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Massive open online courses: A primer for Philippine state universities and colleges

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Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Massive Open Online Courses: A Primer for Philippine State Universities and Colleges

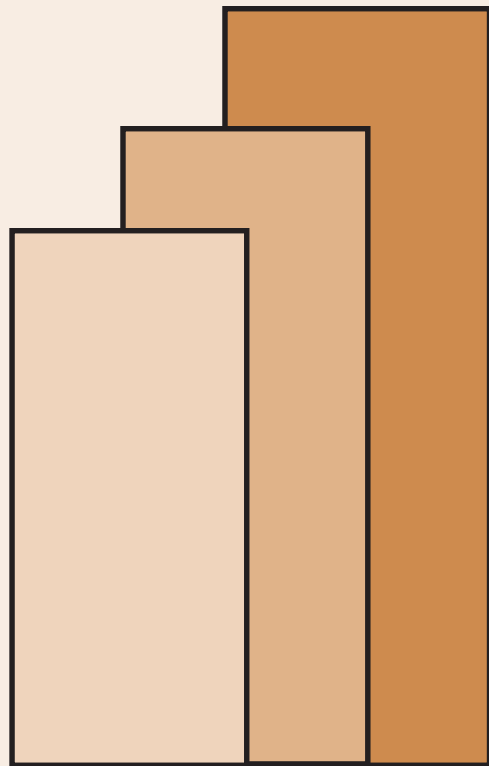
Leonardo dela Cruz Jr.

DISCUSSION PAPER SERIES NO. 2015-47

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Massive Open Online Courses

A Primer for Philippine State Universities & Colleges

Leonardo dela Cruz Jr.

REPUBLIC OF THE PHILIPPINES

October 2015

ABSTRACT

“The State shall protect and promote the right of all citizens to quality education at all levels, and shall take appropriate steps to make such education accessible to all.”

– Article XIV, Section 1, 1987 Philippine Constitution

They have been called the MP3s of higher education, surpassing and improving on the technology of Compact Discs that is online learning, and the outdated cassette tape that is the traditional classroom. They are called Massive Open Online Courses, and their advent and rising popularity has had a profound impact on the sphere of education. Whether they are seen as an opportunity or a potentially disruptive threat to current pedagogies, their promise of offering low-cost quality education to all has certainly captured the imagination of everyone, especially those in higher education institutions, causing them to re-think their policies. But do they represent a new revolution in the often changing world of education, or are they merely an evolution of the same old pedagogies, updated and upgraded to appease the technologically-obsessed masses? Are they hype...or simply hope? For stakeholders in Philippine State Universities and Colleges, the question is simpler – faced with shrinking budgets and rising costs, in a country where the price of quality education is high and access to it remains a serious concern, they ask – does this new model present an opportunity to re-envision how they deliver instruction, giving greater accessibility to all students, or does it merely represent a fad, providing little or no assurance of improving student learning outcomes? This paper attempts to answer these questions by summarizing and analyzing the issues, challenges, threats, opportunities and implications brought about by the phenomenon. It is intended to give these stakeholders a better understanding of the new paradigm that may guide them in formulating policies and specific strategies to address the continuing movement towards openness in education, and in so doing, they may ultimately fulfill the promise embodied in our Constitution – to provide affordable quality education accessible to all.

Keywords: Massive Open Online Courses, MOOCs, State Universities and Colleges, open education, blended learning, flipped classroom

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EXECUTIVE SUMMARY

“The key opportunity for institutions is to take the concepts developed by the MOOC experiment to date and use them to improve the quality of their face-to-face and online provision, and to open up access to higher education. Most importantly, the understanding gained should be used to inform diversification strategies including the development of new business models and pedagogic approaches that take full advantage of digital technologies.”

– Yuan, et al, 2014

“Beyond MOOCs: Sustainable Online Learning in Institutions”

In the recent past, there have been numerous advancements in technology that has threatened to disrupt the way traditional education is being delivered. From open access to open educational resources, and more recently, to open online courses, there is now a growing momentum among higher education institutions (HEIs) to participate in this “open” movement, which has shaped and re-shaped pedagogies all over the world. With the arrival and growing popularity of Massive Open Online Courses, or MOOCs, these traditional pedagogies are once again being challenged, and new issues and challenges are now being raised.

Indeed, the proliferation and popularity of MOOCs is a relatively new phenomenon in the field of online education and distance learning. Only as recent as two years ago did the New York Times declare 2012 as “The Year of the MOOC” [Pappano, 2012]. However, in such a short time, from its advent to its rapid rise, MOOCs have generated considerable media attention and significant interest from various sectors of society. Venture capitalists recognize a business opportunity to be exploited; the techies salivate at the chance for new technologies to be developed and used; government and stakeholders in universities and schools are fascinated by the ‘free’ and ‘massive’ characteristics of the offered courses, and the potential it affords. The collaboration of name-brand institutions such as Harvard, Stanford and the Massachusetts Institute of Technology (MIT) has sparked even greater interest in MOOCs and in online education, in general. The purpose of these institutions varies – expanding access to services, promoting institutional reputation, and developing potential new revenue streams in higher education [Yuan & Powell, 2013] – but they all acknowledge the promise that MOOCs offer: to provide free access to cutting edge courses that could drive down the cost of university-level education. At the same time, they recognize its capability to disrupt existing models of higher education.

However, despite the potential of MOOCs to radically reduce costs, raise a university’s profile and improve education, there are still a considerable number of uncertainties that remain unresolved, especially with regards to the viability and sustainability of this potentially disruptive new pedagogical

model. For school administrators, teachers and students, several questions remain – can MOOCs possibly live up to the expectations placed on them—affordable education for everyone with few, if any, learning problems? Do they really represent a turning point in online education? Or are they simply a popular and headline-friendly trend in a more general move towards online education? These concerns raise the need for a more in-depth research that will lead to a deeper and better understanding of MOOCs that will help policy-makers in HEIs and in government to support the development of MOOCs more effectively and can help guide future MOOC efforts.

The aim of this study, therefore, is to raise awareness of MOOCs and their implications for HEIs by summarizing and analyzing the latest issues, trends, challenges, threats and opportunities afforded by the new model. The report is primarily intended for decision-makers and other stakeholders of Philippine State Universities and Colleges (SUCs). It is written in an effort to give them a better understanding of the phenomenon and provide them with the capability to make an informed decision as to whether their institution should jump on the MOOC bandwagon, or at the very least, provide them some context to help guide discussions in their own campuses. Eventually, institutions will need to develop a cohesive strategy to respond to the opportunities and threats posed by MOOCs and other forms of innovation that lead to openness in higher education. It is important to note that this paper does not seek to produce a verdict on whether MOOCs are good or bad, disruptive or sustaining; rather, it looks beyond those debates and examines the evidence gained from the early MOOC experiments and initiatives so as to provide guidance on how this new tool could be used to solve specific problems in HEIs. Additionally, MOOCs are resource-intensive ventures and require costly infrastructures; before investing these limited, precious resources on what many consider to still be an experiment, they should thoroughly consider first the implications of such a costly, potentially unviable and risky investment.

Although the report is written from the perspective of a developing nation and is intended for SUCs of this country, the data was largely culled from the development of MOOCs in more developed and industrialized countries. This is because its growth in developing countries is still in its infancy, and data from early MOOC initiatives in these emerging economies are rare and unsubstantiated. It is important to keep this in mind because what works in a rich, industrial country may not necessarily work in a poor, agricultural nation. However, these studies do impart valuable information regarding MOOCs, and may be used as a general guide and benchmark as to what works, and what doesn't.

An exhaustive literature review gleaned from the extensive and voluminous reporting of MOOCs through academic research studies, scholarly blogs, media articles, and press releases, written by noted instructors from elite and reputable institutions and reporters working in the field, was conducted to identify the prevalent issues and challenges faced by the growing yet still young industry. The data gathered from the research studies helped define and characterize the profiles of the major players, from the MOOC providers down to the students. These openly-available reports and white papers also documented the current trends and developments in the industry.

This report is presented in five key sections. *Chapter 1* gives an introduction to the MOOC phenomenon and provides a snapshot of its origins and a sense of how the model works; *Chapter 2* summarizes the

major developments and recent trends in the MOOC initiative, and describes the known profiles of the players; *Chapter 3* examines the issues and challenges faced by those who have offered MOOCs, and those who have taken them; and *Chapter 4* discusses the implications and opportunities presented by the new pedagogy and recommends specific strategies that addresses these implications and takes advantage of the opportunities. Finally, a special annex report called “Understanding the Technology behind MOOCs” focuses on the technological aspect of MOOCs, and describes the requirements needed to deploy and develop them.

1. INTRODUCTION

In 2008, Canadian educators Stephen Downes and George Siemens developed an online course called “Connectivism and Connective Knowledge” (CCK08) and offered it at the University of Manitoba. They created it using freely available online services and tools. It was different from other forms of online distance courses because it was a free, openly-accessible, scalable course centered on a domain of knowledge, with a start and an end date, based on connectivist principles of learning [Yuan, et al, 2014]. 25 tuition-paying students at the university initially enrolled, but when the professors offered it for free online to anyone and everyone who wanted to join, over 2,300 students would eventually sign up for the course. In the fall of 2011, Stanford University professors Sebastian Thrun and Peter Norvig opened up enrollment to their “Introduction to Artificial Intelligence” course for anyone with access to a computer and an Internet connection, and the response was nothing short of astonishing. The course would eventually end up attracting over 160,000 participants from 190 countries (Thrun would later co-find the for-profit MOOC company, Udacity). Another Stanford computer science professor, Andrew Ng (who later on would also co-find his own MOOC company, the popular Coursera) opened up his course on machine learning, and more than 100,000 students signed up and 13,000 completed it. And thus the phenomenon of Massive Open Online Courses, or simply MOOCs, was born.

Merriam-Webster (2014) defines a phenomenon as *“something (such as an interesting fact or event) that can be observed and studied and that typically is unusual or difficult to understand or explain fully; someone or something that is very impressive or popular especially because of an unusual ability or quality.”* For some, that definition perfectly fits the phenomenon that is MOOCs. For such was the hype and attention centered on the new yet unproven technological innovation that the whole world – and not just the academes in their lofty institutions – quickly noticed. Perhaps it was the promise of MOOCs that enticed them – that of delivering quality education accessible to all. Perhaps it was the huge numbers – imagine hundreds of thousands of students in *one* course. Or perhaps it was the potential it afforded – “For Free!” they screamed. “IT’S FOR FREE!”

Regardless of the reason, everyone who was anyone in the world of education – and even those outside of it – soon paid attention. Higher education institutions stopped to think about the opportunities and threats the new paradigm presented, and asked themselves, “To MOOC or not to MOOC?” This was in fact one of the many questions raised in a forum on MOOCs organized by the Philippine Institute for Development Studies (PIDS) and the Commission on Higher Education (CHED) held last October, 2013, in Makati City, a forum that was attended by representatives from different universities and colleges all over the Philippines. The forum was organized to discuss the possibility of adopting the new technology and the opportunities and potential difficulties associated in implementing it. Various issues and concerns were raised, including the perceived neo-colonialism and the suitability of a Western-developed design to the local context, the prevailing issues of inadequate IT infrastructure and the high cost of IT access in the country, and the different academic levels of students. In the end, the forum participants felt the concept held promise but agreed that a more thorough study was needed to determine its feasibility in the local setting. It is in this context that this paper was written.

The next section provides a background to the MOOC phenomenon. It briefly describes its origins and attempts to define the model, including its key features and attributes. A short depiction of how MOOCs work is also included in this chapter.

1.1. THE OPEN EDUCATION MOVEMENT: FROM OPENCOURSEWARE TO MOOCS

Yuan and Powell (2013) wrote, “The development of MOOCs is rooted within the ideals of openness in education, that knowledge should be shared freely, and the desire to learn should be met without demographic, economic, and geographical constraints.” Indeed, the global development towards open education dates back more than ten years ago, way before MOOCs were even conceived. As Figure 1 shows, since 2000, the concept of openness in education has been evolving rapidly. In 2002, MIT began putting some course materials online for anyone to access, and the OpenCourseWare (OCW) movement was born. The movement is an important forefather of MOOCs; it made open access courses a hallmark of elite colleges. The MIT OCW project is also credited for having sparked the global Open Educational Resources Movement. In 2006, the Open University in the United Kingdom contributed to the effort by launching the OpenLearn website which provides global, free access to its educational materials.

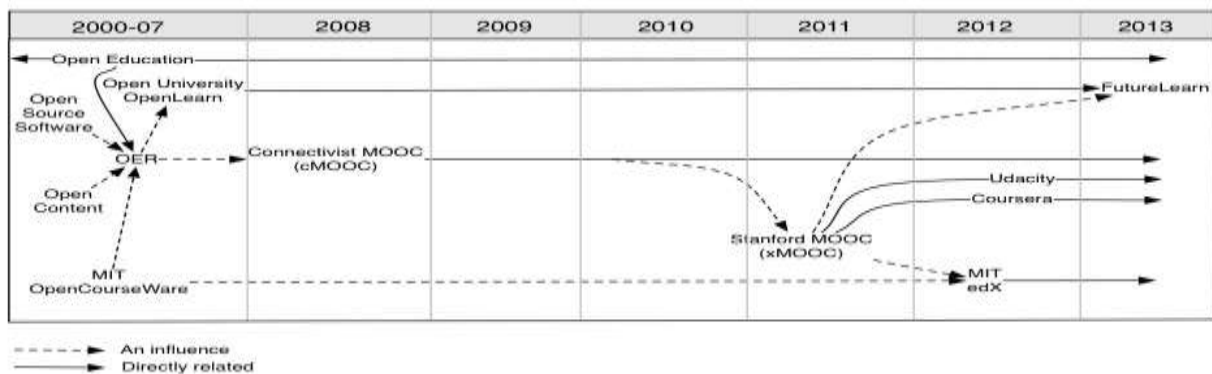


Figure 1: MOOCs and the Open Education Timeline (Source: Yuan, et al, 2014)

After the initial success of Downes and Siemens’ CCK08 course, another Canadian educator, Dave Cormier, would coin the term *Massive Open Online Courses* to describe the new pedagogical model. He defined a MOOC as being a “Course”, with a start and end date, which was “Open”, with no barriers to entry, cost or education criteria. The courses were offered “Online”, accessed on the web, and were “Massive”, requiring a significant number of students to contribute to a connected learning environment [Morrison, 2013]. The huge successes of Stanford professors Thrun, Norvig and Ng in 2011 using a similar pedagogical model would soon follow.

The success of these early MOOCs brought about the creation of more platforms. Loosely borrowing from the original concept of MOOCs by Downes and Siemens (which were subsequently labelled as ‘cMOOCs’), three new major MOOC technology platforms (now known as ‘xMOOCs’) were launched in 2012, namely edX, Coursera and Udacity, the so-called ‘Big Three’. They developed a business model based on partnering with prestigious universities to publish their courses online, for anyone interested in learning for free. This adoption of the MOOC concept was a significant departure from the original model, in that some of the new platforms came from venture-funded, commercial companies, and some of the courses had a revenue-generation incentive more in common with established, content-based, profit-driven approaches to online distance learning in higher education [Yuan, et al, 2014]. In due course, as the popularity of MOOCs grew, more and more players joined the market as they sought to take advantage of these innovations in online learning.

1.2. THE TWO TYPES OF MOOCs: cMOOCs vs. xMOOCs

Although many MOOCs share a common goal of bringing large numbers of learners together in a common environment for a course delivered online, not all MOOCs are presented in the same manner and often differ in terms of their primary strategy for learning design. Different ideologies have driven MOOCs in two distinct pedagogical directions: the connectivist MOOCs (cMOOCs) which are based on a connectivism theory of learning with networks developed informally; and content-based MOOCs (xMOOCs), which follow a more traditional, behaviorist approach [Yuan & Powell, 2013].

The cMOOC concept, pioneered by Siemens and Downes, was derived from the CCK08 course they offered in 2008. The course was about and based on the learning theory of connectivism, developed by Siemens, which proposes that learning happens within a network – learners use digital platforms, such as blogs, wikis and social media, to make connections with other learners to create knowledge. cMOOCs rely primarily on these connections rather than on pre-defined content. Siemens (2012) wrote, “cMOOCs focus on knowledge creation and generation whereas xMOOCs focus on knowledge duplication.” cMOOCs provide a platform to explore new pedagogies beyond traditional classroom settings and, as such, tend to exist on the radical fringe of higher education [Yuan & Powell, 2013]. The courses create their own trajectory rather than follow a linear path, and are more flexible, responsive to the needs of participants who are relatively free from institutional constraints, providing a tailored learning experience. cMOOCs are also not typically sponsored or funded by HEIs or commercial entities but are organized by individuals with a passion for a specific content area.

On the other hand, xMOOCs are essentially an extension of the pedagogical models practiced within universities, which is dominated by “drill and grill” instructional methods. They are modeled on conventional course materials, learning theories and higher education pedagogies. xMOOCs use a traditional lecture format that substitutes pre-recorded video lectures for the face-to-face lecture component of a course and provides automated exercises and quizzes along with opportunities to interact with the course instructors and fellow students using discussions boards. It is more commonly affiliated with the MOOCs offered by providers such as the Big Three and their university partners. These courses tend to use custom-designed technical platforms, scheduled learning events, and proprietary learning resources. They also typically use little distributed content available on the Web outside the platform. Table 1 highlights the major differences between the two pedagogical models.

cMOOCs	xMOOCs
Based on connectivism theory	Based on a more behaviorist/cognitivist approach
Informal learning environment	Formal learning environment
Non-traditional with content as starting point	Traditional course structure and flow
Social networked learning, non-linear, chaotic	Traditional approach, linear, straightforward
Focus is on knowledge creation and generation	Focus is on knowledge duplication
Distributed knowledge	Centralized repository
Created by individuals, academics	Created by universities and schools
Emphasizes connected, collaborative learning	Emphasizes coordinated assessments and quizzes
Comparatively more learner action	Comparatively less learner action
Promotes diversity and collaboration	Encourages a huge diversity of applicants

Table 1: cMOOCs vs xMOOCs – The Major Differences

Table 2, MOOC Typologies, on the other hand, analyzes and gives an overview of the different forms of MOOCs in terms of its individual components. The different interpretations placed upon the title words have significant implications for developing business models, pedagogical opportunities and technology options for each type of MOOC [Yuan, et al, 2014].

xMOOCs		cMOOCs
Scalability of provision	Massive	Community and connections
Open access - Restricted license	Open	Open access & licence
Individual learning in single platform	Online	Networked learning across multiple platforms and services
Acquire a curriculum of knowledge & skills	Course	Develop shared practices, knowledge and understanding

Table 2: MOOC Typologies [Yuan & Powell, 2013]

For xMOOCs, the word “Massive” focuses on scalability with potential revenue streams while for cMOOCs, it focuses on establishing learning communities and connections. For most xMOOCs, the word “Open” means open access with relatively restricted licences for content; for cMOOCs, it is open access with a licence that allows content to be used elsewhere under certain conditions. For xMOOCs, the word “Online” focuses on individual learning, but cMOOCs emphasizes networked learning. For xMOOCs, the word “Course” emphasizes the consumption of content, whilst in cMOOCs, learners are expected to engage with their peers in online communities across the Internet to share resources and generate their own content [Yuan, et al, 2014].

1.3. SO WHAT EXACTLY IS A MOOC ANYWAY?

Wikipedia defines a Massive Open Online Course, or MOOC, as “an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for students, professors, and teaching assistants” [Wikipedia, 2014] (Note: this entry is constantly updated).

As its name suggests, MOOCs are primarily “online courses” delivered over the Internet to potentially an unlimited number of students at a time. It may also be seen as a model for delivering learning content online to virtually any person—with no limit on attendance—who wants to take the course. The students, who pay nothing to participate, can join in some or all of the course activities, which might include watching videos, posting on discussion boards and blogs, and commenting via social media platforms. Although participants receive no credit for the course and may get little or no direct feedback from the instructor, their involvement can add a dynamic to the course that benefits all students. So a MOOC is essentially an educational resource resembling a class, that has assessment mechanisms, a start and an end point, that is all online, that is free to use without admissions criteria and that involves hundreds of students or more [Marques & MacGuire, 2013].

1.4. THE KEY FEATURES OF MOOCs

The next section briefly discusses the nature and key features of a MOOC to differentiate it from other models of online distance learning. Perhaps the best way to understand a MOOC is to work backward through the abbreviation itself and to examine what each letter comprising the word 'MOOC' means. Unfortunately, as Figure 2 suggests, the definitions themselves are sometimes open to interpretation.

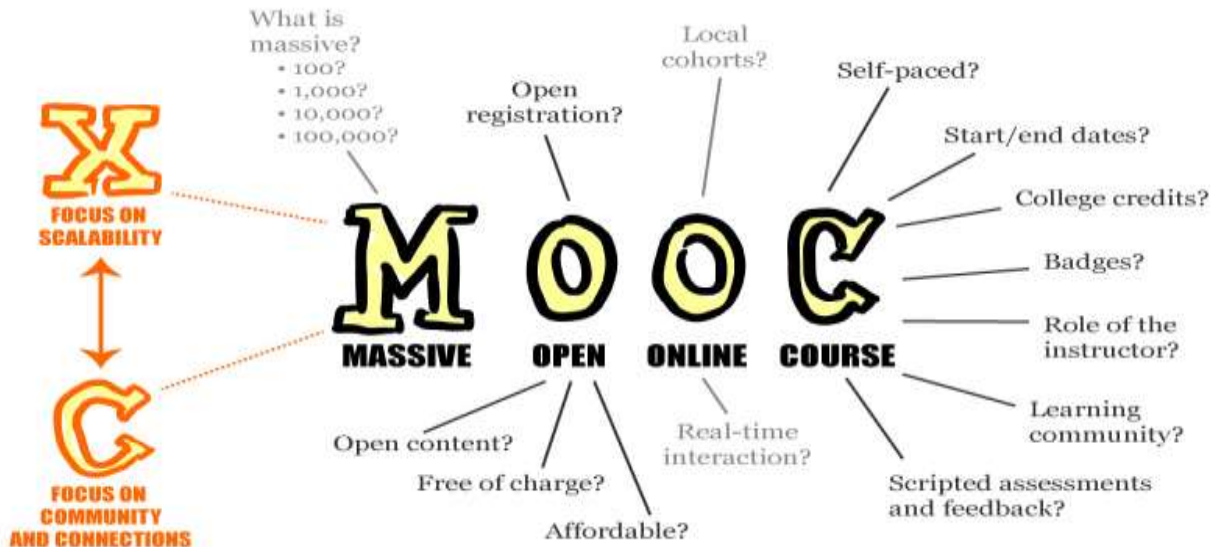


Figure 2: MOOC Poster: Every letter is negotiable. [Source: Wikipedia, 2014]

Massive

The massiveness of a MOOC is a natural result of being an online course open for anyone to enter, with Internet access the only prerequisite, and as such, the number of participants is typically larger than can be taught in a regular classroom. However, most observers contend that what counts as massive is uncertain, and there is no precise number to define it. Some MOOCs have a few hundred students while a few have had more than 100,000 students. Downes himself proposed the use of the Dunbar's Number (148)¹ [Downes, 2013]. 'Massive' can also refer to the scalability of the course, as they are designed to support an indefinite number of participants.

Open

"Open" is a necessary condition for a MOOC to differentiate it from the accepted standards of open education pedagogies, and the one part of the definition that is most in dispute. This is arguably the distinguishing feature that separates MOOCs from other online courses. But what does 'open' truly mean, and what does it imply?

¹ **Dunbar's number** is a suggested cognitive limit to the number of people with whom one can maintain stable social relationships. This number was first proposed by British anthropologist Robin Dunbar, who proposed that humans can only comfortably maintain 150 stable relationships. It has been proposed to lie between 100 and 250, with a commonly used value of 150. (Source: Wikipedia, 2014)

The original designers of MOOCs meant for them to be open in two important senses. First, MOOCs were originally open in the sense of open access, much like creative works under a Creative Commons license can be open. These instructors use materials in the public domain that do not have copyright restrictions, and they intend for their work to be freely available for others to reuse and adapt. Second, the original MOOC concept was open in the connectivist sense. The boundaries between teacher and student and between each student are much more open than in a traditional classroom, and the creation of knowledge happens through connections that are unexpected and unplanned [Marques & MacGuire, 2013].

From this we can glean what “open” implies. First, “open” implies means open access. Unless courses are accessible to the public, without any restrictions or entry qualifications, regardless of the participants’ academic level or whether they are enrolled in the school offering the MOOC or not, they should not be described as MOOCs. Open access also implies that the course content is always available. Second, “open” implies open interaction. The participants are free to interact with each other without any limitations. They choose what to do and how to participate, working on their own pace and relying on their own style of learning. Since open access almost always ensures a diverse student body (age, country, profession, educational background, etc.), student interaction becomes even more valuable. Third, “open” implies open license, although critics contend this is not the case [See Chapter 3.1.4 Issues & Challenges: Copyright and Intellectual Property Rights]. Finally, “open” implies that the courses are free. However, based on current business models, they are not entirely free; students may join for free, but they may have to pay to receive certificates, badges, or even credit.

Online

Of the four definitions, this one is the most obvious. However, one thing to keep in mind is that some forms of distance learning are hybrid, where students do part of their work online and meet with the teacher at school part of the time. Increasingly, hybrid or flipped classes use materials from a MOOC to support the class, but the class itself isn’t a MOOC. Even though MOOC students have found it useful to organize offline meet-ups and even though online courses material can be used by traditional brick-and-mortar institutions as part of their curriculum, a MOOC should be entirely online, meaning all aspects of the course are delivered on the web.

Course

A MOOC is first and foremost a course. It has to be structured like a course, with specific learning objectives, online classes, homework to practice what has been covered in class and exams to assess the learning. The evaluation may be done by the teacher, by machine, or by peers. Having assignments and evaluations distinguishes a MOOC from university initiatives like the Open University that offer free lectures but don’t have any way of assessing a visitor to the site. MOOCs are also courses in the sense of having a completion point. The popular Open Education Resource (OER) website, Khan Academy, has exercises along the way, but if you jump in to start learning, for example, elementary school arithmetic, you’ll never reach a last day of school. MOOC courses are designed to come to a conclusion, usually after 4 – 12 weeks. In other words, there is a start date and an end date.

1.5. SO HOW DO MOOCs WORK?

Any course consists of some basic features: there is a schedule, a syllabus referring to content and learning actions (assignments, assessments, etc.), and there is a learning space where course instructors and participants can meet and exchange ideas on the subject of the course to enhance mutual learning and experiences. A MOOC is no different, but because it is online, the course spaces are as well.

MOOCs use Web-based tools and environments—commonly referred to as platforms—to deliver instruction in this new paradigm. Various entities, known as MOOC providers, own these platforms. The platform providers create a virtual space – normally, a website powered by web software or a Learning Management System – for course creators to host their content and manage their learning environment (forums, quizzes, exams, assignments, etc.). The main website provides students with relevant class information, such as schedules and syllabus, announcements, and links to other useful information. The LMS automates record-keeping and student registration, keeping track of the students’ data. Lectures come in the form of short video lectures. The reading materials reside in a wiki. Discussions and other forms of interactions take place in forums, social media platforms, such as Facebook or Twitter, or other public online venues. Exercises, exams, and grading are automated within the platform. For more-subjective, content-oriented exercises, students may “grade” each other via discussion forums and social-networking interactions (peer-to-peer assessment). The use of technology thus effectively allows the model to scale to massive proportions, enabling a system capable of reaching much larger audiences, regardless of geographic boundaries and time zones.

