participate in a wide array of courses without being enrolled at a physical institution. The most effective MOOCs make creative use of a variety of educational strategies and frequently leverage multimedia to demonstrate complex subjects. One recent entrant in Spain, unX, has integrated badges as a way to reward learners for their participation and concept mastery.

If MOOC projects proliferate, advocates hope that providers will invent innovative ways for learners to demonstrate their knowledge at scale. Peer review systems, student gurus, badges, and other forms of assessment are currently being explored, but there is no real verdict yet on what is most effective. To continue to gain traction, MOOCs will need to strike a fine balance between automating the assessment process while delivering personalized, authentic learning opportunities.

It is that last point that brought Forbes' Guthrie to suggest that MOOCs are nowhere near the kind of transformative innovation that will remake academia. That honor, according to Guthrie, belongs to a more disruptive and far-reaching innovation — big data and its applications. Big data, he feels, is very likely to revolutionize online learning. It will be the means by which we customize learning to match the

needs of individual students, especially in the online learning space. Big data will give institutions the predictive tools they need to improve learning outcomes for individual students. By designing curricula that collect and interpret data at every step of the learning process, customized modules, assignments, and feedback can be targeted to student needs in the moment.

Time and other authors will settle those questions, but there is no doubt that MOOCs have already had a significant influence on the future course of online learning, and continue to do so. Whether it be through the offerings of the large-scale providers, or via the Anti-MOOC-inspired online courses at individual universities or consortia, online learning has earned its place in the academy.

Welcome to the new era of online learning!

Online Learning in Practice

A sampling applications of massively open online courses highlighted in recent Horizon Project research includes the following:

- Acamica is a platform used by Latin American learners to access interactive courses from experts in different areas. As students progress, they build online knowledge profiles to share with prospective employers or institutions: go.nmc.org/aca.
- Bossier Parish Community College offers an online degree program in which students can do a majority or all of their coursework online. The online instruction involves presentations, video tutorials, discussion boards, and other learning activities: go.nmc.org/bpc.
- The Buena Vista School District launched the Buena Vista Online

Academy, an online alternative to a brick-and-mortar school for students: go.nmc.org/bvsdoa.

- Bunker Hill and Mass Bay Community College partnered with MIT's edX to offer MOOCs to their students. They are the first two-year colleges to work with the popular MOOC provider: go.nmc.org/edXMA.
- The California Institute of Technology piloted the "Learning from Data" MOOC in April 2012. The first offering included live streaming and real-time Q&A sessions with the participants, along with automated grading and discussion forums. Since then, it has been offered four times, with over 100,000 enrolled students. go.nmc.org/caltech
- Colorado Technical College developed an online learning platform called MUSE (My Unique Student Experience), which caters to students' varying learning styles: go.nmc.org/muse.
- The Games MOOC is a community site woven around a series of three courses about the use of games in education, including traditional games, massively multiplayer online role-playing games, game-based learning, and immersive environments. The first courses were piloted in the fall of 2012. go.nmc.org/gamesmooc
- The Gates Foundation awarded a grant to Ohio State University to design a MOOC for Coursera. This course will engage participants as writers, reviewers, and editors in a series of interactive reading, composing, and research activities with assignments designed to help them become more effective consumers and producers of alphabetic, visual, and multimodal texts. OSU faculty members have developed the Writers Exchange, an idea-networking website to support the course: go.nmc.org/osu.

- Google created an open course builder and its first massive open online course, "Power Searching with Google." It drew 150,000 students, and helped sharpen their Internet search skills. go.nmc.org/googco

- In the spring of 2013, Indiana University-Purdue University Indianapolis and the Purdue University Department of Music and Arts Technology will offer a new MOOC, "Music for the Listener," that can be converted into credit. The six-week course covers the music of western civilization from 600 AD to the present. The learning environment is bethrough Course Networking, with full translation features, rich media, and social networking tools: go.nmc.org/thecn.

- Maricopa Community Colleges' Career and Technical Education 230: Instructional Technology course stems from a National Science Foundation-funded project to increase the ability of STEM teachers to collaboratively learn and apply STEM skills using information and communication technology. Participating educators acquire knowledge and skills using Canvas and 3D Game Lab learning management systems, and Google+ Community. go.nmc.org/opecou

- Maricopa Community College offers 600 online courses via a cohort of ten community colleges, and serves nearly 70,000 students each year: go.nmc.org/maricopa.

- A MOOC called "Landmarks in Physics" delivered through Udacity was created by an MIT graduate who filmed in Italy, the Netherlands, and England to create a virtual tour that explains the basic concepts of physics at the sites of important discoveries in our history: go.nmc.org/phy.

- The online learning platform Veduca provides Brazilian users with 5,000 online classes, licensed from some of the world's top universities, such as MIT, Harvard, Yale, and Princeton, and translates them into Portuguese: go.nmc.org/ved.

- Open Universities Australia launched Australia's first MOOC provider, called Open2Study, in March, 2013: go.nmc.org/ouamooc.