Although the curriculum for a MOOC might be identical to that of a standard course, learning activities are typically constructed to better match the dynamic of a large and fluid group of participants. Course activities could be synchronous or asynchronous², and a flexible structure is valuable because students can choose their level of participation and many will do so in a free-wheeling manner. A student in a far-flung location may take a particular lecture and do the related exercises in his or her own time zone during a convenient window of delivery. A student may also make up for missed lectures at his or her convenience, although that will lessen the impact of some aspects of the collaborative approach to learning with fellow students.

² **Synchronous learning** refers to a learning environment in which everyone takes part at the same time. A lecture is an example of synchronous learning in a face-to-face environment, where learners and teachers are all in the same place at the same time. **Asynchronous learning** is a student-centered teaching method that uses online learning resources to facilitate information sharing outside the constraints of time and place among a network of people. (Source: Wikipedia, 2014)

The Components of a MOOC

MOOCs embody a convergence of technology and culture that is creating new energy around e-learning. On the technology side, the tools enabling web-based instruction are more effective and reach greater scale than ever before. E-learning technologies that are widely used in MOOCs include the following (Figures 3 and 4 represents the different components):

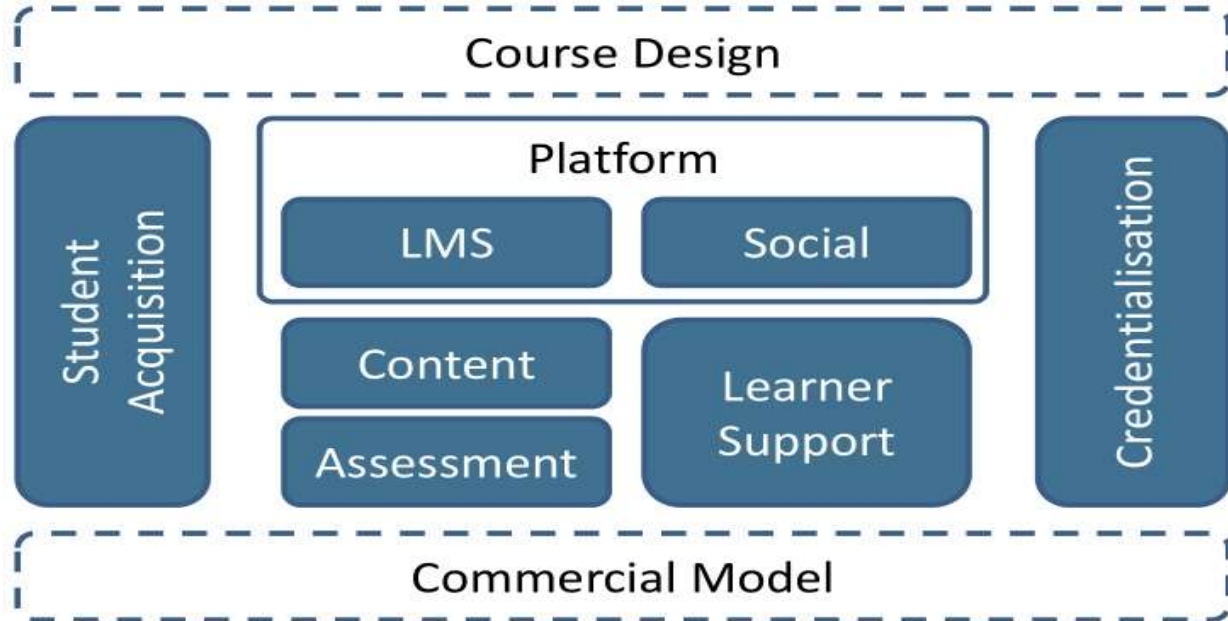


Figure 3: Components of a MOOC [Source: Components of a MOOC [Source: Koxvold, 2014]

1. **PLATFORM.** Delivery platforms function as the classroom in the MOOC model. Platforms are generally the Virtual Learning Environment that combines the qualities of social networking sites with the content delivery, discussion, and grading functions of the traditional Learning Management System. The platform also provides the structure and system for student registration, assignments, assessments, communications, and so on.
2. **VIDEO LECTURES.** In a typical MOOC model, video lectures take the place of classroom instruction. These are, at their most basic, recorded asynchronous sessions of the teacher discussing topics related to their MOOC subject. Their format is not prescribed by the MOOC host and as such, a wide array of presentation styles can be used, from talking heads to interviews to slideshows to graphic novels. They are typically short, normally 10-15 minutes long. Subtitles (primarily in English, but other languages are available) are provided. These video lectures are typically of a high quality.
3. **WIKIS & HYPERLINKS.** Wikis take the place of old-fashioned textbooks and other reading materials. Students are offered excerpts from textbooks covering the areas or subjects relevant to that week's topic of study. An alternative is to provide students with hyperlinks to documents and reading lists to give them access to course content.

-
- 4. FORUMS, BLOGS, FACEBOOK, TWITTER AND OTHER SOCIAL MEDIA PLATFORMS.** MOOC forums are the main method of student interaction with the content, each other, and the course team. In traditional learning, these can be viewed as classroom discussions. Forums are typically split into a number of threads, including (but not restricted to): general discussion, subject-specific discussion, course feedback and technical feedback. Instructors can actively participate in these forums or choose to use teaching assistants to respond to students, escalating queries when needed. Previous Q&A sessions remain in the forums for students who were unable to access the live sessions. In addition, students are encouraged to continue their discussions on dedicated pages on other social media platforms, such as Facebook and Google+. These discussions may or may not be actively monitored or moderated.
 - 5. ASSESSMENT & ASSIGNMENTS.** Assessment can be based on automatically-graded multiple choice questions, either as part of the video lectures (in-video quizzes) or taken separately. In addition to multiple choice questions, course teams could also opt to use auto-graded programming assignments or peer-review assessments. Peer review can be used for more open-ended assessment formats and requires students to mark one another's work based on a defined rubric set by the instructor. Figure 3 on the next page illustrates the common elements of a MOOC.



Figure 4: Components of a MOOC [Source: Jasnani, 2013]

2. MOOCs IN PRACTICE: WHAT WE KNOW SO FAR

The opportunity that MOOCs offer for the delivery of courses to a large number of people has generated significant interest from governments, institutions and commercial organizations. A number of MOOC platforms have been developed and offer courses independent of or in collaboration with universities. A growing number of institutions have been involved in engaging and experimenting with MOOCs for the purpose of bringing in new revenue or reducing operating costs, heightening brand recognition, and expanding access [Yuan & Powell, 2013]. Motivations for learners to participate in MOOCs are varied, and many struggle to engage with courses and keep motivated in the context of an online learning environment. The market value of certification of courses, short of credit as part of traditional institutional awards, has yet to be determined. Other potential business models are being developed but these need further work to become established.

Admittedly, the new pedagogical model is making an impact, but how much of an impact? Already, MOOC providers are capturing a great deal of data about the classes and learning processes currently under way, and analytics on these data vis-à-vis the learning experience of MOOCs are emerging. The ‘digital footprint’ of learners using the technology is captured in large data sets using data analytic tools that can potentially provide useful insights into online teaching and learning with very large numbers of students at low or minimal cost. For example, edX institutions such as MIT and Harvard use MOOCs to understand how students learn and improve innovations in teaching and learning on campus.

From the current data, MOOCs are indeed demonstrating the ability to provide access to education on a massive and international scale. Most students now enrolled in MOOCs are global, i.e. outside the United States. Most are also older, non-traditional students who use MOOCs for continuing education objectives; they are not students currently enrolled in an undergraduate or graduate program. Students who take MOOCs today appear to be doing so either as an “experience experiment” or as a way to augment their previous education for skill-enhancement purposes or personal self-actualization. But that balance could shift at any moment, as the uses of MOOCs to enhance existing educational programs develop.

The following section summarizes the key information gathered from these early MOOC initiatives. It provides a summary of what we have learned so far as the new pedagogical model continues to grow and mature. It also presents insights into the suppliers (providers and institutions) and consumers (learners) of the system. Finally, the recent trends in the industry are described, as well as initiatives coming from developing countries.

2.1. HOPE or HYPE?

If critics and sceptics are to be believed, then MOOCs are just hype, and it's time is over. They point out that enthusiasm for MOOCs has dipped and that it has reached the bottom of the hype cycle [Neal, 2013]. Even Dennis Yang, CEO of Udemy, a popular MOOC provider, admits, "Maybe we are MOOC'd out...we're arguably on the other side of the hype cycle," but adds that there is still hope because "what's happening in online education is revolutionary...[but] like with any other revolution, things will be bumpy [Yang, 2013]."

But what does the actual data show? An analysis of recent data suggests that MOOCs are not falling, but rather, they are still on the rise. The European Commission launched the Open Education Europa website in September 2013 as part of its "Opening up Education" initiative to provide a single gateway to European OERs. A study conducted by website called the "European MOOCs Scoreboard" highlights the growth of the industry from June 2013 to June 2014. It shows the 327% increase in the total number of MOOCs offered for the period (Figure 5).

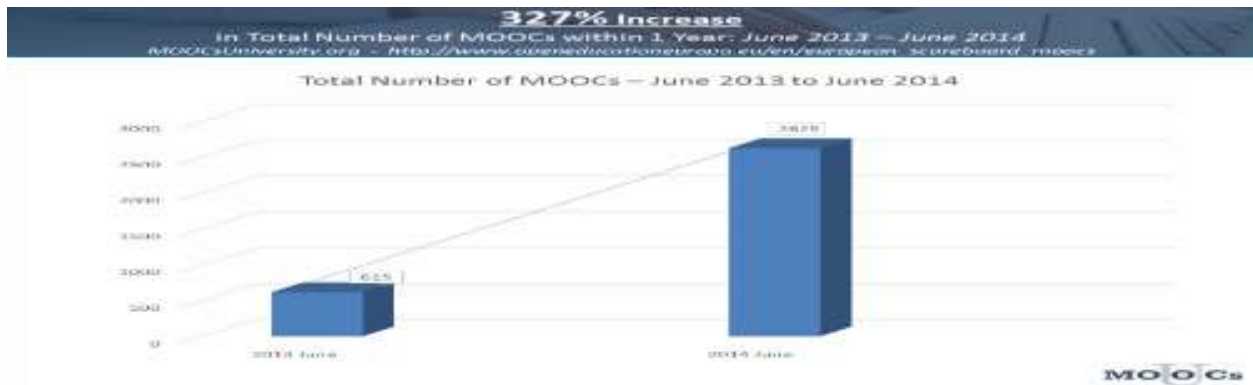


Figure 5: European MOOCs Scoreboard as of June, 2014 [Source: Open Education Europa, 2014]

The same study (which is an ongoing project), updated last month, shows an increase from 2,230 MOOCs in April of this year to 3,246 MOOCs as of September, 2014, representing a 12% increase (Figure 6), compared to an average growth of 10% for the same period globally [Open Education Europa, 2014].

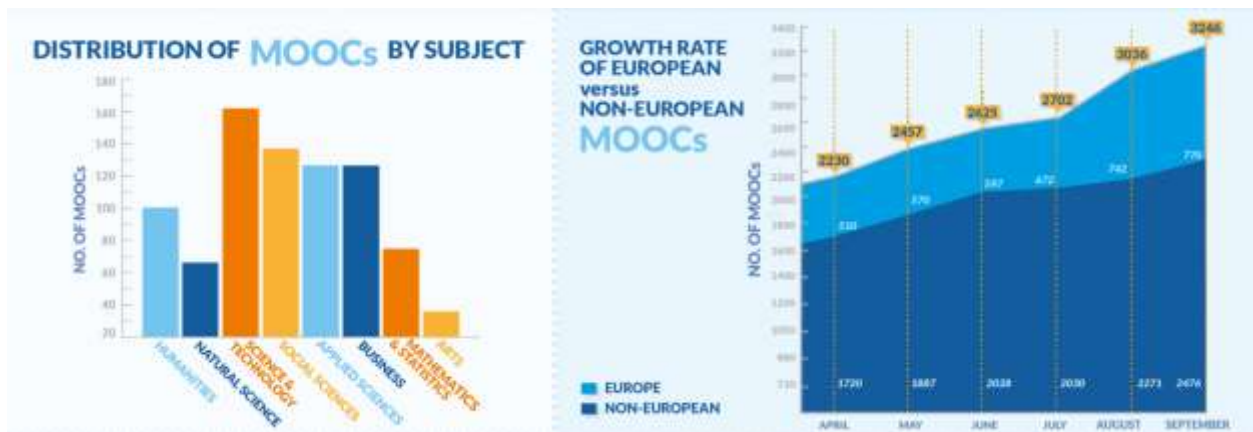


Figure 6: European MOOCs Scoreboard as of September, 2014 [Source: Open Education Europa, 2014]

A similar study conducted in December 2013 by Dhawal Shah shows a similar rise in the number of MOOCs in the United States. These figures were obtained from Class-Central.com, an aggregator website that gathers course listings through provider sites, social media, and tips from MOOC providers and users. According to the website, the number of courses offered has grown from about 100 MOOCs in 2012 to almost 700 starting in 2013, with an average of nearly two new MOOCs commencing every day. More than 1200 courses have been announced so far (Figure 7). The same website claims that over 200 universities are now offering MOOCs worldwide, with over 1300 instructors and 10 million students participating. However, based on an infographic created by the website TopTenColleges.org, as of April 2014, it is now estimated that there are over 5 million users registered to MOOCs worldwide, with an average enrollment of 33,000 users per MOOC offered.

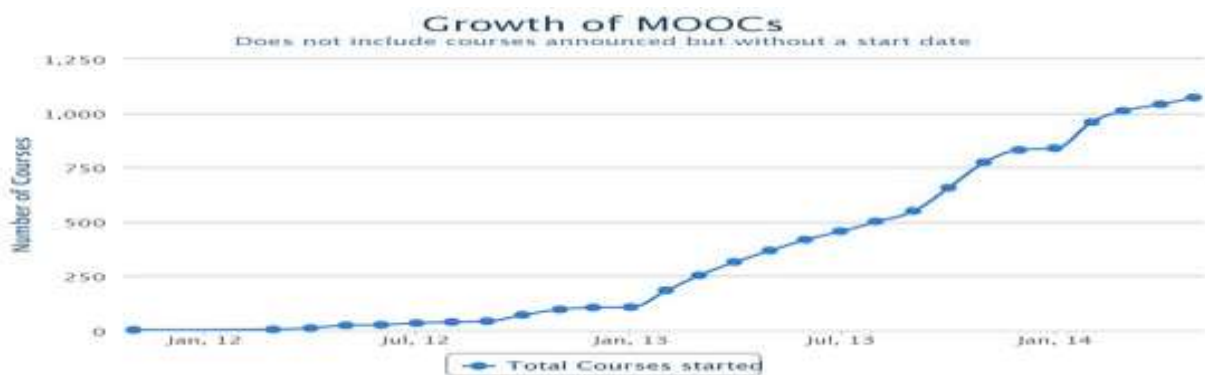


Figure 7: The Growth of MOOCs [Source: Shah, 2013]

More recent evidence shows that the growth of the phenomenon may not stop there. According to a new report by market research provider Sandler Research, the global MOOC market is expected to grow by 56.61% CAGR between 2014 and 2018. CAGR, or compound annual growth rate, is a commonly used method to calculate the average return of investment funds. The study cites the rising cost of quality education as one of the factors driving the growth of the market. It found that more and more students are opting for MOOCs as these courses are lower in cost and provide much better quality of education [Sandler Research, 2014].

Additionally, the MOOC industry is not only growing, but maturing as well. In a massive literature review of the phenomenon conducted by the Department for Business Innovation & Skills in the UK, the author(s) discovered that “the survey suggests that after a phase of broad experimentation, a process of maturation is in place. MOOCs are heading to become a significant and possibly a standard element of credentialed University education, exploiting new pedagogical models, discovering revenue and lowering costs [BIS, 2014].” Recent trends suggest that MOOCs are maturing into a niche but rich and very lucrative market – that of professional development [See Chapter 2.6 Recent Trends and Developments].

2.2. THE PROVIDERS

Yet another proof of the viral nature of MOOCs is to look at the rapid increase in the number of platform providers and participating institutions as well as the rising number of faculty members involved in creating online courses, demonstrating that, thus far, MOOCs are not just a 2012 “flash in the edu-pan” [Anderson, 2013]. The key message that emerges is that the evolution of MOOCs is leading to more players in the market as HEI and private organizations seek to take advantage of these innovations in online learning.

Since 2012, the “Year of the MOOC”, MOOC platform providers have increased exponentially. From the Big Three – Coursera, Udacity and edX – there are now over 50 major MOOC providers worldwide. Coursera remains the largest MOOC provider by far, with almost half of all the MOOCs offered (Figure 8). But its share is slowly being reduced by new MOOC providers from different parts of the world. Aside from the Big Three, other startups from within and outside the U.S. are gearing up to offer MOOCs. To mention a few, the last couple of years has seen the launch of major platforms Udemy and NovoEd (US), FutureLearn (UK), MiriadaX and OpenMOOC (Spain), Open2Study and OpenLearning (Australia), iversity and openHPI (Germany), France Université Numerique (France) and Schoo (Japan). Developing countries, not wanting to be left behind, have also launched their own national platforms, examples of which include Veduca (Brazil), Edraak and Rwaq (Arab), XuetangX and EWANT (China) and more recently, Swayam (India). Even leading traditional Learning Management System companies, such as Moodle, Blackboard (CourseSites), and Instructure (Canvas), and Open Education Resource giants Khan Academy and Saylor.org, have jumped on the bandwagon of MOOC delivery. The past year also saw giant tech companies such as Google and SAP and other major corporations such as AT&T joining the industry to get a piece of the action. Even social media giant Facebook announced this year that it sees itself as becoming a distribution vehicle for MOOCs.

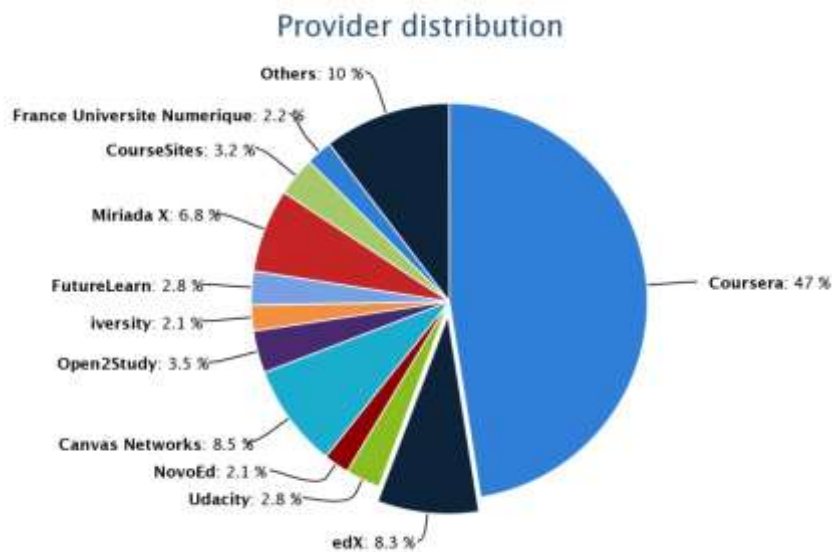


Figure 8: MOOC Provider Distribution [Source: Shah, 2013]

Major Platform Providers: The Big Three

edX is the non-profit, open-source MOOC platform founded by the Massachusetts Institute of Technology and Harvard University with \$60 million of resources contributed by the two institutions to support the project. edX is a collaborative effort between the two schools not to generate a profit, but to use the platform as a vehicle for research, and to explore alternative education models. In September 2013, Google partnered with edX to create mooc.org, a Do-It-Yourself course creation site for educators wishing to develop and offer MOOCs. Coursera, a Stanford University spin-off, is a for-profit company, which started with \$22 million total investment from venture capitalists. It now has over \$63M in total investments [Anderson, 2013]. Coursera is a collaborative online learning effort among more than 100 universities and organizations. Charter providers include Princeton University, Stanford University, University of Michigan-Ann Arbor, and the University of Pennsylvania. It claims to have more than 100 university partners and 5 million registered users worldwide. Udacity is another for-profit start-up founded by Stanford professor Sebastian Thrun along with David Stavens and Mike Sokolsky, with \$21.1 million in investments from venture capitalist firms, including Charles River Ventures and Andreessen Horowitz. After his 2011 Artificial Intelligence MOOC went viral, Thrun resigned as a professor at Stanford University and co-founded the for-profit platform.

Other Major Platform Providers

Aside from the Big Three, other for-profit and non-profit companies have also jumped into the service provider bandwagon. These include start-up companies like Udemy, which created one of the early models of offering open online classes that can be created by anyone and taken by anyone; established LMS vendors like Moodle, Canvas and Blackboard; MOOC initiatives like OpenMOOC, FUN, Miriada X, FutureLearn, and NovoEd. Companies like Google (CourseBuilder) and SAP (openSAP) have also joined the industry as major players.

Adaptive Learning Platforms

In addition to these online ventures, adaptive learning platforms/providers offer focused education programs and skills-development courses. The most widely known are Khan Academy, Saylor.org, and P2PU. While not strictly MOOC providers, these established organizations do offer massively online material as Open Education Resources. These open education initiatives have been around for a while, providing opportunities for anyone to learn with experts, peers and others outside traditional universities. The hugely popular Khan Academy, a not-for-profit educational organization with significant backing from the Bill & Melinda Gates Foundation and Google, was started by Salman Khan in 2008. It offers over 3,600 video lectures in academic subjects with automated exercises and continuous assessment. P2P University was launched in 2009 with funding from the Hewlett Foundation and the Shuttleworth Foundation. P2PU offers some of the features of MOOCs, but is focused on a community-centered approach to provide opportunities for anyone that is willing to teach and learn online. The Saylor Foundation has also created a site that offers certificates for successful completion of online classes. Other popular adaptive learning platforms include TED-Ed and Apple's iTunesU.

2.3. THE INSTITUTIONS

Since the so-called “Year of the MOOCs”, we have also witnessed the rise in the number of institutions, whether in collaboration with or independently of the providers, offering MOOCs. In the US, although still comparatively small, the number of institutions offering MOOCs almost doubled from 2.6 to 5 percent last year, with an additional 9.3 percent planning to offer a MOOC in the future [Allen & Seaman, 2014]. Coursera now boasts that it has 111 university partners worldwide. edX has over 30 university partners that are among the elite in their respective regions. Udacity has 16 partner institutions. FutureLearn, owned by the Open University in the UK, has over 20 prestigious partner institutions. MiriadaX, the Spanish platform, has over 1241 partner universities in 23 countries. Shah (2013) claims that over 200 institutions and over 1300 instructors are offering MOOCs worldwide. Aside from the elite universities, smaller state and community colleges have also begun to offer MOOCs in a wide range of topics either through the existing platforms or even through their own initiatives.

What Are Their Motivations?

An Educause executive brief (2012) identified the current value proposition for institutions to engage with MOOCs as “education access, experimentation and brand extension”. MOOCs can expand access to education and extend an institution’s reach and reputation locally and internationally. MOOCs can also help address the problem of HE budget constraints and help to lower the cost of degree courses by enabling inexpensive, low-risk experiments in different forms of HE provision.

One of the first comprehensive research studies on the MOOC phenomenon was conducted by researchers at Teacher’s College (TC) in 2013. The study, sponsored by the Center for Benefit-Cost Studies of Education, a research center at TC, “serves as an exploration of the goals of institutions creating or adopting MOOCs and how these institutions define [the] effectiveness of their MOOC initiatives” [Hollands & Tirhali, 2013]. The study was conducted from the perspective of institutions and was based on 83 interviews with faculty members, administrators, researchers, and other actors in the “MOOCspace” from 62 institutions, mostly in the U.S. It includes 13 case studies to illustrate how MOOCs are successfully being used to address institutional goals. The authors identified six goals from the institutions in the study that offered MOOCs, as summarized in the table below [Table 3]:

Institutional Goal	% of institutions offering /using MOOCs stating this as a goal (n=29)*	% of all interviewees who raised this as a goal (n=83)
Extending Reach and Access	65%	42%
Building and Maintaining Brand	41%	25%
Improving Economics	38%	29%
Improving Educational Outcomes	38%	20%
Innovation	38%	19%
Research on Teaching and Learning	28%	18%

* Includes one museum in addition to the universities and colleges.

Table 3: Institutional Goals for Developing and Delivering or Using MOOCs

The study finds that a primary goal for institutions offering MOOCs is to extend institutional reach and access to education (65%). “MOOCs are providing educational opportunities to millions of individuals across the world,” wrote the authors. However, to date, “most MOOC participants are already well-educated and employed.” [See Chapter 2.4 The Learners] Consequently, “the evidence suggests that MOOCs currently are falling far short of ‘democratizing’ education and may, for now, be doing more to increase gaps in access to education than to diminish them.”

Using MOOCs to build and maintain brand is another frequently mentioned institutional goal (41%), but while MOOCs often generate media attention, “isolating and measuring impact of any new initiative on brand is a difficult exercise,” the report suggests. Indeed, increasing access to online offerings and enhancing brand may be contradictory goals, because the former can be seen as diminishing the selectiveness of the offering institution.

Hollands and Tirthali (2013) reported that it is still too early to know whether MOOCs can live up to the hype of providing a cost-effective means for producing better educational outcomes on a mass scale. Cost analyses of MOOC production and delivery at four different institutions found that costs ranged from \$39,000 to \$325,000 per MOOC. “MOOCs have, so far, proved to be a significant drain on time and money for institutions,” they wrote. That picture could change as institutions reuse MOOC materials, share them with each other, develop common courses, replace on-campus courses with MOOCs, and save on faculty teaching time and facilities costs. Revenue streams from MOOCs have been slow in materializing. Unless costs of MOOC production can be recovered through fees, Hollands and Tirthali speculate that “free, non-credit bearing MOOCs are likely to remain available only from the wealthiest institutions that can subsidize the costs from other sources of funds.”

As for improving learning outcomes, MOOCs, on the whole, cannot yet make that claim. “While interviewees provided many examples of how MOOCs have been used to change instruction, for the most part, actual impact on educational outcomes has not been documented in any rigorous fashion,” the report asserts. However, two cases highlighted in the report provide examples of positive effects on student performance as a result of adopting MOOC-inspired strategies such as frequent assessment and automatic feedback, or of integrating MOOCs into flipped on-campus courses. Hollands and Tirthali conclude that “while the potential for MOOCs to contribute significantly to the development of personalized and adaptive learning is high, the reality is far from being achieved.” To get there, “a great deal of coordination and collaboration among content experts, instructors, researchers, instructional designers, and programmers will be necessary.”

Other similar studies have shown that fear is also a latent motivation for these institutions – i.e. the fear of being left behind and missing out on what might be a lucrative opportunity– even though they may feel that MOOCs are not necessarily the future of higher education. They stress the desire “to get a foot in the door in case MOOCs take off” [ACE, 2013]. Others mentioned outreach and service to the community and the public as possible motivators as well.

2.4. THE LEARNERS

There has been a lot of data to suggest that the number of people taking MOOCs is growing. Initial data shows that large numbers of people from around the world, who do not have easy access to higher education, have taken MOOCs (41%) [Clark, 2013c]. While student enrollment has risen from an estimated 1 million in 2012 to over 10 million today [Shah, 2013], with thousands of MOOC offerings and dozens of providers, information about *who* these students are has largely been more speculative.

A survey conducted in 2013 by the Edinburg University provides more in-depth information about MOOC users. The focus of the study was the behavior of their students over the course of six MOOCs provided via Coursera. As more and more research studies regarding the learners are conducted, valuable information as to who these MOOC students are and what they want is slowly being revealed.

Who are the MOOC students?

According to the study, MOOC students range from overachieving high school students to retired persons looking to learn something new, but the largest percentage are in their 20's and employed. Noticeably, over 40% of all students from the Edinburgh report had done some level of postgraduate university study (Figure 9). Nor is this an anomaly within today's MOOC students. Professor Tucker Balch released a report about his *Computational Investing* class, where 65% of his students reportedly had completed at least some graduate school [Swopes, 2013]. Potentially, these are recent college graduates who are looking to continue their college learning, perhaps in a subject they never got a chance to take in school, possibly to enhance personal development.

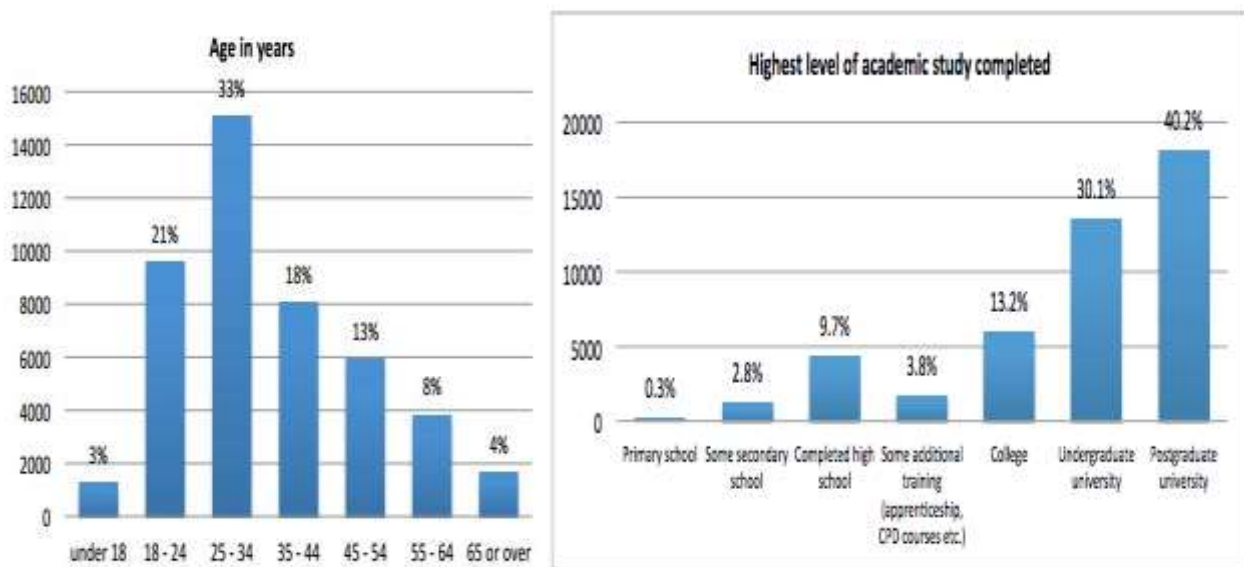


Figure 9: Age in years & Highest level of academic study completed [Source: Edinburg University, 2013]

Where do they come from?

The study reports that MOOC students are predominately from the US and the UK, which isn't surprising given that most MOOC providers are based in the U.S. and most of the MOOCs are offered in English (Figure 10). However, a large majority (61%) do come from the rest of the world, suggesting a broad global market for MOOCs. This trend may continue as more universities outside of the US and the UK join the MOOCspace, such as France's École Polytechnique and Israel's Tel Aviv University, and as providers like Coursera try to capitalize on global demand for its content by partnering with more international universities and offering courses in different languages. In a more recent study of four classes offered in English by The University of Wisconsin—Madison, 73% of students were living in countries outside the US and the UK [Swopes, 2013].

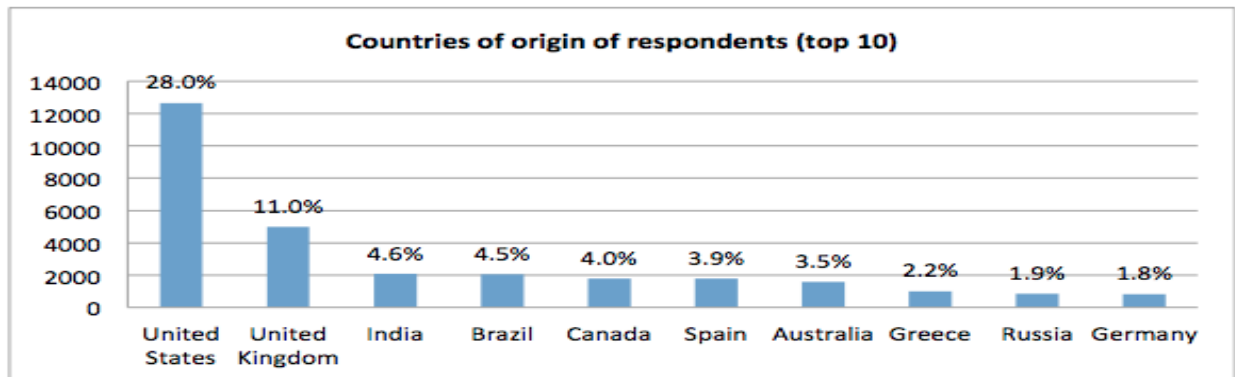


Figure 10: Countries of origin of respondents [Source: Edinburgh University, 2013]

What are their motivations?

This is a lesson that many MOOC observers are learning, that MOOCs reflect, not demand for certification but demand for 'learning' with only around a third interested in certification or career. As for their motivations, the report found out that, for the most part, these students are not taking a MOOC for career advancement (Figure 11), but rather, in order to learn something new or to experiment with the online format. It is important to note, though, that the Edinburgh MOOCs were some of the first MOOCs on Coursera. They ran in January 2013, before LinkedIn and other services started offering ways to promote MOOC learning to employers as acceptable, credited venues for earning valid professional skills. So while there is excitement and progress around the idea of MOOCs making elite-level university content available to people who could use it to better a career, for now, MOOCs seem to be taken more for pleasure [Swopes, 2013].

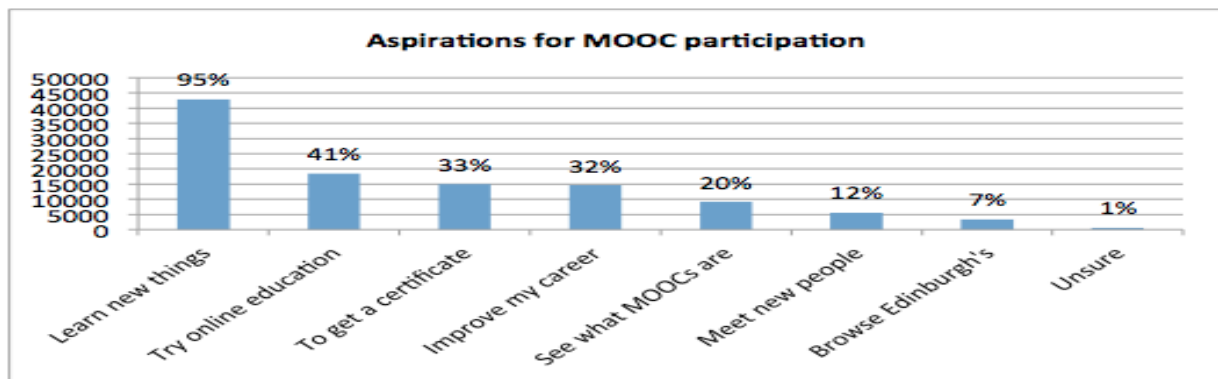
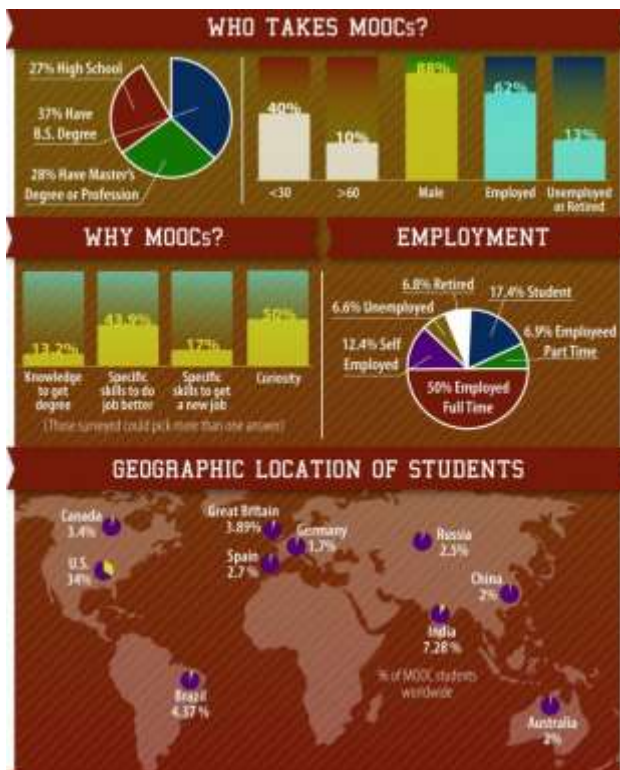


Figure 11: Aspirations for MOOC participation [Source: Edinburgh University, 2013]

The results of this aspect of the study are especially important since learners' motivation to participate in MOOCs is a significant area of interest to many HE stakeholders. There are many factors that influence students' motivation to learn; these include future economic benefit, development of personal and professional identity, challenge and achievement, and enjoyment and fun. But what motivates the MOOC learner? Surveys conducted by researchers at Duke University show that student motivations typically fell into one of four categories (Belanger and Thornton, 2013):

1. To support lifelong learning or gain an understanding of the subject matter, with no particular expectations for completion or achievement,
2. For fun, entertainment, social experience and intellectual stimulation,
3. Convenience, often in conjunction with barriers to traditional education options,
4. To experience or explore online education.

On the pre-course survey, fun and enjoyment were selected as important reasons for enrolling by a large majority of students (95%) and on the post-course survey, most reported that they have a general interest in the topic (87%). Students used the online course to help them decide if they want to take college/university classes (15%) while a significant minority of students claimed that they could not afford to pursue a formal education (10%) [Yuan & Powell, 2013].



Data from the infographic created by TopTenColleges.org show a similar student profile. 27% of those who take MOOCs are high school graduates; 37% have at least a college degree; and 28% have a Master's Degree or Profession. 40% are less than 30 years old, 88% are male, and 62% are employed, of which 50% are employed full-time. As to their motivations, 50% take MOOCs out of curiosity, 43.9% take MOOCs to learn or enhance specific skills for their jobs, 17% take MOOCs to learn new skills to get a new job, and only 13.2% take MOOCs to get a degree. The infographic also shows the continuing expansion of the market globally, not just in the US [TopTenColleges.org, 2014]. The European MOOC Scoreboard indicates that the three largest markets for MOOCs are the US (28.5%), India (16.5%), and China (16.2%) [Open Education Europa, 2014].

Research Study on Dropouts & Disengagement

A research study from Stanford University sheds light on the disengagement of students from MOOCs, and the implications contained therein. The LyticsLab@Stanford project examined the phenomenon of ‘MOOC dropouts’. This is especially important for course designers who want to know how large online classes are being used even by those who aren’t earning a certificate.

The Stanford researchers [Kizelec, et al, 2013] were able to identify four significant clusters of students who exhibited the same traits across different courses for high school, college and graduate levels. They recognized that students were of all ages and signed up for a variety of reason from all over the world. Their research took into account interactions with the lectures, discussions and quizzes for each lesson for nearly 100,000 students. By tracking and clustering the engagement of students in three courses taught at different levels, the researchers were able to identify four patterns or trajectories that provide a basis for understanding how MOOCs are being used (Figure 12). In general, these four clusters are:

- “Auditing” learners watched lectures throughout the course, but attempted very few assessments;
- “Completing” learners attempted most of the assessments offered in the course;
- “Disengaging” learners attempted assessments at the beginning of the course but then sometimes only watched lectures or disappeared entirely from the course; and
- “Sampling” learners briefly explored the course by watching a few videos.

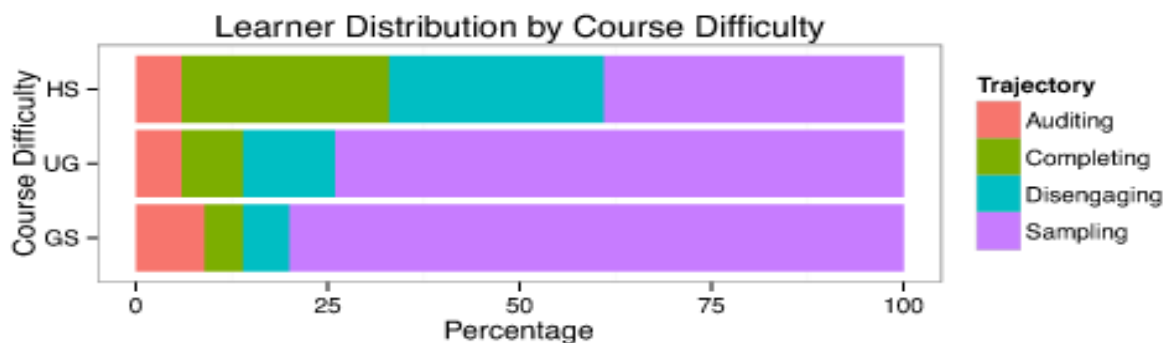


Figure 12: Learner Distribution by Course Difficulty [Kizelec, et al, 2013]

The findings of the report suggest some intriguing possibilities. For course developers, the findings point to areas where MOOCs can be improved. Courses can be designed to identify trajectories early on and to customize course features based on how a student is doing lesson by lesson. Not surprisingly, “completing” students are most satisfied with their course experience. They also interact more in forum discussions. New features might move “disengaging” students to another track or offer tutoring to “auditors”. Experiments can be designed to test whether activity with peers within a class motivates students to dig in more deeply. The researchers leave unanswered a question that might make the biggest difference to anyone who is taking a large online class – what if the class itself can be considered a resource as opposed to a course. This type of research is important because it sheds light on students’ behavior and provides evidence that many people don’t finish a course but still interact with it in several ways, suggesting that learning still happens regardless the end result.

What can we make of all this?

Based on these studies, a profile of the typical MOOC student is being formed. We now know that most MOOC students are young males, well-educated and employed, who are taking MOOCs to enhance personal learning and not necessarily to earn college credit. This is important not only to the MOOC providers but also to HEIs who are looking to offer MOOCs. Understanding who the learners are and what their motivations are may lead to better-designed courses that not only cater to their needs but improve learning outcomes as well. MOOCs generate massive quantities of data about learner behavior, which can be used to understand cognitive growth and how to improve instruction. Some platforms may evolve from course-delivery systems toward adaptive learning platforms—systems that personalize the experience based on the learner’s performance [Educause, 2013]. However, as the industry continues to grow and the model slowly matures, their appeal will likely extend to other types of students as well, such as high school students looking for an advantage on their college application or potential employees trying to stand out for recruiters. Increasingly, MOOCs are becoming more global, and the medium is changing daily, and more and more opportunities are being presented to these institutions and providers. HEIs have to be ready to take advantage of these opportunities not only to improve their brand and reputation but also to fulfill the promise of MOOCs of providing quality education to all.

2.5. THE SUBJECTS

The initial MOOCs were often from disciplines that lend themselves to quantitative assessment, such as engineering, computer science, and math. However, MOOCs are becoming applicable to all fields as the platforms enable more assessment methods such as peer review. The first wave of MOOCs in 2011 was overwhelmingly concentrated in the Computer Science and/or Engineering category. But we are now seeing the emergence of courses that tackle a broad array of topics. Significantly, in the US, the Humanities (composed of numerous sub-categories) has edged out Computer Science & Engineering to become the largest category [Shah, 2013]. One particular fast-growing category is Education and Teaching where courses are geared towards teaching pedagogy (Figure 13). In Europe, Science & Technology subjects still dominate, followed by Social Sciences, Applied Sciences & Business (Figure 5).

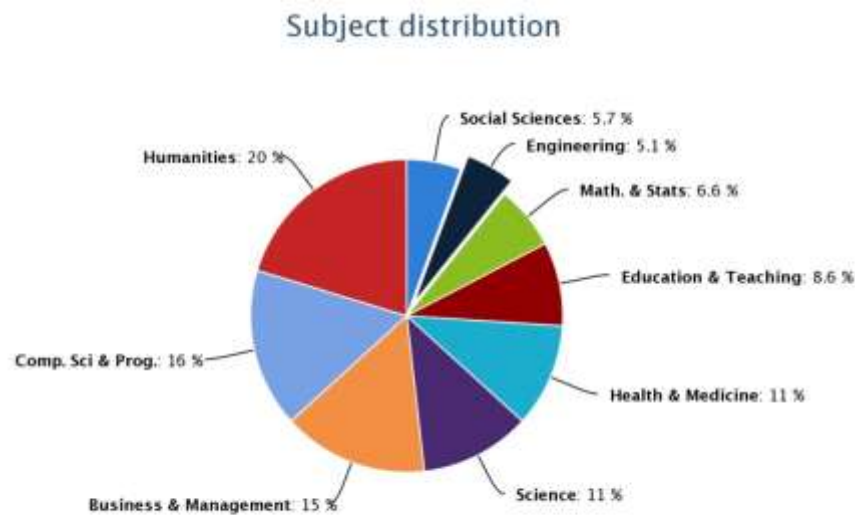


Figure 13: Subject Distribution [Shah, 2013]

2.6. RECENT TRENDS AND DEVELOPMENTS

MOOCs and Corporate Training & Personnel Development

There are strong indications that some MOOCs are becoming more focused on corporate training, which suggests that they may not pose an immediate threat to the existing pedagogical, revenue or business models of HEIs [Yuan, et al, 2014]. Individual job seekers understand that a traditional college degree does not equate to job offers; some employers have expressed growing skepticism that graduates of traditional universities are truly ready for a job. Additional, continuous training is often considered a requirement in the market today. In fact, companies have demanded additional employee development in the workplace. However, these trainings can often be time-intensive and costly. Additionally, the lack of competent trainers is perpetual concern. MOOCs therefore have been seen as a viable, productive (increased productivity), effective and efficient alternative.

Some major corporations have already started using MOOCs and MOOC elements in their training programs. For example, Internet security company McAfee “flipped its classroom” for its sales courses, which resulted in both time savings and increased sales. Insurance company JLT recently experimented with MOOCs in a blended environment by having some of its employees enroll in Coursera’s “Introduction to Public Speaking” and meeting in person once a week. SAP developed openSAP, an open-source MOOC platform, for product training purposes. The MOOCs offered by the platform are used by the company’s customers to orient themselves with SAP technologies. Other companies, such as Bank of America, AT&T, Intuit, Qualcomm and Yahoo!, are also adopting online courses as an effective and inexpensive way to train their workforce. Yahoo!, for instance, reimburses its employees for the cost of verified course-completion certificates from Coursera [Deloitte, 2014]. And MOOC providers, including Coursera and Udacity, are introducing new programs tailored for a business audience.

Meister (2013) cited a Future Workplace survey, completed by 195 corporate learning and Human Resource professionals that showed that “70 percent of its respondents said they saw opportunities to integrate MOOCs into their own company’s learning programs. Even further, this sample of respondents made six recommendations for how MOOC providers could adapt to needs of corporations” (Figure 14):

To Gain Greater Traction In Corporate Learning MOOCs Should Be Adapted To

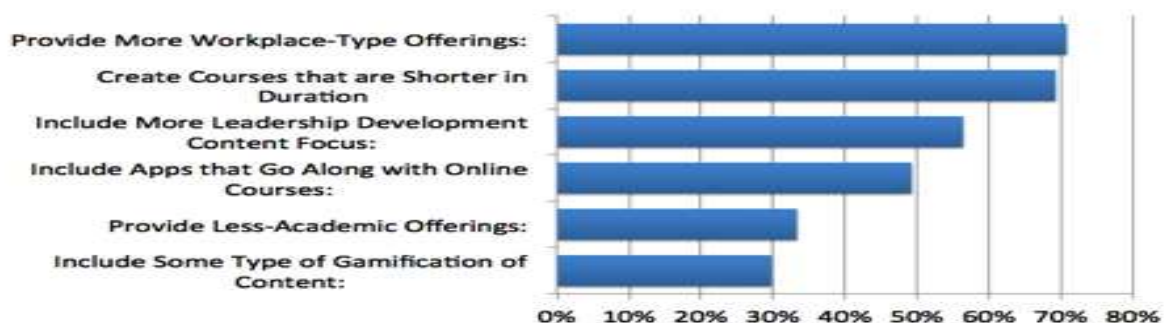


Figure 14: How MOOC providers can adapt to the needs of corporations [Future Workplace, 2013]

MOOCs and Corporate Recruitment

Another growing trend related to corporations is in the area of recruitment, as MOOCs also provide a significant opportunity in terms of job placement and employment. Candidates that have a few courses under their belt demonstrate qualities that employers greatly desire. They are clearly seen as self-starters, determined, ready to embrace continued learning and development, and (depending on the coursework) more likely to have the skills demanded for early success. New niche certifications being offered by the MOOC providers are aimed at satisfying employers' specific needs; in return, they will receive access to a talent pool guaranteed to have studied the skills the employer wants. Corporations are already engaging with students through MOOC platforms. For example, AT&T, Intuit, Google, and others are working with Udacity to develop courses to teach college students and recent graduates the skills demanded by clients and build a pipeline and resource pool of qualified talent. Udacity formed the Open Education Alliance with these corporate members to create courses on technology skills desired by them, and with input from them. edX is starting a course sequence called the XSeries, and plans to ask for input from a consortium of about 50 companies, including United Parcel Service Inc., Procter & Gamble Co. and Wal-Mart. Facebook, Twitter and other employers are working with Coursera to reach out to students who perform well on certain courses [Deloitte, 2014]. These developments will open the door for students to earn inexpensive credentials with real value in the job market.

In addition, there have been recent initiatives by business-oriented social networking services to validate MOOCs as an acceptable alternative to gain valuable, professional skills. A new partnership between popular social media site LinkedIn and some of the largest companies in education technology suggests that providers of MOOCs are seeking to establish online courses as valid professional credentials that people can flaunt on their LinkedIn profiles. LinkedIn announced in 2013 the new "Direct-to-Profile Certifications" pilot program. Organizations participating in the program include The Big Three providers and Udemy; publishing giant Pearson; and e-learning companies Lynda.com and Skillsoft. The new program allows users to display online courses they have completed on their LinkedIn profile by clicking a link in an email from the course provider. Although only a few candidates have been touting the MOOCs they've completed on their profiles, those who have are seen as more desirable and employable for demonstrating traits which indicate a commitment to upgrading skills and knowledge.

MOOCs and Certificates

There is also a growing trend towards the use of "Verified Certificates". For MOOC learners wanting to showcase their MOOC courses and achievements to employers, schools and others, a new optional type of paid certificates called "Verified Certificates" is now available from almost all of the major providers. Verified Certificates are awarded to learners (for a fee) who successfully completed the course. Using a variety of tools and methods such as webcams, keystroke analysis, valid photo identification, proctored test centers, and others, providers can verify and validate the student's identity. The prices of Verified Certificates currently range from \$25 to \$195 per certificate.

MOOCs and Credit

While the majority of MOOCs are not recognized by universities for credit-toward-degree programs, there have been some developments in this area during the past couple of years which indicate that it may become a trend. In 2013, the American Council on Education (ACE) endorsed 5 MOOCs for credit (all hosted on Coursera) – 2 from Duke University, 2 from the University of California at Irvine, and 1 from the University of Pennsylvania. Although the move was widely seen to have significant implications that are likely to reverberate on HEIs globally, it is not without its share of issues [See Chapter 3.1.3 Issues & Challenges: Assessment and Student Authentication] Note that only a limited number of institutions are offering credit for MOOCs. Currently, most universities are still observing the development of MOOCs without any commitment to providing credit toward formal degree programs.

However, some universities have indeed started offering MOOCs that are units from courses of selected degree programs. In August 2013, the University of Maryland University College announced it would be the first university to offer transfer credits to its students who complete MOOCs. Students have the option of sitting for a proctored exam and the results can provide partial credit toward a university degree course. Georgia Institute of Technology, in partnership with Udacity and AT&T, has announced plans to offer a Master's degree in computer science through MOOCs at a fraction of the cost of the on-campus costs. Students who enroll in the MOOC-based degree program will pay about 20% of the normal fees and will sit for formal exams as well have access to tutors and other support services. The University of São Paulo said it would offer credit for two MOOCs offered via the Brazilian MOOC platform, Veduca. MOOC2Degree, a program run by Academic Partnerships, said it would forge deals with its client universities to offer MOOCs for credit. Democratic and Republican state legislators in California and Florida (respectively) have introduced bills that would allow students to transfer MOOC credit to state universities. However, not all MOOCs for credit have been warmly received by students. For example, not a single student at Colorado State University-Global Campus signed up for MOOC-for-credit this year [Kolowich, 2013b].

MOOC Mutants

By mid-2013, a trend to rename any sort of online teaching into "MOOC" emerged, just like anything became e-learning at some point. A second trend was to come up with other acronyms and claim some relationship to MOOCs. For example, in 2013, we were introduced to a number of new acronyms as MOOCs developed in various directions: DOCC (distributed open collaborative course), BOOC (big open online course), MOOD (massive open online discussion), MOOA (massive open online administrations), SMOC (synchronous massive online course), SPOC (small private online courses), and MOOCoW (MOOC on Wednesdays, and yes, it really does exist) [For a comprehensive list of the MOOC variants, see Appendix A]. But for the most part, rather than adopting new acronyms or encouraging new permutations, we saw instead appropriation of the term MOOC to mean any sort of online offering, even if such offerings weren't really MOOCs.

MOOCs and Blended Learning and Flipped Classrooms

Salman Khan, the founder of the popular Open Educational Resource website, Khan Academy, observed one main trend that has caught on in the field of online education. In his TED talk last 2012, he said students reversed the “concept of lecture and homework” in MOOCs and he called it “flipping the classroom” [Endozo, 2013]. In the model, the classroom is effectively “flipped”; students watch online lectures at home and use their time at the conventional brick-and-mortar institution to work on projects and/or assignments guided by his or her teachers and peers. Flipped classrooms operate on the theory that it’s preferable to shift the less interactive part of the learning process — knowledge transfer — to the homework time and to free up classroom time for more coaching and mentoring, particularly on the exercises traditionally done as homework. The instructor can then in turn act more like a tutor walking among the students rather than a sage on the stage performing a monologue.