- Senior academic leaders at the University of Queensland have resolved to develop up to 12 open online learning courses over the next two years. Their main interest is in how MOOCs will enable new opportunities for campus-based students: go.nmc.org/uqmooc.

- Oregon Virtual Education is an online learning program that offers free enrollment. Classes can be taken to supplement or replace traditional classroom learning: go.nmc.org/orved.

- Through the open source platform unX, Iberoamerican universities can offer MOOCs for online learning and vocational training. The model includes interactive features, along with a digital badging system: go.nmc.org/unXIA.

- The University of Melbourne became the first Australian university to join Coursera, a leading international online course provider. Macroeconomics and Epigenetics are two of the courses planned to go live by the end of 2013: go.nmc.org/auscou.

- The University of Texas Online High School provides students with an opportunity to receive their high school diplomas through a flexible, distance education model: go.nmc.org/uths.

For Further Reading

A sampling of recommended readings related to massively open online courses that have been highlighted in recent Horizon Project research includes the following:

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Adaptability to Online Learning: Differences Across Types of Students and Academic Subject Areas go.nmc.org/adapt (Di Xu, Community College Research Center, February 2013.) A comparison study examines student success in an online environment.

Colleges Adapt Online Courses to Ease Burden go.nmc.org/ease (Tamar Lewin, The New York Times, 29 April 2013.) Nearly half of all undergraduates in the U.S. arrive on campus needing more work before they can begin regular classes for credit. Colleges are beginning to experiment with online versions, which allow students to take these initial courses easily and cheaply.

College Is Dead. Long Live College! go.nmc.org/ylazv (Amanda Ripley, TIME, 18 October 2012.) When the Pakistani government shut down access to YouTube, an 11-year old girl continued her online studies using Udacity.

Credit for MOOCs Presents Challenges in Australia go.nmc.org/credmo (Charis Palmer, The Conversation, 7 November 2012.) Following the news that Antioch University was working with Coursera to offer credit towards a degree, Australian tertiary education providers debate the possible negative consequences of this approach.

How Online Learning is Saving and Improving Rural High Schools go.nmc.org/rural (Tom Vander Ark, Getting Smart, 26 January 2013.) Rural high schools face immense challenges, including federal and state education funding inequities, which causes thousands of schools to close down per year. Online schools even the playing field.

How 'Open' Are MOOCs? go.nmc.org/ope (Steve Kolowich, Inside Higher Ed, 8 November 2012.) This article explores several misunderstandings in the way many chief academic officers view massively open online courses and their potential to supplement traditional university classes.

Jump Off the Coursera Bandwagon go.nmc.org/cou (Doug Guthrie, The Chronicle of Higher Education, 17 December 2012.) This author observes that as universities rush to deliver online education, they may be too quick to launch insufficient models. As a result, many MOOCs are not addressing critical pedagogical issues, in addition to interactivity and customization.

MOOCs and Money go.nmc.org/money (Matt Greenfield, Education Week, 1 October 2012.) MOOCs have some possible monetizing strategies that can work as long as they continue to attract millions of students. The author argues that many current students are attracted to MOOCs out of curiosity, and ponders whether enrollment numbers will continue to be high over the next few years.

The Single Most Important Experiment in Higher Education go.nmc.org/single (Jordan Weissmann, The Atlantic, 18 July 2012.) This article discusses Coursera's new partnerships with several other universities. One school, the University of Washington, is giving credit for its Coursera courses. The funding from all these new universities will allow the company to blossom as a market for learning.

States, Districts Require Online Ed for High School Graduation go.nmc.org/require (Kelsey Sheehy, US News, 24 October 2012.) A growing number of school districts, including those in Virginia and Idaho, have recently signed legislation making it mandatory for students to take at least one online course in order to graduate high school.

The Teacher You've Never Met: Inside an Online High School Class go.nmc.org/onlinete (Nick Pandolfo, TIME, 13 June 2012.) This article explores the life and work of an online K-12 teacher at Colorado's 21st

Century Virtual Academy. The teacher reports frustrations in not being able to read students' body language to better understand their learning needs.

xED Book go.nmc.org/xed (Dave Cormier, George Siemens, and Bonnie Stewart, Accessed 2 January 2013.) George Siemens and two education researchers are writing a book that will discuss how the Internet is restructuring knowledge and the implications for MOOCs. They are currently chronicling their ideas on this site.

The Year of the MOOC go.nmc.org/moo (Laura Pappano, The New York Times, 2 November 2012.) Over the past year, MOOC development has become a major trend. This article examines the current higher education institutions and organizations offering MOOCs, discussing their strategies and the challenges each are facing.

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Dr. Larry Johnson serves as Chief Executive Officer of the New Media Consortium, an international not-for profit consortium dedicated to the exploration and use of new media and new technologies. Its hundreds of member institutions constitute an elite list of the most highly regarded universities, museums, and research centers in the world. The NMC's dozen-year exploration of technology use in education, the Horizon Project, informs strategic technology planning for educational institutions in more than 175 countries. As the project's founder, Johnson works with visionaries and thought leaders from across the globe to define new ways of thinking about technology, and explore emerging trends and issues.

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