An increasing numbers of professors are now experimenting with "flipping the classroom lecture". Some professors are capitalizing on video lectures delivered by other experts or on content that is openly available through initiatives like Khan Academy and TED-Ed. A large number of traditional schools now blend online and offline learning, and there is proof that such hybrid models can improve student performance in traditional in-person classes. A San Jose University Engineering course used this model with an edX-sponsored MOOC and found that incorporating content from an online course into a for-credit campus-based course increased pass rates to 91% from as low as 55% without the online component and the retake rate dropped from 41% to 9% [Handover Research, 2013].

Blended learning is another form of education that takes place both online and in a conventional brick-and-mortar institution. In blended learning scenarios, “face time” between students and teachers is not replaced by online course delivery. Rather, the online component of the learning experience usually consists of exercises or additional content that complement the in-class lesson. Often, the term *hybrid learning* is used almost interchangeably with blended learning. However, there is a subtle distinction. In hybrid learning, a significant portion of the course takes place online. In contrast with blended learning, a hybrid learning scenario replaces much of the student-teacher “face time” in a brick-and-mortar institutions with online interaction.

There’s a lot of promise and demand for a blended system that combines a MOOC with some sort of in-person interaction. Kepler University in Rwanda uses teaching fellows to lead in-person discussions and contextualize the information presented in a MOOC to a Rwandan audience. In a blended system like Kepler’s, a MOOC is effectively a textbook, part of a larger educational experience. So far that approach appears to be working. Kepler students are building skills and receiving credentials while avoiding the high dropout rates traditionally associated with MOOCs. Its class sizes are smaller, but it’s still received requests to help with similar initiatives throughout the developing world. Even the U.S. State Department has held “MOOC camps,” or facilitated discussions based around MOOCs, across the globe. Similarly, Coursera is building "Learning Hubs" across the world that includes weekly in-person instruction. Some universities in the Philippines have also started to experiment on using MOOCs as a supplement to classroom instruction. “The blended MOOCs approach has been helpful in enhancing the learners understanding of lessons,” said Dr. Alita Roxas of Mindanao State University [PIDS, 2013].

2.7. MEANWHILE, IN THE DEVELOPING WORLD...

Much of the promise of MOOCs lies in what they might offer the world's less fortunate students. MOOCs, some argued, are a solution — or even *the* solution — to the developing world's higher education problem. These online courses not only promised to bring the Ivy League experience to anyone with a broadband connection, they also promised to provide a way for students around the world to learn new skills and even earn credentials for little or no cost.

The New York Times declared 2012 “the year of the MOOC.” Venture capital funds flooded into for-profit MOOC providers, such as Coursera and Udacity. “Nothing has more potential to lift more people out of poverty,” wrote New York Times columnist Thomas Friedman in 2013. “Nothing has more potential to unlock a billion more brains to solve the world's biggest problems.” And non-profits organizations such as edX, roped in more students and, along with them, more university partners. Their reach seemed expansive: by providing access to world-class institutions to anyone with a high-speed Internet connection, MOOCs had the potential to target the “non-consumers” of education, making the possibility of “a future where everyone has access to a world-class education” a little more plausible.

For some, MOOCs are falling to the bottom of the Technology Hype Cycle but internationally, they seem to be climbing up the Slope of Enlightenment towards sustainability. The discussion surrounding MOOCs is full of opinions about their effectiveness and impact on higher education, but few would argue with the notion that MOOCs are playing a significant role in improving the lives of many around the world who do not even have access to a basic education. Unlike participants in developed countries, who use MOOCs to pursue hobbies, learn new knowledge or acquire new skills, people in developing countries use them to actually improve their lives. The “Big Three” MOOC platform providers, Coursera, Udacity and edX, are based in the United States, but two-thirds of their users live abroad in countries like Rwanda, Kenya, China, and Brazil. The next section summarizes the development of MOOCs in these developing countries.

MOOC Providers in Developing Countries

The increase in the number of platform providers has extended to those of developing nations as well. Already there are 3 major MOOC platforms in China – EWANT, XuetangX and iMOOC. 19 universities in China announced last April that they will acknowledge MOOCs for credits using cnMOOCs, another Chinese platform developed by the Shanghai Jiao Tong University. Recently, India announced the launching of its own official MOOC platform called Swayam, which went ‘live’ on September 25, 2014. Malaysia has a MOOC portal developed in collaboration with OpenLearning. In South America, there is one major platform, Veduca (Brazil).

MOOC Markets in Developing Countries

Even though MOOCs were born in the United States and Europe, they are expanding more quickly in poorer countries around the world. The TopTenCollege.org infographic claims that over 40% of MOOCs users are from developing countries. The European MOOC Scoreboard cites India (16.5%) and China (16.2%) as the 2nd and 3rd largest MOOC markets in the world.

MOOCs Help the Global Poor

Platform providers in more developed countries have also been trying to figure out what the content should be when trying to reach an international audience. For example, Germany is using their platform to help the Philippines – in response to the devastation caused by Typhoon Haiyan in 2013, iversity created a MOOC course titled “Designing Resilient Schools” to teach people how different architectural designs can be used to help build schools that can serve as community centers and shelters. Among countries in Africa, MOOCs are now providing opportunities for a better life. Non-profit organizations like Generation Rwanda are taking full advantage of internet connection to provide students opportunities that otherwise would not be available to them. Generation Rwanda is providing seed funding for Kepler University. The goal is to provide students an opportunity to live and work while they earn a bachelor’s degree online using MOOC material accredited by U.S. and European universities. The school is based on a blended-learning model in partnership with Southern New Hampshire University and will only cost \$1,000/year. This is similar to Coursera’s Learning Hubs where students have a physical classroom to access Coursera material alongside other peers and colleagues. Spire is a similar program in Kenya which is currently under development. In India, a business incubator and arts center built in downtown Bangalore is home to Jaaga. The goal is to develop computer programmers so they can jump into the job market after one year of intensive studies. Students will study MOOC content in partnership with volunteer facilitators and online mentors from around the world. Programs like these are evidence that online open content can open doors many people thought were locked.

MOOC Offerings in Developing Countries

The first MOOC in Malaysia was offered by Taylor's University in March 2013. The MOOC was titled "Entrepreneurship" and it attracted students from 115 different countries. Following this successful MOOC, Taylor's University launched the second MOOC titled "Achieving Success with Emotional Intelligence" in July 2013. In August 2013, Universitas Ciputra Entrepreneurship Online (UCEO) launched the first MOOC in Indonesia with the first course entitled “Entrepreneurship Ciputra Way”. With over 20,000 registered members, the course offered insights on how to start a business, and was delivered in Indonesian. An Najah National University in Palestine offered its first MOOC called “Discover Palestine” which describes the country’s history, heritage, culture and archaeology.

Here in the Philippines, the University of the Philippines Open University offered the very first MOOC in the country, “Introduction to Mobile Application Development using the Android Platform.” Developed in partnership with Smart Communication, Inc., the MOOC attracted 390 participants (Table 4 on the next page summarizes the profiles of the learners who enrolled). The course coincided with the launch of UPOU’s online platform for MOOCs, @ral. The MOOC was conferred the Merit Award in the “PR Programs Merit on a Sustained Basis (Education/Literacy Category)” at the 49th Anvil Awards last February, 2014. A second MOOC, “Online Service Management Program”, has been offered in association with the Information Technology and Business Process Association of the Philippines (IBPAP) and the Asian Institute of Management (AIM). The free MOOC is intended for Filipinos who want to pursue a career in IT and Business Process Management (IT-BPM). An offline version of the program is currently being offered in many universities nationwide as a 21-unit minor course.

1. Geographical location	Based in the Philippines	354	91%
	Based outside the Philippines	36	9%
2. Gender	Male	244	63%
	Female	120	30%
	No response	26	7%
3. Age	20 and below	24	6%
	21-30	172	44%
	31-40	117	30%
	41-50	26	7%
	51 and above	11	3%
	No Response	40	10%
4. Educational Attainment	Undergraduate/2 year-course	117	30%
	College Graduate	189	48%
	Post Graduate	58	15%
	No Response	26	7%
5. Employment Status	Employed	300	77%
	Unemployed	10	3%
	Student	35	9%
	No Response	45	11%
6. Experience Doing Online Course	Yes	165	42%
	No	205	52%
	No Response	20	6%

Table 4: Profile of Learners in 1st UPOU MOOC [Source: dela Pena-Bandalaria, 2013]

3. ISSUES AND CHALLENGES

The attention verging on hype around MOOCs has raised many concerns and criticisms in educational fora. In a massive literature review of the MOOCs phenomenon conducted by the Department for Business Innovation & Skills in the UK, the author(s) found that those opposed to MOOCs contend that “the supposed benefits of MOOCs were already realized in previous generations of ODL (Online Distance Learning) innovation – and the innovations of MOOCs are the victory of packaging over content,” and that the “MOOC format itself suffers from weaknesses around access, content, quality of learning, accreditation, pedagogy, poor engagement of weaker learners, exclusion of learners without specific networking skills [BIS, 2014].”

Over the recent years, there has been a significant change in societal adoption of Internet technologies with extensive proliferation and use in more economically developed countries. However, in terms of the proliferation of MOOCs as an educational approach, there is a risk that the current enthusiasm is being driven by a self-selecting group of highly educated, IT literate individuals who are able to navigate the sometimes complex, confusing and intimidating nature of online learning. In general, there are concerns about the pedagogy and quality of current MOOC courses, with a clear distinction between process and content-based approaches. The motivation for some MOOCs is a philanthropic one and for others a business proposition. However, in both cases, there is the challenge of finding a viable model that allows for sustainability of MOOC provision [Yuan & Powell, 2013].

Hill cites four barriers that MOOCs must overcome to build a sustainable model [Hill, 1992]. These are:

1. Developing revenue models to make the concept self-sustaining;
2. Delivering valuable signifiers of completion such as credentials, badges or acceptance into accredited programs;
3. Providing an experience and perceived value that enables higher course completion rates (most today have less than 10% of registered students actually completing the course) [Jordan, 2013];
4. Authenticating students in a manner to satisfy accrediting institutions or hiring companies that the student’s identity is actually known.

Other issues of concern that have been frequently mentioned and discussed include copyright and ownership of materials, and cheating and bullying. Moreover, there are certain issues and threats not present in the MOOC western model but are inherent in developing countries, including digital access, infrastructure, language and culture, and cost. The next chapter discusses each of these in turn.

3.1. GENERAL ISSUES

3.1.1. SUSTAINABILITY & BUSINESS MODELS

The rise and viral nature of MOOCs may not be enough to sustain the multimillion-dollar investments made by MOOC entities in the past two years. At some point, business models must emerge along with answers to the question: are MOOCs financially sustainable? Education is a \$1-trillion market and growing, as new areas of the world seek ways to educate their populations. Moreover, according to Global Industry Analysts, the global e-learning market will reach \$107 billion by 2015. However, it is not entirely clear how the MOOC approach to online education will make money. Most MOOC start-ups do not appear to have clear business models and are following the common approach of Silicon Valley start-ups by building fast and worrying about revenue streams later [Yuan & Powell, 2013].

Right now, no standard business model for MOOCs exists that clearly indicates a viable revenue stream for these institutions or the companies that offer the courses. Indeed, one is hard pressed to find a clear business model that works, in particular for the institutions that provide the course content. Most of the major providers are still working on developing a variety of business models. Currently, many university professors are designing and developing the course content without compensation or financial backing. Since the courses are free, there are no proceeds that trickle back to the creators of the courses.

The most common revenue stream for most of the major MOOC providers and their partner institutions is to charge fees for certificates or badges (and in rare cases, for credit). The courses are offered for free, but if a student chooses to be certified, then they have to pay. Coursera's Signature Track offers certificates for \$30 up to \$100. Udacity's students can choose to certify their skills online or in one of its testing centers for a fee. edX also charges for certification. However, it is a significant challenge for these entities to generate income in this way. The extent to which revenue from certification fees can support a MOOC business remains unclear. So far, only a small fraction of the students who have registered for MOOCs actually make it to the final exam – generally between 10 and 20 percent, which means that the providers would be relying on a small portion of their users for revenue.

In established education business models, universities have control of the customer value proposition in that they provide any recognition of learning and set tuition fees. For MOOCs, most participating institutions have decided that they will not offer credits as part of traditional awards for these courses, probably as a result of concerns about the quality of the courses and the downside risks posed to their branding. It would be also against the overall principles of MOOCs if universities started to charge tuition fees for their courses. Therefore, many institutions participating in MOOCs consider the courses they offer to be a branding and marketing activity at present [Yuan & Powell, 2013]. Since the institutions producing MOOCs (MIT, Harvard, Stanford and others) have healthy balance sheets and sizeable endowments, revenue streams seem to be of no great concern at the moment.

In the long run, however, in order to sustain the MOOCs model, these organizations will have to find ways to establish a clear business model that generates a continuous stream of revenue. Whilst edX is a not-for-profit organization, at some point it will also need to be self-sustaining. Coursera and Udacity are both for-profit organizations, funded mostly by venture capitalists. Eventually, these venture capitalists will demand a return on their multi-million dollar investments.

But where will the money come from? According to Young (2012), some clues can be found in the contract the institutions signed. *The Chronicle* obtained the agreement between Coursera and the University of Michigan at Ann Arbor, the first public university to make such a deal, under a Freedom of Information Act request, and Coursera officials confirm that the arrangement is similar to those with its other partners. The contract surprisingly reveals that even Coursera isn't yet sure how it will bring in revenue. A section at the end of the agreement, titled "Possible Company Monetization Strategies," lists eight potential business models (Andrew Ng, a co-founder of the company and a professor of computer science at Stanford, describes the list as an act of "brainstorming" rather than a set plan) [Young, 2012]. These are:

1. Certification (students pay for a badge or certificate)
2. Secure assessments (students pay to have their examinations supervised or proctored)
3. Employee recruitment (companies pay for access to student performance records)
4. Applicant screening (employers/universities pay for access to records to screen applicants)
5. Human tutoring or assignment marking (for which students pay)
6. Selling the MOOC platform to enterprises to use in their own training courses
7. Sponsorships (3rd party sponsors of courses)
8. Tuition fees

Table 5 provides an overview of potential business models proposed by the 'Big Three' MOOC providers.

edX	Coursera	Udacity
<ul style="list-style-type: none"> • Certification 	<ul style="list-style-type: none"> • Certification • Secure assessments • Employee recruitment • Applicant screening • Human tutoring or assignment marking • Enterprises pay to run their own training courses • Sponsorships • Tuition fees 	<ul style="list-style-type: none"> • Certification • Employers paying to recruit talented students • Students résumés and job match services • Sponsored high-tech skill courses

Table 5: Overview of Potential Business Models [Source: Yuan, et al, 2014]

Of these options, certification and employee recruitment are under the most active consideration, according to Young (2012), and are the ones currently being employed. Aside from charging for certification, Coursera is also experimenting with a career service that makes money by connecting employers to its students. Udacity has implemented one of the more enterprising business models - doubling as a headhunter for companies that might like to hire some of its more impressive students. Instead of simply selling those students credentials that they can list on their resumes while looking around for jobs, Udacity would offer to match students with companies that have enlisted Udacity as a talent scout. Udacity would then take a commission for each successful match. Recruitment referral is especially attractive, especially in IT and other technical MOOCs, where high-end, practical skills are sought from a global pool.

As previously mentioned, the two options over which the universities have most control, certification and tuition fees, both present problems. More specifically, as regards tuition fees, there are huge challenges of principle and practice. Is a MOOC still 'open' if you have to pay for it? Quite apart from the logistical nightmare of collecting fees from MOOC users in over 160 countries, it seems certain that even a nominal fee would reduce interest dramatically.

Among the other potential business models mentioned in the contract are:

Offering Secure or Proctored Assessments. Many MOOC providers now offer both online and offline assessment, on a shared revenue basis, in partnership with established companies such as ProctorU and Pearson VUE [Chapter 3.1.2 Assessment, Credit, and Student Authentication]. This is an additional high-value proposition that can attract prices greater than that of volume certification.

Selling Courses to Third-parties. The contract mentions the idea of offering the course content to community colleges that could create a customized version of the free course for their enrolled students for credit. That idea was among those discussed, in theory, during Duke University's negotiations with Coursera. Peter Lange, Duke University's provost, says he believes it would be up to Coursera to drum up such business, if it ever happens. "It's my expectation that that would be somewhat mediated by Coursera," he says. "It's not likely that we'd be going out to promote our educational outcomes to community colleges" [Young, 2012]. Another related potential model is to sell courses to corporations for personnel development and training [See Chapter 2.6 Recent Trends and Developments].

Tuition Fees. The contract allows universities to offer the Coursera courses on their own campuses for credit. In that case, the university pays the company for the use of the platform, in an amount determined on a case-by-case basis. So far, the only university actively pursuing that model is the University of Washington. "We don't want to make money, we just want to be able to fund the development of the courses," says David P. Szatmary, the university's vice provost. He says Washington officials expect increased staff costs to design the courses and edit video of lectures. The university will pay the company \$25 per student for those who pay tuition to take the courses. [Young, 2012]

Sponsorship. Google, AT&T and other major corporations have been active in sponsoring MOOCs that are relevant to their respective companies [See Chapter 2.6 Recent Trends and Developments]. This continues to grow as a trend in the industry, and a viable opportunity for niche marketing.

However, the most striking feature about the list is that the organization least likely to make money is the partner university. Already, for example, xMOOC institutions stung by the prevalence of plagiarism are signing up with Pearson VUE, a subsidiary of the Pearson conglomerate, to use its worldwide network of testing centers [Kolowich, 2012]. If and when money does come in, the company will get the vast majority of the cash flow with the institutions getting only 6-15% of the revenue and 20% of gross profits [Young, 2012]. This means that the company gets the vast majority of the cash flow. In other words, the platform is first to see revenue, the university last.

Other potential business models that have been suggested or being employed include:

Advertising. Sending targeted advertising to the users of the system in the same “old” Internet way that Google offers free Gmail, or that Facebook allows all that usage at no cost, through sponsored ads [Voss, 2013]. Any online delivery that attracts a large number of people can generate advertising revenue. In this case the advertisers know exactly what sort of audience they’re attracting, and as MOOCs develop, this data will become invaluable. It’s not just the number of participants, now in their millions, but the intense amount of time they spend on the course [Clark, 2013a]. Currently, the Irish platform provider ALISON employs such a business model, with great success.

Books/Materials. Some MOOCs have already linked the course to compulsory or optional course materials such as existing textbooks but there are also potential sales from specialized course materials, such as software and equipment [Clark 2013a].

Private Donations. Institutions often dip into the pockets of philanthropists for donations that go into expensive, and sometimes ill-advised, capital projects. An alternative is emerging, where donors contribute towards courses. This is a fine idea, especially if the donor is an interested party, with some background and credibility in the subject.

Government. In many countries, especially the developing ones, this is the primary course of funding, as seen in the experience of FutureLearn, via the Open University, in the UK, and EWANT in China.

Summer schools. Universities have pitifully low occupancy rates, which is one reason for their high costs, so offering ‘summer schools’ or other ‘holiday period’ learning experiences could be one way to generate income, especially from the intellectually curious, who are less interested in certification. The Open University, in the UK, has been doing this for decades.

Regardless of which model is chosen, universities are advised to formulate clear value statements and general policies and practices to guide their actions in online education. In addition, it is critical to fully understand the cost structure, development and production costs, opportunity costs, and revenue distribution models. It is also important to facilitate discussions within academic departments to consider organizational cultural challenges, faculty teaching and service expectations, and faculty compensation policies and to develop policies that are truly sustainable.

3.1.2. QUALITY & COMPLETION RATES

MOOC completion rates remain remarkably low (normally below 10%) compared to traditional online and offline courses as shown in the data visualization developed by Katy Jordan below (Figures 15 & 16).

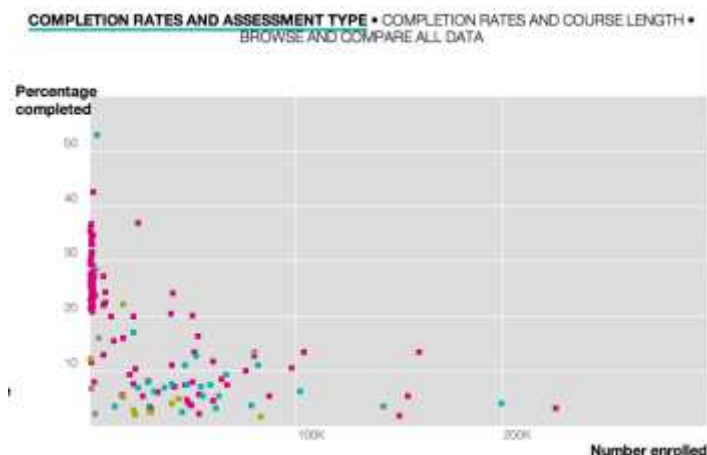


Figure 15: MOOC Project by Katy Jordan [Source: Jordan, 2013]

Jordan collected completion data from 221 different MOOCs, primarily from platform providers Coursera and Open2Study. Jordan [2014] states in her conclusion, “The majority of courses have been found to have completion rates of less than 10% of those who enroll, with a median average of 6.5%. The definition of completion rate used here is the percentage of enrolled students who satisfied the courses’ criteria in order to earn a certificate, and this definition was used because it is the type of information that is most frequently available...The wider range of completion rates (while still remaining quite low overall, with a median of 10%) observed when defining completion as a percentage of active learners in courses is interesting and warrants further work to better understand the reasons why those who become engaged initially do or do not complete courses.”

A more recent study conducted earlier this year by researchers from Harvard and MIT looked at various aspects of 17 MOOCs offered in 2012 and 2013 through edX, the online learning platform established by the two universities. They discovered that just 5% of the more than 841,600 people who registered for edX courses earned a certificate of completion. In fact, 35% never even viewed any of the course materials at all [Ho, et al, 2014]. In addition, Udacity only has a 7% completion rate [Bonhardt, 2013].

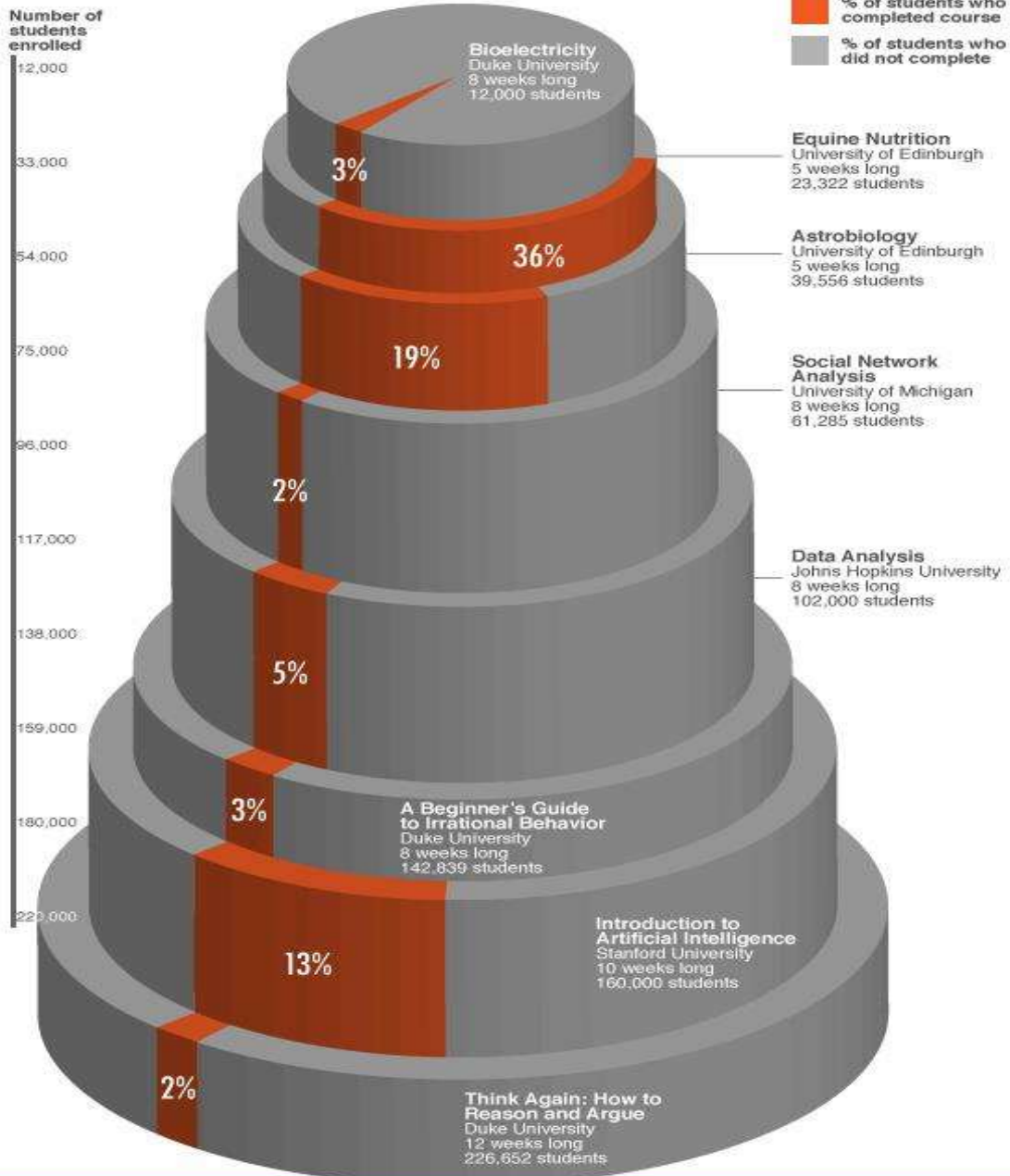
Still another study from the University of Pennsylvania Graduate School of Education (Penn GSE) show that MOOCs have relatively few active users, that user “engagement” falls off dramatically—especially after the first 1-2 weeks of a course—and that few users persist to the course end. The Penn GSE study analyzed the movement of a million users through 16 Coursera courses offered by the University of Pennsylvania from June 2012 to June 2013. They found that course completion rates are very low, averaging 4% across all courses and ranging from 2% to 14% depending on the course and measurement of completion [Perna, et al, 2013].

HOW MANY STUDENTS ARE FINISHING MOOCS?



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MOOCs are more popular than Justin Bieber right now, but that doesn't mean they don't have their share of problems. Out of the thousands of students enrolling in these free online courses, few are actually completing them. Because MOOCs are so new, the reason why is anyone's guess.



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 Source: <http://www.katyjordan.com/MOOCproject.html>

Figure 16: How Many Students Are Finishing MOOCs? [Source, Varner, 2013]

Even if most research in this area is just starting, researchers, professors and MOOCs providers have already ventured several reasons that could explain the exaggerated dropout rates:

1. **Price as a barrier:** MOOCs are free, so most people enroll just out of curiosity to check out new courses. And with no psychological or financial investment, it is easy for the participant to become disengaged.
2. **Scope of interest:** Some students are interested only in one specific topic or section. They enrolled to have access to the video lectures or discussion forums but they have no intention of finishing the course.
3. **Extrinsic motivations:** Since most students will not earn credits or validated certificates, they are less concerned about the requirements to pass the course and are just focused on their own learning interests. However, if the work is too hard, they soon lose interest.
4. **Lack of physical interaction:** There is a noticeable absence of any meaningful engagement with either the instructor or the material. Often, the methodology feels more like a classroom lecture on steroids with all interaction taking place (or not) with peers.

Whether the low dropout rates should be a concern for MOOCs is an ongoing debate. The TopTenCollege.org infographic points out that the average completion rate for MOOCs worldwide is only 7%. Whether or not these rates matter depends largely on the perceived purpose of the MOOCs in the first place. If the aim is to give the opportunity of access to free and high-quality courses from elite universities and professors, then high dropout rates may not be a primary concern. Previous studies have shown that a majority of MOOC users take the courses out of curiosity, or for personal growth, and not for accreditation. However, it is widely agreed that it would be useful to improve the retention rates of MOOCs by finding out why and at what stage students drop out of courses. A survey conducted by the website OpenCulture.com lists the top ten reasons why MOOC users dropped out of the course:

1. It takes too much time.
2. It assumes too much knowledge.
3. It's too basic, not really at the level of Stanford, Oxford and MIT.
4. Lecture fatigue (same old boring lectures, just in video format).
5. Poor course design (no idea what to do when I'm there).
6. Clunky community/communication tools (discussion forums aren't useful or engaging).
7. Bad peer review & trolls.
8. Surprised by hidden costs.
9. Just shopping around.
10. I'm there to learn; I'm not there for the credentials.

Another big concern for HEIs is the issue of quality assurance of MOOCs. In most cases, compared to other online courses, MOOCs lack structure, and rarely include the central role of the instructor or teacher. They are largely self-directed learning, which is a very different experience to formal education. The open nature of MOOCs creates a population that is self-selected to be engaged and passionate about this approach to learning. MOOCs also demand a certain level of digital literacy from the participants, which has raised concerns on inclusivity and equality of access [Yuan & Powell, 2013].

Typically, there tends to be little formal quality assurance for MOOCs. It has been suggested that one approach could be for them to be evaluated by learners and educators, leading to league tables that rank the courses by the quality of the offering [Daniel, 2012]. In this way, it is possible that courses from institutions and individuals that rate poorly will either disappear due to lack of demand or will survive by improving course quality in response to poor ratings. Arguably, for most MOOCs, the most significant form of quality assurance and enhancement comes from the reflections and informal evaluations of the enthusiasts who put on the courses and comments from participants using social media.

Additional suggestions have been put forth to improve the quality and completion rates of MOOCs – promoting greater intimacy and collaboration, improving the quality of content, conducting better needs assessment for a better product fit, and improving the instructional and/or interface design. Conole [2013] suggests designing “more pedagogically informed MOOCs, which enhances the learner experience and ensure quality assurance...quality is a fundamental facet that needs to be considered in relation to both the design and delivery of MOOCs. We need to develop better metrics to understand the way in which learners are interacting with MOOCs and hence their experience of them.”

She suggests a better classification of MOOCs is in terms of a set of twelve dimensions: the degree of openness, the scale of participation (massification), the amount of use of multimedia, the amount of communication, the extent to which collaboration is included, the type of learner pathway (from learner centered to teacher-centered and highly structured), the level of quality assurance, the extent to which reflection is encouraged, the level of assessment, how informal or formal it is, autonomy, and diversity.

The MOOC criteria described in her blog fits under the “Conceptualise C” of the 7Cs of Learning Design framework. It can be used to plan the design of the MOOC against these twelve criteria. The 7Cs framework can be used both to design and evaluate MOOCs. The tools and resources associated with each of the Cs enable the designer to make more informed design decisions. The evaluation rubric under the Consolidate C enables them to ensure that the design is fit for purpose, hence ensuring the quality of the MOOCs and the ultimate learner experience.

She concludes, “Whether or not MOOCs will reach the potential hype currently being discussed is a mote point, what is clear is that we need to take them seriously. More importantly, for both MOOCs and traditional educational offerings we need to make more informed design decisions that are pedagogically effective, leading to an enhanced learner experience and ensuring quality assurance.” [Conole, 2013]

3.1.3. ASSESSMENT & STUDENT AUTHENTICATION

Touted to be the ultimate provider of educational access to all, MOOCs can expose students to a diverse assembly of knowledge and artifacts in a rich, engaging learning environment. Enabling twenty-first century learners to exercise more control over their own learning, in their own space, at a time they specify, is a very attractive proposition. MOOCs affirm the notion of students as lifelong learners, and in important ways they shift focus away from teachers and processes toward learners and outcomes.

However the hype surrounding MOOCs will remain a promise unfulfilled unless it can be proven that MOOCs can actually enhance learning outcomes. The extent to which the credentials students earned from MOOCs end up carrying weight, in the work force or in academe, remains an open question. But if they do become valued currency, the volume and proportion of MOOC registrants who have their sights set on a credential might stand to rise relative to those who register out of mere curiosity or thirst for knowledge. As such, for us to be able to judge this new paradigm as a successful academic business model, the students who take these courses must demonstrate positive learning outcomes. Learning outcomes must be explicit, measurable, and effectively assessed, and evidence must be assembled demonstrating added educational value from the courses that will enhance students' lives, aspirations, and ambitions. Without evidence of these outcomes, the effectiveness of MOOCs will remain in doubt.

The following issues need to be addressed for MOOCs to realize their promise.

Assessment

The two most common methods of MOOC assessment are machine-graded multiple-choice quizzes with automated answers for feedback and peer-reviewed written assignments, a.k.a. peer assessment. Peer review is often based upon sample answers or rubrics³, which guide the grader on how many points to award different answers. Students are then expected to learn via grading others and becoming more engaged with the course.

College course grades are often the result of subjective comments and assessments by instructors, particularly for written and project-based work. Up until now, MOOCs have relied on quizzes and tests where there is a clearly defined "right" answer. This limitation severely inhibits the potential for MOOC providers if they wish to offer a wide spectrum of courses. The challenge is that instructors cannot review essays or other open-ended work from thousands of students as they do in smaller class settings. In order to remove this limitation, MOOC providers are looking to peer-based assessments, in which students learn to review the work of their cohorts.

In the peer assessment model, students in MOOCs often grade each other's work according to the professor's specifications that makes managing a large number of submissions possible. From a pedagogical perspective, this is a promising practice, as it extends the students' learning experience by reinforcing concepts and broadening perspectives.

³ In education terminology, *rubric* means "a standard of performance for a defined population"

However, this practice can be problematic. Many of the students are unprepared or not qualified to give meaningful feedback to one another, and most are on different academic levels. Gibbs (2012), a professor at The University of Oklahoma, enrolled in a Coursera course and later on blogged some of the struggles she and other students faced with the course’s peer feedback feature: “[T]here is going to be a whole range of feedback, from the very zealous people who give feedback longer than the essay itself, to the ill-informed grammar police.” Watters (2012) also discussed problems associated with peer assessment grading such as the lack of feedback on peer feedback and the anonymity of feedbacks. To ensure that the peer review process contributes successfully to students achieving their learning outcomes, rubrics that define criteria for performance levels should be made explicit. If MOOCs are designed so that standards are available for both the grader and recipient of the grading, this increases the likelihood that students will be equipped with the proper tools for peer review.

To be fair, many MOOC participants feel peer assessment is reasonable and fair. They are generally supportive and keen to be as objective as possible. In a study conducted by Stanford University (2013) on the impact and usefulness of peer assessment, 40% of the students surveyed acknowledged the usefulness of rating and being rated by others (Figure 17). In the process, students reported that their own learning improved. Among other benefits, the students-helping-students approach fostered empathy and equality, scaled naturally and required serious community buy-in.

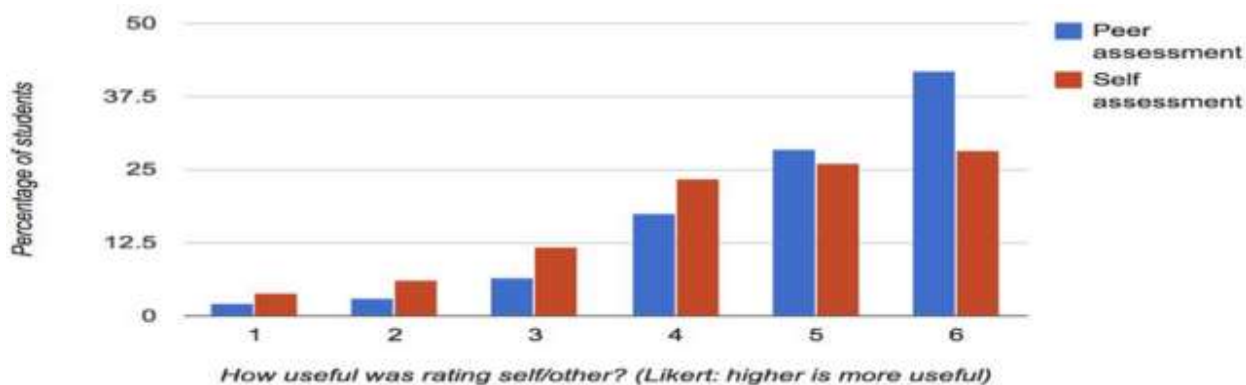


Figure 17: Peer Assessment vs. Self-Assessment [Source: Stanford University, 2013]

Plagiarism and Other Forms of Cheating

Some concerns have been expressed around cheating and plagiarism with online learning, particularly where courses are eligible for academic credits. Plagiarism will always be a burning issue with MOOCs, as students may feel they have little to lose financially (the course is free) and academically (the course is not for credit). If the ultimate goal is for a student to receive academic credit by sending a completion certificate to his base institution, academic leaders will have to work hard to reign in plagiarism and to keep students honest. To ensure that students’ work represent their own efforts and reflect the outcomes of their learning, plagiarism detection tools should be used to monitor student behavior in the MOOC environment. Adding plagiarism-detection software to their systems may also help. More recently, in response to these concerns, some MOOC providers have partnered with third-party test centers for in-person examinations, particularly for those who want to earn a certificate.

Proctoring

An alternative to machine-grading and peer assessments is to proctor an exam in regional testing centers. The Big Three providers have introduced proctored in-person final exams for their courses. Students at edX and Coursera will be able to take on-site exams administered through a third party, the Pearson VUE service, which has more than 4000 test centers in more than 160 countries. These centers have surveillance and biometric systems, and a digital fingerprinting system used by the FBI that has an almost zero rejection rate. Students who pass these exams will receive certificates noting the exams were proctored. Although edX has not yet disclosed the cost to students of these exams, Udacity's proctored exams will cost \$89.

Another alternative is to submit students to proctored online tests. Huge efforts are being made to allow learners to take summative exams online. In order to address security and other issues, hi-tech digital identity security systems are being used and deployed, such as iris, fingerprint and voice recognition systems. Motion sensing and camera identification systems are also used. Both Udacity and Coursera offer online proctored exams at a cost of \$60–\$90 through ProctorU. ProctorU employs a variety of security and authenticating systems to validate the identity of the student. Online proctors watch examinees with 360-degree cameras and observe the student's body and eye movements through a webcam.

For MOOCs to be successful and credible in the future, proctoring will be important for students in the verification of their identities and to provide evidence that they are responsible for the achievement of their own learning outcomes.

Certification, Badges, and Credit

Most MOOC providers give participants the chance to earn badges or certificates of completion (Table 6). In some cases, they may even be able to gain credits towards a degree qualification. However, it has been observed that most learners using MOOCs are people who already have a degree. In this case, whether the course carries credit seems less important compared to whether they have evidence through certification that they have participated in a program of learning and that they can present to an employers as evidence of professional development [Yuan & Powell, 2013].

Certification in MOOCs		
	Free certificate	Certificate with cost
 MiriadaX	Certificate of participation (75% completed, Without: university logo, professors' signatures)	Certificate of fulfilment (Platform + University)
Coursera	Statement of Accomplishment (not offered by all universities, signed by course instructor)	Verified Certificate (Signature Track) (Plataforma + Uni, it does not make you a student at issuing uni, no credits) + Course record (with grade)
edX	Honor Code Certificate	Verified Certificate of Achievement
Iversity	Course Certificate	Certificate + ECTS credit if face-to-face exam at university
Case: UNED		Certificat de Aprofitament (low cost) Diploma (higher cost, non-official titles, ECTS)

Table6: Examples of certificates granted by MOOC providers [Source: <http://daviniah1.wordpress.com/>]

Clark (2013b) provides examples of the different types of certificates MOOC providers have been giving.

- 1. Certificate of Completion.** A certificate of completion simply recognizes that the student has completed the course, including the required formative assessments and assignments. Often this is sufficient for those who simply want some recognition at the end, without a need for official accreditation. Coursera opened its “Signature Track” courses where students can earn a certificate from a school. This entails proctored exams from third-party vendors such as Pearson or ProctorU.
- 2. Certificate of Mastery.** Some edX courses from Harvard and MIT have Certificates of Mastery. They come with a grade but not an official credit. edX offer a Certificate of Mastery issued at the discretion of edX and the university that offered the course. These certificates have been free but they plan to charge a modest fee in the future.
- 3. Certificates of Distinction.** Different levels of accomplishments are being offered by many MOOC providers. With Udacity, this is the core model, with the following different grades; completion, distinction, high distinction, highest distinction.
- 4. Credit.** In 2013, the American Council on Education (ACE) endorsed 5 MOOCs for credit (all hosted on Coursera) – 2 from Duke University, 2 from the University of California at Irvine, and 1 from the University of Pennsylvania. The move was widely seen to have significant implications that are likely to reverberate on HEIs globally, for it could mean an improvement in college affordability for hundreds of thousands of students. However, it raised some logistical concerns from school administrators. Another concern is that of identity management – in an online environment, it is difficult, if not impossible, to verify that the students signed up for the courses are the ones actually taking them. Note that only a limited number of institutions are offering credit for MOOCs. Currently, most universities are still observing the development of MOOCs without any commitment to providing credit toward formal degree programs.
- 5. Badges.** Badges are digital tokens that appear as icons or logos on a web page or other online venue. These badges are awarded by institutions to individuals to signify accomplishments such as completion of a project, mastery of a skill, or marks of experience. A collection of badges can function as a distributed portfolio that may eventually be accessible from a variety of social media sites, such as LinkedIn and Facebook. One example of badges is that provided by the popular Mozilla Open Badge Infrastructure (OBI) specification. Khan Academy and edX both issue badges as records of achievement.

While the MOOC business model continues to evolve, some advocates assert the value of MOOCs is in identifying highly-capable students for recruitment either by colleges or by employers. Others believe that the cost of a college education can be substantially reduced if students complete free MOOC courses that are accepted for credit by an accredited institution or that are recognized by prospective employers as evidence of a bona fide skill. In any of these scenarios, much progress is still needed in the realm of student learning outcomes and assessment. If the conversation about MOOCs can shift from technology to a thoughtful assessment of what students know and are able to do, to pedagogy and the impact of differing learning approaches, to some greater assurance of academic integrity as we move forward, the likelihood of success for the new MOOC paradigm will be greatly enhanced.

3.1.4. COPYRIGHT & INTELLECTUAL PROPERTY RIGHTS

The original designers of MOOCs meant for them to be open in the sense of open access, much like creative works under a Creative Commons⁴ license can be open. These instructors use materials in the public domain that don't have copyright restrictions, and they intend for their work to be freely available for others to reuse and adapt [Marques & MacGuire, 2013].

Unfortunately, that is not how the current major MOOC providers work. On sites like Coursera and edX, anyone may enter, but the materials a visitor will find there are under copyright and can't be removed or modified. Moreover, after those classes are completed, the materials are often closed from public viewing until the next time they are offered, whereas on many independent MOOCs outside those major platforms, even after they have become inactive, the materials remain available for anyone to access. Teachers who want to re-use their own materials discover that the content rights no longer belong to them, but to the provider.

This is a troubling situation for teachers and students alike. For academics, content rights are the top worry. The faculty union at University of California-Santa Cruz kicked off with a challenge to the university in March last year, alleging that Coursera was taking a chunk out of professors' intellectual property rights to their lectures. Learners are also affected by the issue - course materials are only available to be used by learners as learners on the course and not allowed to be copied, and re-used (in the original form or as revised derivative work).

Indeed, the rapid rise of MOOCs has rejuvenated debates about copyright and the development of distance education programs. Copyright and IP rights have long been a challenge for distance learning [Center for Digital Research and Scholarship, 2013], and the vast scale of MOOCs escalates the importance of addressing the issue.

Educause helpfully focused discussions on the issue with a briefing paper, "Copyright Challenges in a MOOC Environment", which contain observations from the key thought leaders and a lot of questions with worryingly few answers. The nub of the legal issue is that MOOCs are legally framed as a publishing contract between institutions and platforms, whereas academic copyrights are vested in individuals who are being cut out of the deal. As noted in the Educause Executive Briefing, "Some commercial MOOC platforms have highly proprietary terms and conditions that claim ownership of course content and prohibit sharing or remixing of material." It adds, "The intersection of copyright with the scale and delivery of MOOCs highlights the enduring tensions between academic freedom, institutional autonomy, and copyright law in higher education." [Cheverie, 2013]

To gain insight into the copyright concerns of MOOC stakeholders, EDUCAUSE talked with CIOs, university general counsel, provosts, copyright experts, and representatives from other higher education associations. The consensus was that intellectual property questions for MOOC content merit wide discussion because they affect multiple stakeholders and potentially carry significant consequences.

⁴ A **Creative Commons (CC) license** is one of several public copyright licenses that enable the free distribution of an otherwise copyrighted work. A CC license is used when an author wants to give people the right to share, use, and build upon a work that they have created. [Source: Wikipedia, 2014]

Each MOOC provider, for example, establishes a proprietary claim on material included in its courses, licenses to the user the terms of access and use of that material, and establishes its ownership claim of user-generated content. This conflicts with the common institutional policy approach that grants rights to faculty who develop a course. Fair-use exceptions to traditional copyright protection face challenges as well, given a MOOC's potential for global reach. Nonetheless, fair use and MOOCs are not mutually exclusive ideas. Initiating discussions with a wide range of campus stakeholders will ensure clarity of purpose and a common understanding of copyright issues in a MOOC environment.

The Educause brief concludes, "Higher education should pause and reflect on these restrictive licensing terms and the implications for the academic enterprise that has been traditionally built on creating and sharing knowledge as a core value of the teaching and learning mission. In today's remix learning culture, what does it mean when users have to give up their IP rights to participate in a MOOC? When sharing is restricted? The licenses show that these companies are quite proprietary about the rights for use of their content, but are broadly sweeping in claiming rights for user-generated content. MOOC licenses, to date, are blurring the lines between traditional educational values and the commercial enterprise. These are some of the challenging issues that colleges and universities need to consider as MOOCs become more pervasive." [Cheverie, 2013]

Copyright in MOOCs should be viewed not as a legal assertion, but as a set of rights to be shared and managed. Rather than leave copyright and IP ownership to a legal answer, HEI stakeholders should implement policies and agreements that specifically distribute rights among the interested parties. Faculty instructors often want the ability to reuse the content of the course in future teaching, research, and publications. Universities want assurance that they can make continued use of the course for at least a few years, preserving the integrity of academic program planning. Careful planning also allows consideration of CC licenses to permit public use of the courses. The law alone cannot accomplish any of these alternatives. The HEIs must invest the time and effort to develop insightful and constructive policy standards to properly address the issue.

3.2. ISSUES FOR DEVELOPING COUNTRIES

Admittedly, most of the news and the hype regarding MOOCs are coming out of more developed countries, and the prominent perspectives on MOOCs are, to a great extent, coming out of those countries as well. While voices from Silicon Valley and elite educational institutions in the United States (amplified by prominent media personalities) have been the loudest to date, a fair component of the 'hope' surrounding MOOCs has to do with their potential to improve educational opportunities for students in so-called developing countries.

MOOCs and its underlying technology and pedagogies have been hailed by many as a solution for the developing world's lack of access to education because MOOCs can provide learning opportunities to a massive number of learners from anywhere in the world as long as they can access the course through the Internet. However, a close consideration of the ability of learners from most developing countries to make use of MOOCs seems to contradict this rhetoric. This section looks at the issues related to MOOCs from a developing countries' perspective. As this revolution takes shape, people are asking: Will MOOCs bring higher education to those who cannot access or afford it? Is it an effective – perhaps revolutionary – way to teach skills, open minds, and present alternatives in countries with weak higher education systems? Will it lift people out of poverty?

3.2.1. DIGITAL ACCESS

By far, the biggest criticism of MOOCs in the developing world relates to accessibility. Critics contend that the disruptive potential of these courses was overhyped, pointing out that they were already failing to reach the very group they were supposed to save. MOOCs require a strong digital infrastructure, one that can handle downloading or streaming high definition videos and participation in social media platforms and discussion forums. A study conducted by the International Telecommunication Union (ITU) in April 2014 showed that only 31 percent of households in developing countries have Internet access. Urban areas may have high-speed Internet, but its reach could dissipate right outside the city limits. Students who can commute to Internet access centers may struggle with limited access times and sluggish download speeds. This also defeats the purpose of a course that markets itself on its convenience. Better infrastructure may improve access, but it doesn't guarantee engagement. MOOCs, some argue, are focused on only expanding access, not fostering cross-cultural understanding or improving local educational institutions.

However, as Liyanagunawardena and Williams (2013) point out, 'access' doesn't simply mean having a computer and internet connections. They stress that "building digital literacy among the public is as important as providing them with physical resources." They cite that "[c]omputer literacy levels in developing countries is still in infancy...[and] the very basic ability to use computers is neither sufficient for knowledge work (which includes searching, filtering and assimilating knowledge from multiple sources), nor for participation in daily activities (such as online shopping, banking, online learning and social networking)." The implication is that basic computer literacy is not enough to navigate the complexities of a MOOC network; many will eventually struggle to cope with the multiple learning spaces in a MOOC and this could lead to disengagement.

3.2.1. INFRASTRUCTURE

In many developing countries, there is simply inadequate technology infrastructure to support the systematic use of MOOCs in any substantial way. Learners from developing countries come from geographical locations with various levels of infrastructural facilities. While there are places where the digital infrastructure facilities are comparable or exceeding that of modern developed cities, the vast majority of locations suffer from poor digital infrastructure. Liyanagunawardena and Williams (2013) cite several examples:

- A female undergraduate from Sri Lanka has to take two bus-rides taking 45min (one-way) to travel to an Internet access center which imposes restrictions on access times to ensure fair distribution of resources while students residing in the capital, Colombo, enjoy having high speed unlimited broadband access;
- In Burundi, a land locked country in the African continent, 97% of the population live without electricity; those who have access to electricity only get it on certain days of the week.

The situation here in the Philippines is not much better. A survey was conducted in February 2014 by OpenSignal, a company that specializes in wireless coverage mapping. Six million users from around the world were asked to comment on download speed and proportion of time spent with LTE access⁵ during the second half of 2013. These two matrices were then combined to “build a picture of true network performance.” The study showed that the Philippines has the poorest and slowest Long Term Evolution (LTE), or 4G, broadband internet access and coverage in the world. According to the study, the Philippines came in last place when it came to both speed and time spent on LTE (Figure 18).

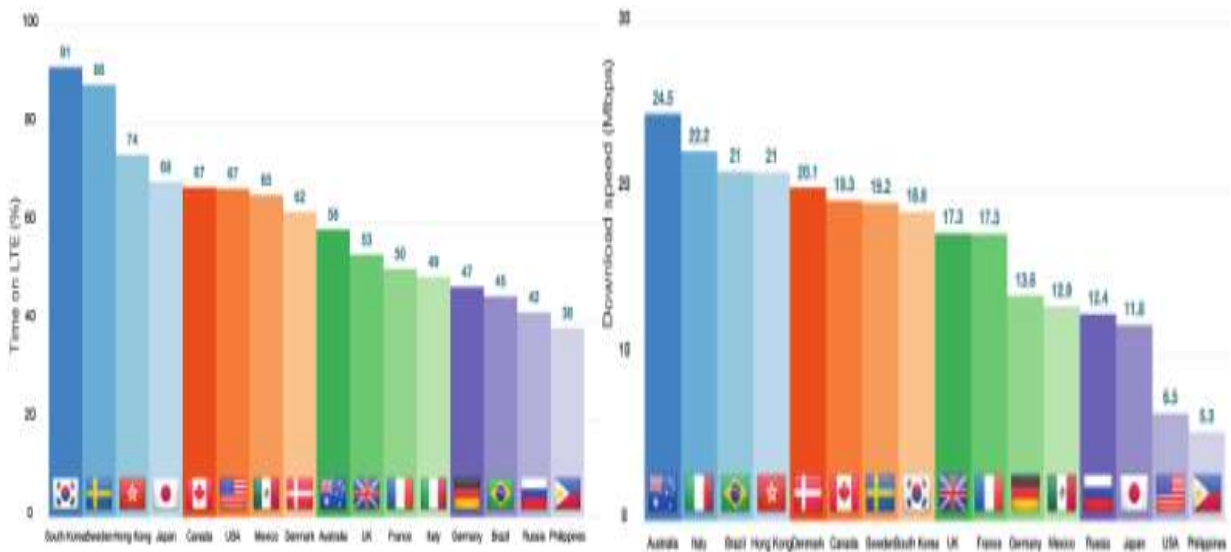


Figure 18: Time Spent on LTE & Speed of 4G internet access worldwide [Source: Westwood, 2014]

⁵ **Time spent on LTE** – The metric looks at coverage based on user experience rather than geography, focusing on the proportion of time a user has access to the LTE network, which gives a more accurate look at how real-world users are being served by their connection. [Source: OpenSignal, 2014]

A separate study from Akamai, a major US-based provider of cloud services, entitled “The State of the Internet Report for the 1st quarter of 2014”, showed that the Philippines had an average connection speed of only 2.1 megabits per second (Mbps) in the first quarter of 2014, near the bottom of a list of 14 Asia Pacific countries surveyed, compared to that of South Korea (23.6 Mbps), Japan (14.6 Mbps), Hong Kong (13.3 Mbps), Taiwan (8.9 Mbps) and Singapore (8.4 Mbps). The Philippines did not even qualify for Akamai’s “high broadband” survey of countries with Internet connectivity of 10 Mbps or higher, because less than 1 percent of users in this country have access to that kind of speed.

This low broadband penetration rate is borne out by a 2013 study by the Broadband Commission for Digital Development under the International Telecommunication Union (ITU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). That study showed that only 2.2 of every 100 inhabitants in the country had access to fixed broadband services in 2012. This ranked the Philippines 110th in a field of 183 countries, with a penetration rate well below the world average of 9.1.

Not only does the Philippines have one of the slowest broadband connections in the world, it also has one of the costliest. Statistics gathered by Internet metrics company Ookla show that the Philippines has the 63rd most expensive Internet service among 64 countries, at \$22.33 per Mbps (the only country more expensive is South Africa with \$23.14). Compare that to our neighbors in Southeast Asia: Thailand at \$2.34, Singapore at \$2.60, Vietnam at \$5.33, Malaysia at \$10.21 and Indonesia at \$16.01. This means Internet service here is eight to nine times more expensive than it is in Thailand and Singapore.

In another study released in January 2014, the management consultant company Boston Consulting Group looked at factors that were inhibiting online interactions and transactions. The study, commissioned by the Internet Corporation for Assigned Names and Numbers or ICANN, identified the Philippines’ most serious problem lay in poor infrastructure (access, speed and price). The Philippines also has a problem with data caps imposed by internet providers. Both Globe and Smart recently faced users’ disdain over the networks’ data caps on unlimited postpaid and prepaid plans where 3G connections are reduced to 2G when users reach a certain limit, to ensure fair distribution of resources.

Given how important fast and affordable Internet access is to the MOOC model, this is certainly an issue that has to be taken into account by policymakers in SUCs. The download speeds of Internet connections in many of the developing countries are not sufficient to download large files or viewing streaming videos. While MOOC providers take lot of effort to produce high definition videos to satisfy developed countries’ participants with high expectations, these videos add to the challenges faced by developing countries’ participants as the videos take either a long time or fails to download. In these conditions, it is difficult to expect learners to take part in discussions even though they wish to. In order to serve students from developing countries with limited bandwidth and access times, MOOCs that aspire to engage learners from these environments need to consider offering suitable engagement tools such as lower resolution versions of videos and facilitating offline “burst connectivity” tools which download the minimum text-only information during connection.

3.2.3. LANGUAGE & CULTURE

Another concern regarding MOOCs in developing countries is its suitability for adoption. Critics say that the new model is just another form of cultural imperialism that threatens to eradicate ethnic norms and established regional educational traditions. Most MOOCs have been developed and are being offered by institutions or entities from rich, industrialized nations, and thus represent only their viewpoints and interests. In addition, the majority of these MOOCs are in English, thus limiting potential access to participants who understand and speak the language. This is not of great concern in the Philippines, where a vast majority of the population, at the very least, understands the language. However, their level of understanding may still not be enough for them to fully comprehend the lessons, given the nuances of the English language, and its use of idioms and colloquialisms.

Furthermore, MOOCs are offered to a global audience of culturally diverse nationalities. As Liyanagunawardena and Williams (2013) assert, “Humor in one context can be interpreted differently in another. Thus one can take offence at a forum post even though it was not intended. Participants from various locations may not understand the colloquial language and idioms used in forums. Unacceptable behavior (for example, forceful intellectual debates, feelings of participation being demanded, and rude behavior) from some MOOC participants [have been] reported...which led other participants to cease posting on forums. Given that people from different cultures are engaging in the dialogue, the likelihood of conflict and misinterpretations can be greater than that of offering a course in a class. Thus MOOC facilitators have a greater challenge in facilitating discussions in MOOCs as their participants are a culturally heterogeneous group.”

There have been, however, developments that specifically address this issue. MOOC open-source providers, such as edX and OpenMOOC, allow course creators to customize and tailor-fit the platform to meet the needs of a particular community or region — for example, by expanding language capabilities, allowing them to adapt it to meet linguistic and regional needs. In the Arab-speaking world, for instance, edX’s platform has been adapted to produce Edraak; in China, it helped produce XuetangX. Other major providers are exploring potential link-ups with some of the leading higher education institutions in countries such as China, Brazil and Turkey. Initiatives such as Coursera’s Learning Hubs, physical spaces supported by partners where MOOC participants can gather, suggest a potential model to extend the reach of MOOCs to groups of learners in developing countries who may not be already accessing, or completing, MOOCs.

3.2.4. DEVELOPMENT COSTS

Before a MOOC can be offered to the public, a university (or an individual educator) must create it—and that can be a costly process. The average cost for developing a MOOC ranges from \$50,000 to \$100,000, industry experts estimate [Jackson, 2013].

The comprehensive study on MOOCs by Hollands and Tirthali (2013) investigated the resource requirements and costs of producing and delivering a MOOC. They determined that MOOCs require resource-intensive efforts, and that estimated costs associated with development are high. The development of a MOOC and the facilitation of the course once it goes live (i.e. accessible to students) require significant amounts of time and energy from individuals across several departments within the institution. The faculty member (or members) acting as the subject matter expert for the MOOC requires a team, each with different areas of expertise to support him or her in bringing the content to life and creating an environment of learning for hundreds, if not thousands of course participants. The report cited the “number of faculty members, administrators, and instructional support personnel involved MOOC production teams seldom included fewer than five professionals and, in at least one instance described to us, over 30 people were involved. Faculty members typically reported spending several hundred hours in the production and delivery of a single MOOC.”

Hollands and Tirthali also report that it is still too early to know whether MOOCs can live up to the hype of providing a cost-effective means for producing better educational outcomes on a mass scale. Cost analyses of MOOC production and delivery at four different institutions found that costs ranged from \$39,000 to \$325,000 per MOOC. The study concludes that the initial investment of time and resources to develop MOOCs is likely to be three to four times greater than for developing a face-to-face course based on the same content and learning goals. Rough estimates ranged from as low as \$5,000 per course at a university where the online course development infrastructure was already in place and existing materials could be re-purposed for MOOCs, to as high as \$1.2 million at a university that is new to online course delivery and is building the required infrastructure needed to deploy multiple courses. “MOOCs have, so far, proved to be a significant drain on time and money for institutions,” Hollands and Tirthali wrote. Moreover, revenue streams from MOOCs have been slow in materializing. Unless costs of MOOC production can be recovered through fees, Hollands and Tirthali speculate that “free, non-credit bearing MOOCs are likely to remain available only from the wealthiest institutions that can subsidize the costs from other sources of funds.”

Given the lack of human resources (faculty members, teaching assistants, instructional designers, programmers) and the high costs associated with the development of a MOOC, policymakers will have to determine whether it is feasible to offer MOOCs, and if it is, where they will get the funding for it. Each university has a different approach to funding. Some are simply absorbing the costs associated with MOOCs, offering stipends to faculty who develop MOOCs, or relieving instructors of some other obligations to free up their time for MOOC development. Others are seeking support from foundations and donors. Harvard University is asking alumni to volunteer their time to help develop MOOCs. For cash-strapped SUCs, an alternative would be to foster private-public partnerships, such as what UPOU did when it collaborated with Smart, Inc. to deliver the country’s first MOOC.

4. MOOCs IN THEORY: IMPLICATIONS & OPPORTUNITIES

The surge and rising popularity of MOOCs has prompted leaders in education, business and government to re-examine how the new pedagogical model affects their organizations. Some see MOOCs as a game-changer for traditional universities, one which holds appeal and promise; others see them as disruptive forces capable of wreaking havoc on established pedagogies; still others view them as hype, merely a popular trend. As the debates continue to swirl around the phenomenon, a large majority does recognize its potential to change the future of learning. MOOCs are designed to enable a large number of people around the world, including remote regions lacking access to education, to educate themselves for free using new innovative technologies. Is it hype? Probably. But with millions of dollars invested in MOOCs, with millions of students signing up all over the world, like it or not, it's here to stay.

In Chapter 2, we noted that MOOCs are not all hype and the industry continues to grow. Whether they become part of mainstream provision as they mature remains to be seen. The social experiment is still in its infancy and what lies ahead is unclear, for we are still very much in the early days of MOOCs. Nevertheless, questions remain, questions that stakeholders in HEIs ask themselves:

1. Do MOOCs have the potential to solve our problems?
2. Are traditional pedagogies failing to solve them now?
3. Why should we MOOC? Why should we not MOOC?

Understandably, these stakeholders are under a lot of pressure. With constrained budgets, rising tuition fees, mounting student demands for cheaper, more cost-effective and better alternatives, these leaders are being pushed by their boards, donors, governments and others in the community to take action. They are also being encouraged by their own faculty, who are eager to give MOOCs a try. All of this is within the context of an increasingly globalized and open higher education system with more competition nationally and internationally for students. As a backdrop to this context, there is an ongoing maturing of technologies and infrastructures providing an opportunity for the development of new pedagogical models such as MOOCs, which promise lower costs, greater accessibility, and improved learning experiences. This is in part why MOOCs have generated significant levels of interest, for they offer a viable, cost-effective model for learning. However, the appetite for full-time, face-to-face instruction still remains strong [Yuan, et al, 2014]. Nonetheless, whatever the future holds, there may still be significant opportunities to be exploited from MOOCs for institutions and their stakeholders.

This concluding section enumerates some of the lessons we have learned from the MOOC initiatives of the past two years. It describes the reasons why institutions should MOOC (the current value proposition) and why they shouldn't (barriers to adoption). It also postulates questions that must be considered by policymakers in higher educational institutions that will hopefully steer and focus future discussions with relevant stakeholders in coming up with relevant policies that address the phenomenon and the movement towards openness in education. Finally, the chapter concludes with a list of specific recommendations that may guide policymakers in SUCs in formulating specific strategies for the new model in line with their institutions' mission, vision and mandate.

4.1. LESSONS FROM THE PAST

Two years after the New York Times declared 2012 as the “Year of the MOOC”, predictions about the disruptive effect it would have on traditional pedagogies have largely been overblown. Their supposed climb to world domination and their predicted eventual and relentless destruction of conventional brick-and-mortar universities have yet to happen, and will probably never happen. However, in the two years since, a number of lessons have been learned, which are of strategic significance to HEIs as they attempt to formulate policies that address the phenomenon. Here are some of the lessons we’ve learned:

1. MOOCs are but just one part of the growing trend towards openness in education. This implies that MOOCs are not the end-all and the be-all; not *the* solution, but *a* solution. Voss (2013b) stresses that “MOOCs are not ‘it’; the focus on the ‘Next Big Thing’ has often been viewed as a search for what might be called the ‘Highlander Model’—that is, there can be only one, and MOOCs are the one. But MOOCs are just a single tool in the online education toolbox.” He added that “we need to stop thinking in terms of a MOOC revolution and instead think in terms of teaching and learning revolution, of which MOOCs are just one (currently very disruptive) element.” It is indeed utopian to think and expect a one-size-fits-all format for online education, much less all of education, which conveniently solves all of its problems.
2. MOOCs are a great supplement for traditional classrooms. Ultimately, MOOCs (and other open learning initiatives) may take over the world, but for now, their most important disruption may be helping to transform traditional higher education classes. Merging the strengths of MOOCs with those of in-person classroom instruction — creating a “blended learning” approach — holds a lot of promise. More and more institutions are importing MOOCs, not as complete courses, but as components of face-to-face classes. One example: A San Jose State University course on circuits and electronics used a blended-learning approach to lower its failure rate to 4% from 40%.
3. MOOCs aren’t revenue-generating cash cows (pun intended). There has yet to be a standard business model that is sustainable, and those that exist tend to favor the platform providers rather than the institutions and the individual teachers. Inevitably, a sustainable model must be created sooner rather than later. No college or university can continue to give away its product for free through MOOCs as a sustainable, profitable business. Venture capitalists have poured millions of dollars into the industry. Ultimately, they will want some sort of return on their investment, because they can’t just spend money unless they know that there’s some value coming back in some way.
4. MOOCs do not yet guarantee greater accessibility, especially among low-income, technologically-challenged students from developing worlds. Reaching lower-income students requires additional effort. If a MOOC requires a high-speed Internet connection, then the students in that course will tend to come from higher socio-economic groups. To draw in more students from disadvantaged groups or rural areas, issues such as poor digital access and literacy, inadequate infrastructure, high development costs, and social and language barriers have to be addressed. Until then, the promise of MOOCs to deliver quality education to the poorest of the poor remains just that – a promise.
5. MOOCs may not be a threat to existing HE business models after all, or if they are, then the threat is minimal. Research suggests that 65-75% of MOOC students already have at least a Bachelor’s degree [Yuan, et al, 2014], and most are taking them to enhance personal development. As a result, the commercial MOOC providers, such as Udacity and Udemy have moved on to professional and corporate training, broadening their offerings to appeal to corporate employers.

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6. The format may be especially viable for vocational learning. Companies may create their own MOOCs for potential employees to close the skills gap between their requirements and what traditional college education has provided. We've seen that shift in focus when we discussed the recent trends and developments in the industry [See Chapter 2.6 Recent Trends and Developments].
 7. MOOCs require heavy investments and are resource-intensive. However, while the initial outlay to create and deploy an online course can be significant, that investment can pay off over the long term. MOOCs are not free and the costs can add up. For example, there's the cost of recording a professional-looking, polished professor's introduction to the course with a script, a teleprompter, green screen, multiple cameras, microphones, and retakes — in addition to adding animation and other effects. But once it's in the can, the material can be re-purposed in other contexts — in multiple video formats, audio podcasts, and written transcripts, for example — even after the course has run its course. In other words, the investment provides reusable content. And a MOOC, once created and deployed, can be re-run over and over again.
 8. Students still need the “personal touch.” Technology isn't the answer to everything. Critics contend that one of the biggest problems with the model is that it lacks true interpersonal engagement between teacher and student and student with other students. The instructor's feedback and his or her (gentle) nudge to encourage students are severely missing in the format. While collaborative learning will be a contributing factor for establishing peer-to-peer connections, how will the instructor contribute to these connections in a sea of so many students? Teaching assistants and support technicians are critical links for students who need a real person to answer a question or troubleshoot a technical issue. But students still need to be engaged through technology *and* through old-fashioned human contact. The importance of human interaction cannot be overstated enough; MOOCs have to provide a system for direct social engagement. A large part of education is about building relationships to truly personalize learning, which one cannot do with a 100:1 student to teacher ratio.
 9. Students who take MOOCs may not be learning a lot from them, but we are certainly learning a lot about them from taking MOOCs. The system has provided us opportunities to learn more about what makes students more successful, then giving instructors (and the platforms themselves) the chance to encourage those students accordingly. These data analytics tools provide information that help predict academic demand, tracking course success, preventing dropout, enabling social integration and reporting relevant student information. For academics, these learning analytics provide information about student success, areas of misunderstanding, levels of effort, persistence and other details about learning and online activity, which can then be used to improve pedagogies.
 10. Finally, a MOOC is not just about the course. It's not just about the technology, either. It's a movement. And as movement, it's not static; it continues to grow, expand and mature. The issues presented in Chapter 3 of this paper are slowly being resolved as the model transforms and adapts to the needs of the providers, the institutions, the teachers and the students. It may not herald the death of traditional education and the conventional face-to-face classroom pedagogy, but it will definitely enhance it, if not alter it altogether. MOOCs may be game-changers, but it's still early in the game. After all, it took almost a decade before the concept of distance education was accepted.

4.2. WHY MOOC...?

The Educause briefing “What Campus Leaders Need to Know About MOOCs” (2013) identified the current value proposition for institutions to engage with MOOCs as “education access, experimentation and brand extension”. MOOCs can expand access to education and extend an institution’s reach and reputation locally and internationally. MOOCs can also help address the problem of HE budget constraints and help to lower the cost of degree courses by enabling inexpensive, low-risk experiments in different forms of HE provision [Yuan & Powell, 2013].

1. *Education Access*

MOOCs provide access to education on a massive, global scale. They have the capability of extending education to even the most remote populations who normally wouldn’t have access to the course. They allow an institution to extend its global reach and enhance its educational mission by opening its curriculum to a wider audience, extending the institution’s voice into the community at large as it removes barriers to learning. In some cases, they want to reach the unserved masses that don’t have access to universities or schools either because of distance, cost or lack of time. Currently, most students who enroll in MOOCs are international students and/or professionals rather than enrolled college students. This balance may shift as institutions develop models for integrating MOOCs into the students’ educational pathways. MOOCs can be used as primary or supplementary course material for instructors who wish to weave them into their curricula, thereby increasing its accessibility and reach.

2. *Experimentation*

MOOCs represent an experiment in education that attracts talented and prestigious instructors, technologists, and entrepreneurs. Many institutions are experimenting with MOOCs to inform instruction for large undergraduate courses. Commercial MOOC partners host sophisticated application platforms that mine click-stream data, which can be used to refine adaptive systems and tutoring algorithms that enhance e-learning effectiveness. These data analytic tools enable the providers and/or the institutions to track everything and understand what’s really happening to drive student learning.

MOOCs are also an experiment to come up with a new pedagogy for the digital era. They serve as a low-risk alternative to test new ideas and new teaching methods to enhance the traditional learning experience and improve pedagogy. Technological innovations can augment the educational experience on and off-site. For others, MOOCs are a way to innovate and use these innovations in the traditional classroom. Experimenting with new courses, content, pedagogies and technologies also increases the impact of university research.

3. *Brand Extension*

A third reason for offering MOOCs is to promote and market an institution, or its renowned professors – in other words, to “build brand”. The students receive free instruction and in turn, the institution and its faculty receive recognition. Ultimately, MOOCs can extend the institution’s reach and reputation internationally for it can be seen as an opportunity to showcase their work to a global audience.

Particularly among elite research institutions, MOOCs have become a way of enhancing the institution's brand and signaling innovation. Successful professors can gain a global following, building their own reputation—as well as the institution's—and creating new opportunities for research and collaboration. Some university presidents have pointed out that by raising the profile of their school through a MOOC, they are in effect increasing the value of the degree to past and future graduates. Additionally, international recognition and acclaim of both the institution and its faculty helps enhance and extend the brand and creates new opportunities for the institution. It then becomes an effective platform to promote the trademark of the institution. MOOCs can also be used as a marketing tool to attract potential enrollees, such as high school and international students.

4. *Social Corporate Responsibility*

Although not part of Educause's list, one can also add "Social Corporate Responsibility" to it. Providing access to education at no or minimal cost can become a way for the university to give back to a global, regional or local community. At their core, MOOCs can speak to the best, altruistic nature of educators by allowing them to share their knowledge freely with the world. At the same time, if an institution can properly identify needs within their own specific regional and local communities and take steps to address them while the stakes are low, that's a good outcome. It may be that offering a MOOC may fulfill an institution's mandate or mission or serve a particular noble and humane purpose.

4.3. ...and WHY NOT MOOC?

1. *High development costs*

The biggest obstacle for institutions in engaging with MOOCs is the high development costs associated with its production and deployment. Not all universities are well-endowed; most rely only on tuition fees as a source of revenue; and public universities have severe budget constraints and limited funding. Given how expensive it can be to create a MOOC (estimates run up to \$50,000-\$100,000 per course), and given how expensive it can be to build and maintain the supporting infrastructure necessary to deploy the course, cost could limit many universities from adopting MOOCs unless a sustainable and profitable business model has evolved.

2. *Labor-intensive endeavors*

Even for faculty members who have previously taught online courses, organizing a MOOC is a labor-intensive experience. An xMOOC project typically requires a full team, not just a single teacher, and this means coordination, human resources as well as a pricey technical environment. Similarly, a professor that uses Do-It-Yourself platforms (such as Google's CourseBuilder) to produce a MOOC requires dozens to hundreds of hours in preparing, designing and creating a single online course. Then there are the other required tasks such as grading papers and administering online forums, adding more work to the already overstretched teacher. Will the average overburdened teacher then be able commit the time and mental energy needed to make and manage the MOOC?

3. *Lack of a sustainable business model*

There is still no standard business model for how MOOCs will generate revenue. The models that do exist favor the provider heavily rather than the institution or the teacher that created the course. It is hard to see many higher educational institutions, especially public universities and small community colleges that would be willing to bear the costs of high-end production, at scale, on top of their existing commitments, without viable and sustainable business models.

4. *Threat to Traditional Pedagogies*

MOOCs are seen by some educators as a threat to traditional classrooms. For example, professors from Amherst College and Duke University have come out against the online courses on their campuses and even some Harvard instructors have called for a committee to investigate the school's participation with edX, the popular MOOC platform provider [Cassidy, 2013]. A 2013 survey conducted by Gallup and the website InsideHigherEd.com noted that only one in five professors thought that online courses could be as effective as face-to-face classroom instruction [Lederman & Jaschik, 2013]. Among the most common reasons for the skepticism include: limited interaction between teachers and students, the loss of control over course content, and the impersonalization and automation of education. Even the most tech-savvy teacher worries about the level and speed of change required to adopt the new technology, and how they will transition from their existing approach to pedagogy to a brave new world. It is especially threatening to faculty members who value close contact with students. Resistance may be futile, but for some, the conventional way of doing things will be hard to overcome.

4.4. TALKING POINTS: 20 QUESTIONS FOR HEIs

Understandably, MOOCs may not be a suitable tactic for every organization. But because of the attention and hype surrounding the phenomenon and its promise to deliver learning to a large number of people for free, many leaders in HEIs undoubtedly feel the pressure to at least consider MOOCs, if only to answer anxious questions for their stakeholders to address the issue.

When a phenomenon like MOOCs comes along, it is tempting to react to it without taking time to put it in context. But before jumping into the development of costly resources, universities should define their objectives and thoroughly consider what it means to adopt and adapt the new technology. In the classical framework of universities, MOOCs encourage innovation by offering alternative methods of teaching and learning, complementary to or as a substitute for traditional methods. HEIs must think carefully about their motivations to decide why and how to engage in the production of MOOCs. Before proposing a strategy, it is necessary to clearly define the institution's goals and policies.

MOOCs raise a growing list of challenging questions for university administrators, but here are some questions that may help focus the discussions towards building a truly responsive policy and strategic plan. Ultimately, the answers to these questions can only be answered by these administrators, depending on their organization's mission, strategy and motivations.

20 QUESTIONS TO PONDER:

1. *Why does the institution want to offer a MOOC? Why should we MOOC?*
2. *How does offering MOOCs fit into our strategic plans?*
3. *What problem is being solved by offering this MOOC?*
4. *What theory underpins the institution's MOOC strategy?*
5. *How might MOOCs help us pursue our target market? Who is our target market?*
6. *How might MOOCs help us serve our students better?*
7. *How might MOOCs help us strengthen our relationships?*
8. *How might MOOCs help us leverage our advantages?*
9. *What does my university do better than any other school or university?*
10. *Where do we have faculty and institutional expertise?*
11. *How might MOOCs offered elsewhere weaken our strategic position?*
12. *What kind of partners do we need, and why?*
13. *What is the degree of urgency?*
14. *Are there issues that should be addressed sooner as opposed to later?*
15. *What is our institutional capacity to deliver a MOOC?*
16. *Should we invest in building technological capabilities and competencies?*
17. *What are our peer institutions doing?*
18. *What are best practices for an institution like ours?*
19. *What area of concern bothers us the most? Why?*
20. *Who pays for all this?*

4.5. INTO THE FUTURE WITH MOOCS

Clearly, MOOCs have created opportunities for higher education reform that were not even available two years ago. But where there is promise, there are also pitfalls. Ultimately, whether or not an institute should join the bandwagon and start offering MOOCs is a question answered best by the institute. Yuan, et al (2014), stress, “The degree to which institutions respond or not to the advent of MOOCs will be determined by the characteristics of each institution and the motivations of individuals working within them. At the individual and institutional level, the institutional mission, purpose and values, and how these are interpreted, should inform the strategic direction.” A thoughtful self-appraisal of key operational and pedagogical requirements should help determine the optimum approach for a successful implementation.

So how do HEIs/SUCs proceed then? The following is a compendium of recommendations that may guide these policymakers and relevant stakeholders as they move forward to address the phenomenon.

Formulate a policy to address the new technology/pedagogy...

...even if it is just to ignore it. Institutions will need to assess their strengths and develop a strategic plan that enables them to make the most of campus and online education by providing MOOCs or other open education initiatives. They may choose to go on the defensive – formulate policies that prepare their institutions in case the new model really takes off, but delay forming strategic plans. They may choose to go on the offensive – become a leader in online learning, in general, and in delivering MOOCs, in particular. Or they may do nothing – watch as the model continues to mature and evolve. But the last may be risky, as the institution may be left behind.

...but before they do, first: observe, study, and evaluate.

Exercise caution in taking impulsive and reckless actions in response to a largely unproven trend. Perform a cost-benefit analysis before jumping onto the “next big thing”. Conduct a needs assessment to identify the organization’s current technological and human resource capabilities and competencies to determine the institution’s capacity to deliver MOOCs.

Then talk.

Engage in discussions with various stakeholders. Talk to the faculty – is there faculty interest and enthusiasm for MOOCs? Would their courses scale to MOOCs? Talk to students – is there interest and enthusiasm for MOOCs? Would they accept the model as a viable learning alternative to traditional face-to-face classroom instruction? Then talk to the techies – ask them if the institution has the required infrastructure and proficiencies to offer MOOCs. But remember: the academe must lead the charge. Board members, provosts, deans, chairs, and faculty members must embrace it. In most instances, the techies can play the role of collaborators, supporters, and enablers of the process of change (not to mention instigators of change), but the new model cannot be viewed exclusively as an “IT thing” along with all the other “IT things” facing nearly all campuses now.

Then experiment.

Test the waters. Engage purposefully in trials of MOOCs, adaptive learning systems, and emerging technologies to develop institutional understanding. Learn about these new environments, platforms and processes by taking MOOCs yourself. Or pilot a MOOC – use user-friendly, Do-It-Yourself platforms such as those offered by MOOC providers edX (through mooc.org), Google CourseBuilder or Udemy. Then formulate a long-term strategy for MOOCs and/or other open learning initiatives. Take an active role rather than simply waiting and watching for future developments and opportunities. HEIs are about creating, sharing, and preserving knowledge. As Voss (2013b) said, “By taking an active role in the MOOC revolution, we are fulfilling the first, to the benefit of the second.”

Afterwards, look for funds.

MOOC production and deployment costs are prohibitively high. So get sponsors. Or get grants and endowments. Or encourage/build public-private partnerships. UPOU has Smart. What about other telecom companies? Or education technology corporations?

Or establish partner networks.

Open University had FutureLearn in the U.K. The Universia Network had Miriada X in Latin America.

Or establish a common national network...

...to build a common customized platform that can be used by partner institutions nationwide. France did it with FUN; China with EWANT [See the Special Report on MOOCs technology].

Or go at it alone and build your own platform.

Be a maverick. Use open source platforms and customize and brand it to your needs (you’d need a lot of programmers, though). Open edX is one, Moodle another.

Or don’t MOOC at all. Just flip the classroom.

Adopt a blended learning strategy, e.g. MOOC + Face-to-Face instruction, as successfully practised in other developing countries. Develop online components for existing courses. 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. Sometimes, a blended learning approach works best. Or optimize content for the MOOC platform, then re-purpose it for the traditional classroom

Or offer it as a value-added service.

Market the institution to graduating high school students or potential international enrollees. Market “signature” programs and degrees to make your institution stand out.

Do...

- Decide why the institution should (or should not) engage in MOOCs and provide real support to make it happen, if you do decide to MOOC.
- Treat MOOCs as part of the “tool kit” to fulfill your mission.
- Discuss, define and communicate your MOOC strategy broadly.
- Embrace change; while MOOCs are not the end-all or be-all of anything, they are substantially different from the way education has operated for centuries. They provide a great opportunity to rethink about policies, strategy, education practices and learning outcomes.
- Determine the value of MOOCs to the institution and to the faculty, then develop incentives and rewards for faculty members who get out of their comfort zone to try a MOOC.

Do not...

- View MOOCs as an alternative to classroom education. They aren't. Not yet.
- Expect MOOCs to generate revenue or save money. They won't. Not yet.
- Underestimate the amount of effort involved in design or delivery.
- Think you can create a solid, quality MOOC without major investment.
- Rush to monetize MOOCs or offer credit for them. At least, not yet.

CONCLUSION

In a decade when the need of the hour for academic institutions is to expand their reach, MOOCs have managed to get their timing right. As the cost of higher education continues to grow and tuition fees continue to rise, so too has the search for cheaper alternatives intensified. As the potential ultimate provider of educational access to all, MOOCs have been showcased as one such option. The potential of this new pedagogical model to open up education and deliver quality learning to all regardless of economic, social, demographic and geographical constraints has created a whirlwind of great interest not only in academic circles but also outside of it. While there is still much debate surrounding the pros and cons of the phenomenon, its value lies in its promise to open education to all, signaling the continuing movement towards openness in education. Understandably, MOOCs may not be a viable solution for all. However, despite their flaws, MOOCs, if utilized properly, have the potential to assist in the democratization of knowledge. But to do so, policymakers must make some key, fundamental changes to their programs to embrace openness and make education more affordable and accessible for all. After all, as the United Nations Universal Declaration of Human Rights states: “Everyone has the right to education... Education shall be free.”

GLOSSARY

Behaviorism – Behaviorism is an educational theory that suggests that standardized tests provide a reliable measure for students’ knowledge. The idea arose with the development of public schools and the challenge of comparing the relative success of different teaching techniques. Critics of the behaviorist approach argue that not only do standardized tests fail to demonstrate the true ability of each student, but our reliance on them leads to inefficient teaching practices that focus on success on these tests. Some critics also shun the administration of anxiety-provoking exams.

Blended learning – Blended learning is a form of education that takes place both online and in a brick-and-mortar location. In blended learning scenarios, “face time” between students and teachers is not replaced by online course delivery. Rather, the online component of the learning experience usually consists of exercises or additional content that complement the in-class lesson.

cMOOC: Stephen Downes, co-founder of one of the first MOOCs, coined this term in 2012 to create a distinction in MOOCs in this category from what he termed ‘xMOOCs’. The ‘c’ in cMOOC stands for ‘connectivist.’ which represents the nature of cMOOCs. Rather than being delivered by an individual instructor, as in traditional university courses, cMOOCs involve groups of people learning together. cMOOCs often include blogs, learning communities, and social media platforms that contain content and promote interaction. In this environment, participants are all considered teachers and learners, which stands in contrast to the structure of xMOOCs, where each individual is either a student or a teacher.

CMS –CMS stands for Content Management System, which is a tool that can facilitate the development and implementation of MOOCs. CMS, which has been available since the late 1990s, enables content to be published, edited, and organized. The system is a popular application for MOOCs because it is conducive to collaborative work efforts and does not require coding.

Constructivism – Constructivism argues that learning occurs as a dialogue between prior knowledge and new material. To achieve meaningful learning outcomes learners must “construct” their own concept and update or revise it based on whether or not their interpretation was valid. A good example might be applying the scientific method to a different situation than the one you learned it in. Project-based learning, learn-by-doing approaches, and simulation learning are all inspired by constructivism.

Creative Commons: Creative Commons is a non-profit organization that promotes the sharing of copyrighted works through free legal licenses. It was founded by Lawrence Lessig, Hal Abelson, and Eric Eldred in 2001. With Creative Commons, creators can structure the ways that their work can be shared by others, and people can choose works to license based on the works themselves and the specific rights they receive from the license. The effect Creative Commons has had on the use and law surrounding intellectual property has been met with both praise and criticism. Those championing Creative Commons applaud the enhanced access at reduced prices, while those against the organization claim it may ruin the foundations of our copyright system and stifle creativity by reducing motivation to create works that will generate little revenue for the creator.

Hybrid Learning – Often, the term hybrid learning is used interchangeably with “blended learning”. However, there is a subtle distinction. In hybrid learning, a significant portion of the course takes place online. In contrast with blended learning, a hybrid learning scenario replaces much of the student-teacher “face time” in a brick-and-mortar location with online interaction.

Flipped Classroom – The flipped classroom is another form of blended learning where a student is first exposed to new material outside of class, usually in the form of an online presentation. When the student attends class in a brick-and-mortar setting, the class time is used to apply the material in the form of problem-solving activities and discussion.

Gamification: Gamification refers to the strategy of presenting information in a manner that is entertaining to enhance engagement and the ease with which information is attended to and learned. Gamification is relevant for learning in general but is particularly important as MOOCs are developed because MOOC technology presents a new opportunity to “gamify” content in a way that the traditional classroom is unable to. Gamification capitalizes on the human aspects of reward to make learning more enjoyable and increase motivation to do exercises required for content mastery.

LMS – LMS stands for Learning Management System, which is another application tool for implementing MOOCs. An LMS provides infrastructure that enables not only the creation and delivery of instructional content, but also the ability to track progress and collect all relevant data during the duration of a MOOC or traditional on-campus course.

LTI: LTI is an acronym for “learning tools interoperability”. LTI was built to in response to the complexity associated with building online courses. Because different platforms offer different options and resources, course developers may want to use pieces offered by different platforms. LTI allows for this type of mix-and-match function during course building so that students can use one site for their course that integrates information from multiple platforms. The downside to this approach is that LTI does not change the appearance of tools provided by different platforms, which can make the look of the site inconsistent.

MOOC – MOOC stands for Massive Open Online Course. They typically include a collection of many of the following learning objects: video lectures, online readings, problem sets, quizzes, and student interaction. The goal of MOOCs is to reach a much larger audience than traditional courses can accommodate and to foster interaction between people with similar interests across the world.

OER – OER stands for Open Educational Resources, which refer to free teaching resources, such as documents and media files. OERs are openly licensed, which enables them to be free and limitlessly distributed. Though traditional educational materials are protected by copyrights, a significant amount of educational intellectual property has begun to be more flexibly licensed through Creative Commons.

Pedagogy – Pedagogy refers to the science of education, including the design of learning environments and study of their relative effectiveness. It is also used to define different approaches to teaching and learning, e.g. a connectivist or behaviorist pedagogy.

SCORM: SCORM stands for Sharable Content Object Reference Model, which was created as part of the Office of the United States Secretary of Defense's Advanced Distributed Learning (ADL) initiative and defines standards and specifications for e-learning.

STEM: STEM is an acronym for 'Science, Technology, Engineering, and Mathematics'. A similar term is MINT, which refers to Mathematics, Information sciences, Natural sciences, and Technology. 'STEM' is most often used in discussions on education policy in response to the perceived lack of participation in technological careers, despite the increase in open positions in relevant fields.

xMOOC: Stephen Downes, co-founder of one of the first MOOCs, coined this term in 2012 to create a distinction in MOOCs in this category from what he called 'cMOOCs'. xMOOCs are based on traditional university courses. An advantage of xMOOCs is that they significantly broaden the number of students who can be exposed to university-level courses. Critics of xMOOCs, however, argue that xMOOCs are inferior to the university courses they mimic because they eliminate teacher-student interactions and involve limited student-student interactions. Platforms like edX, Coursera, and Udacity provide xMOOCs.

APPENDICES

APPENDIX A

MOOC Derivatives and Variants

A large number of MOOC variants were developed over the course of 2013, all of which consisted of online courses. The section below features an overview of these courses, with links to the relevant websites for those in search of further information.

ACRONYM	MEANING	REFERENCE
MOOC	Massive Open Online Course	http://en.wikipedia.org/wiki/Massive_open_online_course (this description is regularly updated)
mOOC	Micro Open Online Course	Course Mini courses, offered by OER University: (www.oeruniversity.org) www.scienceguide.nl/201311/na-moocs-nu-de-mooc.aspx
SPOC	Small Private Online Course	Online course, often closed (enrolment is limited to the institution's own, paying students) www.bbc.co.uk/news/business-24166247
SOOC	Selective Open Online Course	SPOC, without restrictions in terms of the number of enrolments, but based on a selection process designed to limit the number of participants. Also referred to as an SPOC. http://etcjournal.com/2013/09/26/spocs-are-mooc-game-changers/
DOCC	Distributed Open Collaborative Course	MOOC in which participants collaborate on the basis of distributed expertise. Very similar to the cMOOC. http://moocs.com/index.php/from-mooc-to-docc-new-directions-in-open-online-education
LOOC	Local Open Online Course	Derived from a MOOC, but offered online to the institution's own student community; may be adjusted. Not available outside of the community. www.ecampusnews.com/around-the-web/loocing-future-digital-learning
MOOR	Massive Open Online Research	MOOC with a substantial research component. For example, participants may be offered the opportunity to contribute to ongoing research projects during the course. www.technoduet.com/mooc-spoc-moor-and-the-walking-dead-the-journey-continues
ROOC	Regional Open Online Course	MOOC with a regional appeal, reflected in the language used or the specific cases. Regarded as a MOOC application for higher professional education institutions. http://blog.han.nl/hanicto/van-mooc-naar-rooc/
HOOC	Hybrid Open Online Course	MOOC with an intensive focus on student participation. This may vary from mixed classes with students also taking the on-campus version of the course, or the delegation of supervision tasks to active participants. www.universitybusiness.com/article/course-connections-new-mooc-phase-student-engagement
COOC	Classically Offered Online Classes	Online course that seeks to emulate the classroom-based approach. The actual extent of this course's openness is unclear. www.nebhe.org/thejournal/coocs-over-moocs/

Source: SURF, 2014

APPENDIX B

MOOC Resources

The growth of MOOCs continues to be exponential and as soon as an article or paper is published about MOOCs, it can often be out-of-date within a matter of weeks or even days. Indeed, the environment in which MOOCs and other forms of online education operate is changing virtually every day. So to stay abreast of this rapidly shifting landscape, you should regularly visit continually updated sources of information. In order to keep up with the fast pace of developments, here are additional MOOC resources on the web:

For those who to know more about MOOCs, here are good places to start: “[A Ten Point Reading List to Help You Make Sense of MOOCs](#)” by Michael Trucano is a good take-off point as it provides useful links to other MOOC resources for beginners. The [EDUCAUSE library entry on MOOC](#) is another good starting point, and a great source of a limited number of informative, curated links about MOOCs. The Chronicle of Higher Education also maintains an excellent curated set of resources outlining [What You Need to Know About MOOCs](#).

The [mooc.ca](#) news aggregator is provided by [Stephen Downes](#) and [George Siemens](#) – the two guys behind what is generally considered to be the first MOOC by most people, and who have remained as in-the-know as anyone about what is happening in the MOOC space. The site also has a ton of information on the latest MOOC trends. [Diigo, MOOC links](#) is another collection by Siemens. [The MOOC Newsletter](#) is online newsletter produced by Downes. It brings information and resources from the world of MOOCs once a day every day.

For a very quick overview of “*What is a MOOC?*”, watch this short [YouTube video](#) from Dave Cormier. And if that video didn't do it for you, the very popular [TED Talk from Coursera founder Daphne Koller](#) might.

[Alt-Ed](#) is another good MOOC resource. The site documents significant initiatives relating to MOOCs, digital badges, and similar alternative educational initiatives. The site is a bit outdated though, but still contains relevant information regarding the subject.

If you're into social media, then the [Facebook group, Massive Open Online Courses \(MOOC\)](#) is for you. It contains everything you want to know about the subject...and then some. [Internet Time Blog](#) also has 195 posts about MOOCs and [14 articles](#) on MOOCs. [Scoop.it](#) also has its own MOOC pages.

Another useful resource site is [Knollop, Start Learning](#) – “Making sense of the wealth of educational resources on web. Knollop is a dollop of knowledge, linking together endless learning materials to illuminate multiple pathways for students to achieve their educational goals.”

[mediasite, Massive List Of MOOC Resources, Lit And Literati](#) contains a “Massive List of MOOC-ness” articles and links. [paper.li, Stalking the MOOC](#) is curated by Vanessa Vaile and [Stephen's Web](#) features MOOC post search.

[MOOC News & Reviews](#) is a very useful MOOC resource as it contains news, reviews, commentaries, success strategies, case studies and profiles, and other MOOC resources. Similar sites include [moocs.com](#) and [massiveopenonlinecourses.com](#) and [MOOCs Directory](#) from MOOCUniversity.com.

For students, there is “[MOOC List](#)”, an aggregator (directory) of Massive Open Online Courses (MOOCs) being offered from all over the world from different providers. It features an easy search function with MOOCs categorized according to providers and categories. Another popular aggregator is [Class Central](#). [www.mooc-list.com](#) which claims to offer a complete list of all available MOOCs by category, university/entity, course length and estimated effort required to undertake the course is another good resource for students and learners.

For researchers and students of the subject, there’s Bill & Melinda Gates Foundation’s [Research Initiative](#). The site is funded by the foundation as part of a set of investments intended to explore the potential of MOOCs to extend access to postsecondary credentials through more personalized, more affordable pathways. From the website: “Welcome to the MOOC Research Hub. The dramatic increase in online education, particularly Massive Open Online Courses (MOOCs), presents researchers, academics, administrators, learners, and policy makers with a range of questions as to the effectiveness of this format of teaching and learning. To date, the impact of MOOCs has been largely disseminated through press releases and university reports. The peer-reviewed research on MOOCs has been minimal. The proliferation of MOOCs in higher education requires a concerted and urgent research agenda. The MOOC Research Initiative (MRI) will begin to address this research gap by evaluating MOOCs and how they impact teaching, learning, and education in general. The first research studies and white papers conducted in 2013 and early 2014 are now available on the website. Another resource dedicated to researchers is Katy Jordan’s [MOOC Research Literature Browser](#). If you want to find out about the growth of the industry, then check out [MOOC Map](#), an interactive visualization showing the geographic spread of MOOCs from six providers (Coursera, Instructure, Blackboard, edX, FutureLearn and Open2Study).

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A SPECIAL ANNEX REPORT

UNDERSTANDING THE TECHNOLOGY BEHIND MOOCS

Information Technology has become an increasingly indispensable enabler of almost every aspect of life in the 21st century – in our homes, in our work, and in our schools [Voss, 2013]. The last is especially true – the advent of new information and communication technologies has radically transformed the world of education in unprecedented ways. Over the last decade alone, technological developments have significantly changed and influenced modern pedagogies, heralding the movement towards openness in education. New forms of education and media technologies as well as the availability of affordable devices, free services and open content have allowed institutions to impart learning in faster, simpler, cheaper and more effective ways. Additionally, the advent of open courses demolished organizational restrictions and dramatically increased the number of participating students. This in turn led to an increased demand for more accessible quality education, and the need for newer technological innovations, such as MOOCs, to address the demand.

Part of the reason why MOOCs have garnered so much attention since its inception is its ability to deliver learning to a greater number of people, regardless of geographic, economic, and social boundaries. Thus, the development and rising popularity of MOOCs are causing institutions to consider how they can better use technology to improve learning outcomes, reduce costs, create efficiency in their teaching operations, and reach new markets. Whether or not MOOCs become a part of mainstream provision, there is a question about the technology options that best suit a particular institution's needs, and this may include MOOCs as well as other online distance learning provisions.

While it is true the information services and technology rest at the heart of the MOOC experience, there is little to MOOCs that is new or innovative. Most of the components in MOOCs merely reuse what has already been established on the web – search (Google, Yahoo), hyperlinks, short videos (YouTube, Khan Academy), wikis (Wikipedia, Wikispaces), communication (e-mail, chat), collaboration (forums, social media), peer learning, and Virtual Learning Environments (Learning Management Systems, Content Management Systems). But the rapid development of MOOC platforms and services with different functions, terms and conditions can lead to significant levels of confusion about what strategic course of action an institution should take. MOOCs pose a set of challenges for HEIs given their existing technological infrastructures and capabilities. It is important then for policy-makers to have a greater understanding of the technology so they may make better informed decisions.

This special report gives the readers insights into understanding and using the technology embedded in MOOCs by describing the technical dimensions of the model and the theoretical concepts behind it. The major platform providers are identified and described in detail. The report also identifies the requirements needed to produce and deploy MOOCs in terms of hardware, software, and humanware. The concluding section specifies what decision-makers must consider in order to come up with specific strategies to implement solutions that can handle the technological demands required to deliver MOOCs in a learning environment.

I. LET'S TALK TECH: SOME MOOC CONCEPTS & TERMINOLOGIES EXPLAINED

The fundamental difference between previous models of open learning pedagogies and MOOCs is that the latter is free and open to a larger number of participants. This implies that the system used to deliver MOOCs has to be capable of accommodating the huge number of potential users (*scalable*), that it is flexible to meet their demands (*elastic*) and that service costs are kept low (*affordable*). It's not surprising, therefore, to see that most MOOC frameworks are cloud-hosted, since cloud computing offers the best solution in terms of scalability, elasticity, efficiency, accessibility and affordability.

What is cloud computing?

Cloud computing is an internet-based technology that provides access to services, storage space, and resources on demand without the worry of downloading or installing anything on your computer. The cloud is made up of a network of servers working closely together, and each server has a different function. Some servers use computing power to run applications or 'deliver a service'; other servers are responsible for storing data. Often, these servers are distributed throughout the planet. Data centers owned and operated by cloud providers use these servers to deliver a range of IT services through software and virtual hardware (as opposed to physical), which is then delivered remotely through public (e.g., Internet) or private networks, or a mix (i.e., hybrid) of the two delivery modes. Cloud providers offer their services according to three fundamental models:

- **Infrastructure as a Service (IaaS):** Products offered via this model include the remote delivery (through the Internet) of a full computer infrastructure, physical or virtual machines, and other resources, e.g. virtual computers, servers, storage devices. Examples include Amazon's Elastic Compute Cloud (EC2) and Joyent.
- **Platform as a Service (PaaS):** In this model, the provider supplies the supporting infrastructure (OS, programming language execution environment, databases, web servers) from which software developers can build and run their applications without the cost and complexity of buying and managing the underlying hardware and software layers. Examples include Google's App Engine, Microsoft's Azure, and Amazon Web Services.
- **Software as a Service (SaaS):** In this model, users are provided access to application software and databases. Instead of installing and maintaining software, one can simply access it via the Internet. Cloud providers manage the infrastructure and platforms that run the applications. SaaS is sometimes referred to as 'on-demand software'. Examples include Google Docs and Microsoft Office Live.



Characteristics of Cloud Computing: Scalability, Elasticity, Efficiency, Accessibility, Affordability

When it comes to MOOCs, the cloud is vital. A single web server or web application won't cut it. Instead, the software on the servers must work in tandem with each other, and in conjunction with management software that will allocate more servers as the need arises. This concept of allocating additional software based on demand is called *elasticity* [Cogswell, 2014]. Elasticity basically means that the platform can handle sudden, unanticipated, and extraordinary loads. In this manner, the system can adjust itself accordingly as the number of students taking a particular course changes at any given time.

Additionally, the cloud must also be *scalable*, especially when dealing with a potentially high number of users who might want to use a high number of resources. Scalability simply refers to a system's ability to increase (or decrease) in size as demand warrants. Scalability is a planned level of capacity that is anticipated will be required. Often the servers in a cloud are virtually identical and they provide duplicate functionality, allowing the high workload to be spread out between them. This in turn allows the services the servers are providing to be able to handle the high number of people throughout the planet needing to use them, which is ideal for online learning services that need to reach as large an audience as possible [Cogswell, 2014]. This ability of cloud platforms to 'elastically scale' and to use resources only when needed eliminates the high costs of service delivery, making it *affordable*.

Cloud-based provisions and the use of open standards also make it easier for different platforms and services to exchange information and data, because cloud computing facilities allow vast amounts of data to be stored and transmitted at a very low cost, thus making the system *efficient*. Additionally, the expectation for a MOOC is to be *accessible 24/7*, and for its high quality video content to be streamed in high definition so that engagement is not lost, and cloud computing allows for that provision.

MOOCs in the Cloud

MOOCs are naturally hosted in the cloud to fulfill its online component. In a MOOC, the course content is delivered through an online platform. Teachers create these lecture-based, interactive courses which are then hosted on the platform, and the students access them through that particular platform. The platform is a web-based software which generally consists of a Learning Management System (LMS)⁶, a web user interface, and a communications system. The platform enables an educator to run online lectures, deliver multimedia, administer tests, assign homework, mark assignments, grade students, etc. The MOOC materials are also hosted in the cloud. Therefore, students can access advanced learning applications and can interact and collaborate, regardless of geographical location, with their peers through a cloud system.

The next section describes in more detail what MOOC platforms are and who the major MOOC platform providers are.

⁶ **Learning Management Systems (LMS)** [sometimes referred to as **Virtual Learning Environments**, or VLEs] are software applications for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs [Wikipedia, 2014]. LMS are also known as online learning platforms.

II. MOOC PLATFORMS AND THEIR PROVIDERS

Siemens (2011) wrote, “At the heart of MOOCs are the platforms that enable the various operations involved in offering a MOOC to be done effectively.” He described the race to create effective platforms in various fields. He (2012) notes that “MOOCs, regardless of underlying ideology, are essentially a platform.” It can be seen as a stage where student meets teacher and other students, and where the learning takes place. Figure 1 represents the platform concept and illustrates the way the various stakeholders connect to each other.

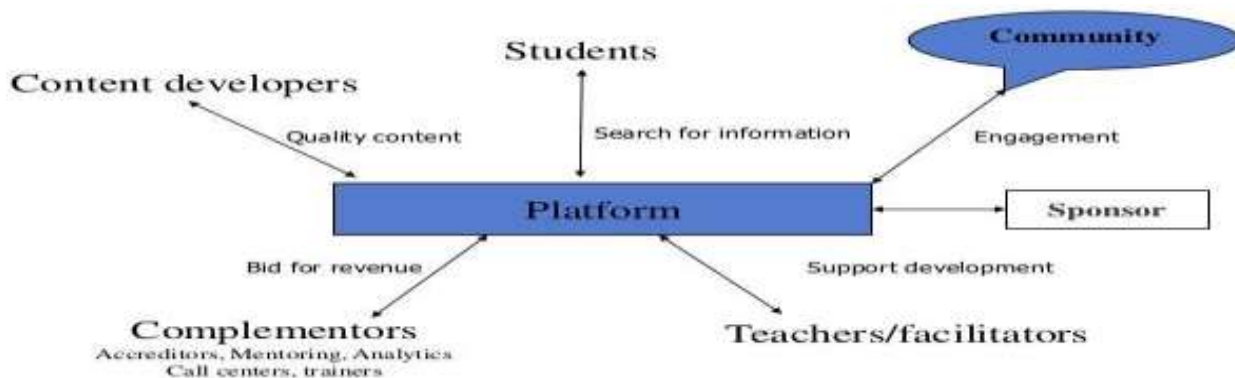


Figure 1: The Platform Concept [Source: <http://www.slideshare.net/balaiyer/framework-for-blended-learning>]

What is a MOOC platform?

A MOOC platform is a web-based system that provides courses and associated services to learners that is scalable and elastic. It can be based on a single site on the web (xMOOCs) or be distributed among several sites and/or services (cMOOCs). MOOCs are operated through hosting platforms which provide computing and communications services to enable online teaching materials to be delivered. MOOC platforms provide a place for course creators to host their content and manage their learning environment (forums, quizzes, exams, assignments, etc.).

The engine that drives the platform is a web-based software that is either open source (edX) or proprietary (Courser, Udacity), or may be based on an existing LMS/VLE (Moodle, Canvas, Blackboard). Depending on the platform provider, may be hosted by the provider (SaaS or PaaS), or self-hosted by the institution offering the MOOC using their own IT infrastructure and servers.

Unlike in previous models of online delivery where the LMS was the central point, in the MOOC model, the LMS is reduced to one node on the entire network and is used primarily for management tasks, such as registration and student profiles, and hosting of discussion forums. The LMS also enables the students to login to the main system and gain access to its software and hardware. However, MOOC platforms are more than just the LMS component; in addition to traditional LMS's, MOOC platforms provide innovative features such as assessment systems, and communication tools.

Who are MOOC providers?

A MOOC provider is an organization that accepts and selects contributions for open courses from individual educators or universities and makes them available for learner enrollment and participation. Most MOOC providers offer additional online and offline services, such as marketing and technical support, tutoring, and formal certification. Educators working with existing MOOC providers such as Coursera or edX should consider them as IT suppliers providing application development, maintenance and infrastructure services.

Platforms have assumed a variety of organizational models. Companies that provide the platforms access content through a variety of licensing and support arrangements. Typically, platform providers are either for-profit or non-profit organizations. They can be:

- a) A government-based (public) institution;
- b) A private institution/company;
- c) An higher education institution; or
- d) A consortium of public/private institutions/nations.

These providers are funded by venture capitalists, government or private institutions, or by HEIs or foundations. They may comprise of a single institution, or part of a consortium.

The Platforms

The first consideration for an institution or an individual teacher who has decided to deliver a MOOC is the choice of a suitable platform for course content delivery, based on their current needs and existing infrastructure and technological capabilities. There are plenty of options for an educational institution to consider when rolling out a MOOC: they may join a course aggregator network like Coursera, spend time and money on building their own solution, buy proprietary software and hosting, use Do-It-Yourself software like Google's Course-Builder, or self-host an open-source application like edX or Moodle. In general, their options may be categorized into three: they may choose to 'build' their own platform; they may 'buy' a platform or the services offered by the provider; or they may choose to 'borrow' an existing platform.

Consequently, the following is a list of the major platforms, classified into the following types: 'build' platforms (open source, Do-It-Yourself), 'buy' platforms, and 'borrow' platforms (free, hosted solutions). Additionally, a fourth option explores LMS-based platforms. Table 1 on the next page provides a summary of the major platforms based on their characteristics. Though the list is by no means complete (as there are over 50 platforms worldwide) this list does represent some of the more popular and most-used platforms currently available.

	Owned by	Established	Origin	Economic Model	Funding	Partner Institutions	Source Code	Hosting
ALISON	ALISON	2007	Ireland	Commercial	Private	Many	Proprietary	Hosted
Canvas Network	Instructure	2012 ⁷	U.S.A.	Commercial	Venture Capital	Many	Open Source	Both
CourseBuilder ⁸	Google	2013	U.S.A.	Commercial	Private	Google, edX	Open Source	Self-Hosted
Coursera	Coursera.org	2012	U.S.A.	Commercial	Venture Capital	Stanford, Yale, Princeton, etc.	Proprietary	Hosted
D2L Open Courses	Desire2Learn	2013 ⁹	Canada	Commercial	Private	Many	Proprietary	Hosted
Eliademy	CBTec	2013	Finland	Commercial	Private	Many	Proprietary	Hosted
Iversity	Iversity.org	2013	Germany	Commercial	Grants + VC	Many	Proprietary	Hosted
FutureLearn	Open University	2012	U.K.	Consortium	UK Universities	UK Universities	Proprietary	Hosted
Miriada X	Miriada X	2013	Spain	Commercial	Venture Capital	Spanish & Latin American HEIs	Proprietary	Hosted
Moodle	Moodle.org	2002	Australia	Commercial	Venture Capital	Many	Open Source	Both
NovoEd	NovoEd	2013 ¹⁰	U.S.A.	Commercial	Venture Capital	Stanford	Proprietary	Hosted
Open Education	Blackboard	2014 ¹¹	U.S.A.	Commercial	Private	Many	Proprietary	Hosted
Open edX ⁸	edX	2012	U.S.A.	Non-profit	Harvard, MIT	Harvard, MIT, Berkeley, etc.	Open Source	Both
Open Learning Initiative	CMU	2002	U.S.A.	Non-profit	Grants	CMU	Proprietary	Hosted
Open2Study	OUA	2013	Australia	Non-profit	OUA	OUA	Proprietary	Hosted
OpenLearning	OpenLearning	2012	Australia	Commercial	Private	UNSW	Proprietary	Hosted
OpenMOOC	UNED	2012	Spain	Non-profit	UNED	UNED	Open Source	Self-Hosted
OpenUpEd	OpenUpEd	2013	Europe	Non-profit	Private	EADTU	Proprietary	Aggregator
Sakai	Sakai	2005	U.S.A.	Non-profit	Grants	Many	Open Source	Self-Hosted
Udacity	Udacity	2011	U.S.A.	Commercial	Venture Capital	Stanford	Proprietary	Hosted
Udemy	Udemy	2010	U.S.A.	Commercial	Venture Capital	Many	Proprietary	Hosted

Table 1: Major MOOC Platforms

⁷ Canvas Network is owned by Instructure, the education technology company that developed the Canvas LMS. Instructure was established in 2008.

⁸ Google and edX joined forces in 2013 to create mooc.org, an online, hosted, DIY platform for educators. See Open edX and/or Google CourseBuilder.

⁹ D2L Open Courses is owned by Desire2Learn, the education technology company that developed the D2L LMS and open learning suite. The online learning suite, previously called 'Desire2Learn', was re-launched as Brightspace in 2014. The company was established in 1999.

¹⁰ Venture Lab was re-branded and re-launched as NovoEd in 2013. The company was originally founded in 2012.

¹¹ Open Education powered by Blackboard is owned by the enterprise technology company that developed the popular LMS, Blackboard Learn. The company was established in 1997. Its predecessor is CourseSites, which was launched in 2012, was not intended to offer MOOCs, but as a way of providing opportunities to educators to offer online courses.

“Build” Platforms

‘Build’ platforms allow course creators - institutions or individual teachers – to customize and brand the platform by modifying the software to suit their needs, or by providing them with tools so they can create their own courses online. These can be subdivided further into two - open source and Do-It-Yourself platforms.

1. Open Source Platforms

An open source platform software is platform whose underlying source code is made available to the public for free. It carries a license that grants users the right to deploy, modify and distribute the software at no cost and for any purpose. They are often developed in a public, collaborative manner. Typically, open source platforms allow the users to host the platform on their own servers. Open source platforms are highly customizable, brandable and free.

1. Open edX – <https://www.edx.org/>



edX is the non-profit, open source platform founded by the Massachusetts Institute of Technology and Harvard University in 2012 with \$60 million of resources contributed by the two institutions to support the project. Considered one of the “Big Three” platforms, and one of the first MOOC providers on the scene, it offers interactive online classes and MOOCs from the world’s best universities, such as MIT, Harvard, Berkeley and many others, for free. It has also been adopted by major corporations, such as Tenaris. The platform was released as open source in March 2013. Although it is open source, investment will need to be made in both installation and maintenance, but the return will be a platform that can provide best-in-class content to thousands of students. edX is generally considered to be one of the big boys in the market and has established a firm position with its ‘open source’ offer, solid funding and global reach.

The edX platform, Open edX, is a full-featured LMS and authoring tool, dedicated specifically to building MOOCs. The goal is to become the WordPress of online course platforms [Swope, 2013], where users can start with a basic framework and then add to the core functionality via third-party plug-ins. The platform has a fast, modern feel, with the ability to accommodate large enrollments (over 100,000 users). It is suitable for organizations that want a modern, flexible and robust course-management platform. In addition, the edX course-building software allows course creators to develop basic courses via a graphical user interface. Open edX does require a self-hosted installation; in return for the time it takes to set up and maintain the platform, the institution gets full access to student data and unlimited customization options. The platform is fully customizable and brandable -some MOOC national platforms, such as Edraak (Arab), XuetangX (China) and France Université Numérique (France) were developed using the edX code. edX’s advanced technology features interactive, self-paced and wiki-based collaborative learning, online discussion groups and a rich assessment of students as they progress through courses. Other features include an advanced LMS centered on MOOCs, a course-authoring tool, a machine learning-based grading APIs for computational as well as written responses, and discussion platforms offering voting systems and allowing endorsements by instructors.

mooc.org (<http://mooc.org>) – In September 2013, Google teamed up with edX to create a new site that edX's president compared to as a "YouTube for MOOCs". Google also became a partner in developing the Open EdX platform, and rolled out its own open source platform, CourseBuilder, into mooc.org. The site will use the same edX platform through which professors at Harvard, MIT, and other edX-partner universities now offer their online courses. But it will now be open to everyone, including businesses, governments, and private individuals as well as professors at non-edX colleges. mooc.org is essentially edX's DIY platform for individuals and institutions wishing to avoid the complexity of customizing the edX code. The site will be built on Google infrastructure.

2. OpenMOOC – <http://openmooc.org>



In October 2012, Spain's largest distance-learning university, the National University of Distance Education (UNED) launched the Open UNED (UNED *Abierta*) program. The aim of the program was to create a single web portal where students can access open educational resources from sites such as YouTube, OpenCourseWare and iTunesU. Soon after, the school made a commitment to include MOOCs in the program and subsequently developed an open source platform called OpenMOOC. The platform, which was released with an Apache 2.0 licence, allows universities and teachers to create and launch MOOCs. It integrates text and multimedia content and then optimizes the display for both mobile and traditional devices. The software is designed to create self-paced modules, which OpenMOOC calls 'knowledge pills.' The modules are built around short videos and supplemental materials, like readings and exercises. As with Open edX, the platform requires a self-hosted installation. Unfortunately, there is a lack of documentation regarding the source code.

The software enables the teacher to add video and have discussions in a built-in forum. Content can be accessed online from a desktop, tablet, or smartphone. The platform also has some unique features, such as a dynamic small group formation model, where students are placed into smaller groups in forms to structure the interaction between them; an advanced peer review system; and a flexible certification model, where they offer badges, credentials or certificates to those who successfully complete a course. All in all, the platform is more suited for cMOOCs as it aims to create open access based on free source components to build a connectivist environment. Some downsides are that it does require some technical skills to get going, and it doesn't allow for integration of social networks.

a) Do-It-Yourself Platforms

Do-It-Yourself (DIY) platforms are platforms where individuals or institutions follow a step-by-step guide to create and upload course content online using the provider's software or templates, and the provider either hosts the course material on their website, or the institutions self-hosts the course. The emphasis is thus on the creation of a course over managing the content and mastering the hosting on the respective platform. DIY platforms are ideal for individual teachers or small colleges who do not have the time, resources or capability to customize open source options.

1. CourseBuilder by Google – <https://code.google.com/p/course-builder/>



CourseBuilder is the open source, DIY platform that was developed on and powered by Google technologies, based on a code the company used to build an experimental web course called “Power Searching with Google”. The goal of CourseBuilder is to provide a platform for anyone to create a MOOC by bringing together several web elements, such as YouTube, App Engine, Groups, Apps, Google+ and Hangouts, into one component technology. The platform allows anyone to create, present and deliver courses online. It contains software and instructions for creating and presenting course materials, allowing teachers to organize the materials into lessons, activities, and tests. Additionally, there are instructions for using other Google products to create a community and to evaluate effectiveness. Since its initial release, four more versions have been offered, adding extra features such as user-friendly content development, administrative support, dashboards on student performance and behavior, new assessment types including peer review, accessibility, and internationalization, making it highly customizable and flexible. A large number of courses have been hosted on CourseBuilder, with many more in the pipeline. Their users include not only colleges and universities, but also non-profit and K-12 organizations, supporting a diverse set of learners. The downside is that it is necessary to have a grasp of HTML and JavaScript if one chooses this solution. It also requires a self-hosted installation and a server on which to run it.

UPDATE: In September 2013, Google partnered with edX to create mooc.org, a DIY course-creation site for educators wishing to develop MOOCs. Google has committed to maintaining their previous platform, but will be “focusing our development efforts on Open edX, and look[ing] forward to seeing edX’s MOOC.org platform develop” [Ferriman, 2013].

“Buy” Platforms

Commercial platforms are typically provided by for-profit organizations. They usually have high quality content and strong relationships with universities from all over the world. The platforms are provided to educators not necessarily for a fee, but as part of a revenue-sharing contract. In return, the user receives technical and marketing support. However, the cost of creating the course lies with the instructor or institution. But courses on commercial platforms can be monetized through the offering of premium or freemium services, such as certificates, allowing instructors and institutions to refinance their expenses. The courses are usually not available under an open license. So far most content is available at no cost and the business model is related to certification but also sometimes to tuition fees.

1. Coursera – <https://www.coursera.org/>



Based in Silicon Valley and widely considered to be the largest MOOC provider, Coursera is an education platform that partners with the top universities in the world to offer courses online for anyone to take, for free. Founded by Stanford computer professors Andrew Ng and Daphne Koller in 2012, Coursera currently has 9.8 million registered users in 774 courses from 114 partner institutions all over the world. As of December 2013, it had raised over \$85 million in venture capital funds. In September 2013, the company announced that it had earned over \$1M in revenue through verified certificates that authenticate successful course completion by participants. It launched its Signature Track program in 2012, a special option given to students who want to receive a Verified Certificate upon completion of the course and course requirements, for a fee (\$30-\$90USD). Coursera also offers proctored exams at the end of these courses through ProctorU, an online proctoring service that connects proctors and students via webcam, at a cost of \$60-\$90.

Coursera not only partners with educational institutions but with government entities, non-profit organizations, and businesses from all over the globe as well. It currently has deals with US State Universities and dozens of other organizations around the world, e.g. in Europe, China, Korea, Russia and Mexico, among others. Their partnership with the World Bank won't do them any harm either. Given that EdX was funded by Harvard and MIT, we shouldn't be surprised that Coursera has Yale and Stanford. Some partner universities offer credit for their Coursera classes to those who want to pay a fee to have some extra assignments and work with an instructor and be assessed. High quality online courses taught by faculty members from those institutions are freely available on a published schedule. Certificates are awarded to those who take all of the quizzes and exams in classes. The platform is most appropriate for large institutions that are well-endowed and have money to spend. Any revenue stream will be divided, with schools receiving a small percentage of revenue (6-15%) and 20% of gross profits. The platform is available in multiple languages. Coursera has also announced they will offer companies a 'Career Service', a way for these companies to search successful students from the Coursera courses, introducing students to potential employers and recruiters.

2. Udacity – <https://www.udacity.com>



Udacity is a for-profit educational company founded in June 2011 and launched in 2012 by Stanford professor Sebastian Thrun with David Stavens, and Mike Sokolsky, after the huge success of Thrun's "Introduction to AI" course. While it originally focused on offering university-style courses, it now focuses more on vocational courses for professionals. Udacity has morphed into a specific market – corporate training. Much has been made of Udacity's switch into the corporate market which has been called innovative and signals a new trend in the industry. With over 20 million registered users, the company is widely considered to be one of the "Big Three" and a market leader. Udacity has partnered with Pearson VUE, the electronic testing company, to offer proctored exams in one of the latter's 4500 testing centers. Udacity also offers a range of certification options that are recognized by major technology companies who are actively recruiting from the Udacity student body. The company offers verified certificates in three different levels, and a unique coaching system. The business model is that revenues from the placement service, which will charge the employer 20 percent of the first-year salary that is awarded top students, will fund the operating expenses of making the classes open to everyone.

3. UdeMy – <https://www.udemy.com/>



With over 4 million students enrolled in 20,000 courses from 10,000 instructors, UdeMy is one of the major players in online education and is sometimes named in the same breath with edX, Coursera and Udacity (and sometimes confused with the latter). They've set their sights on revenues from the start and similar to Udacity, they seem to be shooting for the corporate market. UdeMy created one of the early models of offering open online classes that can be created by anyone and taken by anyone. The company was founded in 2010 and, like some other platforms, allows instructors to build and host their own online courses. UdeMy then hosts the courses in the cloud under a revenue-sharing agreement. Most of the courses on UdeMy do charge fees, and overall, it is more oriented toward workplace skills rather than higher education study. The company offers a large catalogue of largely business and IT oriented courses that vary from free to \$500, with most courses priced from \$29 to \$99. A small number of the classes, however, are free – it's up to the instructor's discretion whether to offer them for free or for a fee. UdeMy currently offers courses in 53 different languages.

From the beginning, UdeMy has specialized in MOOCs created by individuals. Think of it as the YouTube of MOOCs, similar to mooc.org. It can be seen as a presentation platform like Slideshare, but enhanced with voice-over, quizzes and forum capabilities. Courses are very easy to set up and require no coding knowledge. Using UdeMy's course development tools, they can upload video, audio recordings and documents. Most teachers upload a PowerPoint and record a voice-over, with multiple-choice questions at the end of each unit. UdeMy is for individuals who want to easily build basic courses and monetize them. The platform is full of coders, photographers, designers and other specialists who offer their knowledge in the form of an online course. UdeMy also offers "UdeMy for Organizations" (UFO), enabling organizations to create custom learning portals for corporate training. UdeMy's most distinct strength is its base of 4 million registered students. When one builds a course on UdeMy, one is able to reach this pool of potential students. However, a UdeMy course must be accessed via its website, so branding options are limited, and a MOOC cannot use a custom domain.

4. Iversity – <https://iversity.org>



Iversity.org was established in 2011 by Jonas Liepmann and Hannes Klöpper in Germany to develop a cross-university platform for distance education and to foster communication in teaching and research. The platform, initially designed to be an alternative LMS for students and professors, eventually evolved into an online platform for MOOCs. They re-organized and re-launched iversity, the MOOC platform, on October, 2013. Their aim is become Europe’s leading provider of MOOCs. Courses are mainly conducted in English, German, Russian and Italian, with the addition of more languages being planned. Based on the European Credit Transfer and Accumulation System (ECTS), three iversity MOOCs offered ECTS credits to those who successfully complete the course. The MOOCs can be taken remotely, but the paid final examination must be taken in each respective university campus for the credits to be awarded. Iversity also charges fees for certificates.

5. ALISON – <http://alison.com/>



ALISON (Advance Learning Interactive Systems Online) is a for-profit social enterprise and one of the world’s most popular e-learning providers. Established in 2007 by entrepreneur Mike Feerick in Galway, Ireland, it is a free (but advertiser-supported) online learning resource for basic education and essential workplace skills. This UNESCO award-winning platform focuses on workplace readiness topics such as business & enterprise skills, financial & economic literacy, digital literacy & IT skills, and health literacy. It provides high-quality, interactive multimedia courseware for certification- and standards-based learning. To allow students to take the courses free of charge, the company mainly utilizes a mix of advertising and sponsored programs from partners and publishers. ALISON is considered by some to be the first MOOC provider, predating the ‘Big Three’ American initiatives. Contrary to other MOOC providers with close links to American HEIs such as MIT and Stanford, the majority of ALISON's learners are located in the developing world, with the fastest growing number of users in India. ALISON registered its 3 millionth learner in February 2014, making the distance education company one of the biggest MOOC providers outside of the US. ALISON currently offers over 600 courses from universities all over the world to 4 million registered learners across every country. Recently, the company announced that they will soon release a Self-Publishing feature which will allow anyone to publish what they know for free on the ALISON Free Learning platform.

ALISON invites educators to put some of their courses on the platform for free or as part of a revenue-sharing agreement. Publishers on ALISON are entitled to a share of the income earned when their courses are studied, either through advertising or the sale of premium services, such as certificates. One highly equitable aspect of this “freemium” model is that when someone clicks on an advert while studying a subject in a developing country, the net income to ALISON is zero; when a student from a developed country clicks on the same advert, however, he or she is in effect paying for the next one hundred students from the developing countries, and so on. Through this innovative online pay-per-click advertising revenue model, ALISON has founded a business model whereby 'learners in the developed countries are essentially paying for those in developing countries' while providing the learning materials for free. This enterprising business model is sustainable, highly scalable, and self-funding.

“Borrow” Platforms

“Borrow” platforms are platforms where institutions or individuals can create courses and upload them to the provider’s site, where they are offered for free. These platforms are designed to host MOOCs created and offered by universities or individuals, or institutions within a nation, or a partner within a network. These platforms can be open to anyone or are available only to the partner institutions.

1. FutureLearn – <https://www.futurelearn.com/>



FutureLearn, the first UK-led MOOC learning platform, was founded in December 2012 by a consortium of 12 UK universities as a joint effort to provide a space for British institutions to engage in the MOOC space. The move was widely seen to counter the efforts of their American counterparts and take advantage of the rapid and widespread growth in open online courses. Prior to the launch of FutureLearn, few British universities had run online courses, and most British institutions only had the option of working with US-based platforms, with only two (the University of Edinburgh and the University of London) having previously offered online courses through the American platform, Coursera. The aim was to bring together the leading UK universities to create a combined and coherent offer for students in the UK and internationally, increase access to higher education for people around the world, by delivering high quality distance and open learning and combining this with online and mobile technology and the best of the social web to reinvent the learning experience.

FutureLearn is an independent entity, but is wholly owned by Britain’s Open University (OU), which put up the seed funding and provided the technology that underpins online courses. FutureLearn draws on the OU’s 40 years of experience in delivering distance learning and in pioneering open education resources. This enables FutureLearn to present a single, coherent entry point for students to the best of the UK’s online education content, available to students across the world free of charge. Although initially open only to UK institutions, the company has now expanded globally to include partner institutions from South Korea, Norway, South Africa and Australia. Currently, FutureLearn includes 36 leading UK and international university partners and – unlike similar platforms – 4 non-university institutions: the British Museum, the British Council, the British Library and the National Film and Television School. The first courses on FutureLearn were offered a full 10 months after the company was launched. Additionally, the platform is still in beta and the courses that have been offered are considered to be pilot courses only.

2. Miríada X – <https://www.miriadax.net>



Miríada X is a Spanish MOOC platform founded in 2013 by Banco Santander’s university partner network, Universia, and Telefónica’s Telefónica Learning Services (TLS). TLS specializes in offering comprehensive online learning solutions for Education and Training; Universia is a network that consists of 1,100 universities in 15 countries – Andorra, Argentina, Brazil, Chile, Colombia, Spain, Mexico, Panama, Paraguay, Peru, Portugal, Puerto Rico, Dominican Republic, Uruguay and Venezuela. The Universia network represents 10.1 million students, 8 million users and 850,000 university teaching staff and is sponsored by Banco Santander, a Spanish banking group.

Miríada X, the leading MOOC provider for the Spanish speaking world, has been globally expanding the platform's accessibility into much wider markets beyond Europe into the larger Latin American market where increasing broadband availability is driving demand for online education. The company estimates that there are about 600 million potential students in the Spanish and Portuguese speaking communities of the Latin American region, where access to English-taught education is low. The reach of the platform has now extended to include 1,241 partner universities from 23 countries in Latin America representing 15.3 million students and academics. Miríada X provides a platform for teachers or institutions of any Latin American university to create and deliver open online courses accessible to everyone free of charge. The courses are offered in Spanish and English. Miríada X has hosted 153 courses in Spanish and Portuguese with the help of a €4M investment through TLS and Universia. The major downside is that it is available only for universities in the Universia network [Moessinger, 2013].

3. NovoEd (formerly Venture Lab) – <https://novoed.com/>



NovoEd is a for-profit educational technology company that offers MOOCs. In early 2012, Stanford professor Amin Saberi and PhD student Farnaz Ronaghi created a project called Venture Lab to offer Stanford courses for free on the web. In April 2013, they re-launched and re-branded the company as NovoEd to solve what they deemed to be a big pain-point for MOOCs – the problem of dealing with huge classes. They wanted to create a MOOC platform for courses that demanded more group interaction and peer-to-peer collaboration. The platform aims to break down massive numbers into manageable groups of ten or less, for group peer work. Like other MOOCs, students view lecture videos online as individuals, but NovoEd's unique selling point is that students converse in defined teams of 4-10 for group assignments. Students are able to form teams with people around the world to work on class projects. NovoEd intends to use crowdsourcing, reputation systems and algorithm design to foster project-based learning. It takes a collaborative approach to MOOCs with an emphasis on teamwork and team-based social learning. NovoEd, the third platform born out of Stanford (the other two being Coursera and Udacity), will also provide the technical platform for limited-entry courses closed to the general public, such as Stanford executive education programs, alongside the MOOC courses. Their initial offerings were entrepreneurship-centered courses, but plan on offering more courses from creativity courses to medicine. To help it seek partnerships with other universities and expand its course catalog, NovoEd has raised an undisclosed amount of seed funding from investors.

4. Open Learning Initiative (OLI) – <http://oli.cmu.edu/>



Carnegie Mellon University's Open Learning Initiative (OLI) was created in 2002 with a grant from the William and Flora Hewlett Foundation to address the challenge of how to use technology to enact instruction in online environments. OLI offers innovative online courses to anyone who wants to learn or teach. Their aim is to create high-quality courses and contribute to original research to improve learning and transform higher education. It is an ongoing research project that develops online educational environments. As part of this work, CMU offers a platform that others may use in collaboration with OLI. An LMS system supports the administration of a course, while OLI courses provide an entire experience based on the unique development process. Teachers may build courses using OLI's Course Builder. The program doesn't offer course credit or certificates but the courses are sophisticated.

5. OpenLearning – <https://www.openlearning.com/>



OpenLearning is a for-profit educational technology company from Australia offering a social online learning platform that can deliver MOOCs. OpenLearning was founded in 2012 by University of New South Wales computer science professor Richard Buckland and software engineer Adam Brimo. The site markets itself as a place for people to teach and/or learn online. Anyone can create a public or private online course, or take free open courses. Moreover, students are also able to improve courses as they take these. OpenLearning follows a similar approach as Open2Study with their focus on building a community around a course to foster collaboration and communication. OpenLearning believes student's learn best when they are self-motivated, engaged and interested in learning. OpenLearning has worked with the University of New South Wales and Taylor's University to deliver the first MOOCs in Australia and Malaysia respectively. In December 2013, OpenLearning launched a cloud-based software product for companies to create private educational portals on its platform.

6. Open2Study – <https://www.open2study.com/>



Open2Study is another Australian MOOC provider. Open Universities Australia (OUA), a private distance and online education organization, launched the free online education platform on March, 2013. Like the FutureLearn initiative in the UK, Open2Study is a collaboration of many different institutions, including Macquarie University, RMIT University and the Central Institute of Technology. Open2Study rewards learners with certificates of achievement or with different categories of badges, which are used as an incentive in a game-based approach; the more points and badges you earn, the higher you move up the high score list. The free platform is based on Moodle.

7. OpenupEd - <http://www.openuped.eu/>



OpenupEd, established in April 2013, was the first MOOCs initiative which went Europe-wide, with the support of the European Commission. The initiative was called OpenupEd and refers indirectly to the new European program Opening up Education launched in September 2013. OpenupEd was initiated and is coordinated by the European Association of Distance Teaching Universities and mostly involves open universities. The 11 launching partners are based in France, Italy, Lithuania, the Netherlands, Portugal, Slovakia, Spain, and the UK, and outside the EU, in Russia, Turkey and Israel. Another 10 institutions confirmed that they most likely will join this initiative in the near future with about 20 more showing serious interest in becoming a partner. This project did not design a new MOOC platform; instead, it aims to provide accessible and flexible online higher education, specifically for Europe, in order to contribute to the modernization of higher education through the provision and services of the partners. Right now it seems to only aggregate MOOCs from various partners so there is no hosting service offered. Also it is not clear if you can participate since they work only with selected partners.

LMS-based Platforms

With the launch of Open Courses in 2013, Desire2Learn joined a growing list of LMS providers, such as Blackboard and Instructure, who are now facilitating MOOCs, signaling the convergence of the LMS and MOOC markets. That Desire2Learn's platform gives higher education institutions more control over their content and revenue could help it become serious competition to major MOOC providers like Coursera, Udacity and EdX. Traditionally, most LMS's are closed systems; however, with the rising popularity of MOOCs and the demand for open courses, LMS vendors have affected solutions and tweaks to allow their platforms to offer MOOCs. Similar to Desire2Learn, the other LMS vendors have effectively rebranded their existing LMS's functionality to become alternative delivery vehicles for MOOCs. Since some institutions are already using these LMS's, and they are familiar with the system, they may opt to use these platforms to deliver MOOCs instead of partnering with the conventional MOOC providers.

1. Moodle – <https://moodle.org/>



Moodle (Modular Object-Oriented Dynamic Learning Environment) is a popular, open source LMS that allows users to build and offer online courses. Moodle is built by the Moodle project which is led and coordinated by Moodle HQ, an Australian company of 30 developers which is financially supported by a network of 60 Moodle Partner service companies worldwide. The first version of Moodle was released on 20 August 2002. It is designed to provide educators, administrators and learners with an integrated system to create personalized learning environments. It was originally built for traditional online classrooms; as such, it is not really a MOOC platform but a capable online course platform which can handle large classrooms. A lot of the open online classes one may have seen that are not affiliated with the major platforms were built on Moodle (Downes and Siemens ran their first MOOC on Moodle). Available in over 100 languages with over 70 million users all over the world, Moodle is best suited for organizations that want a full-featured, customizable LMS. Some Philippine universities that use the LMS include UST and UPOU, which used the platform to deliver the first MOOC in the country.

The great strength of Moodle is its combination of full functionality with extensive customization options. Because Moodle is open source, users have the ability to customize nearly everything within their implementation, including the use of numerous third-party plugins. Moodle does require a self-hosted installation, but there are hosted or one-click install options available. Hosting a Moodle website requires specific programs to be installed and may be too complex for non-technical users. Alternatively, institutions or individuals may hire a Moodle partner that can configure the software and/or host the site, but will have to shell out \$6000 (using their own server) to \$11,000 (for hosting and support services). Building simple courses is also fairly intuitive and requires no coding knowledge. The platform offers more than Open edX in terms of educational tools, analytics and SCORM compliance. The trade-off is that the platform is over 10 years old and its user interface may be too simplistic and outdated. The number of configuration options can be daunting, and system performance suffers with larger numbers of students, since the platform tends to be performance-intensive. Fortunately, the Moodle community is very active, and most questions can be solved via a quick search in the forums. Moodle has always had a vibrant community around the platform, and is supported by a global community.

2. Open Education by Blackboard (preceded by CourseSites) –
<http://openeducation.blackboard.com/>

Open Education
powered by Blackboard

Blackboard, the giant LMS vendor familiar to many college and K-12 instructors, is an enterprise technology corporation founded in 1997, known primarily as a developer of education software, in particular Blackboard Learn, its flagship LMS. In 2011, the firm launched CourseSites, a free version of its Blackboard Learn and Collaborate software, for which it provides hosting and support. The platform was originally intended for educators to experiment with Blackboard’s software for their traditional courses, as a way of providing them open learning experiences. However, as MOOCs gained more and more popularity and as more and more institutions and teachers started using CourseSites to create and offer MOOCs, the platform eventually evolved to extend support for MOOCs as well. In July 2013, the company announced it was offering a new, dedicated and custom-built MOOC platform that combines and streamlines elements of its popular technologies, including Blackboard Learn and CourseSites. The new platform is called “Open Education by Blackboard”, and is currently being piloted via the public cloud. CourseSites will remain in operation, but in the future it will be reserved for its original purpose and not to offer MOOCs. However, CourseSites still hosts over 70 MOOCs from over 25 partner institutions, such as Temple University and Syracuse University, while the new platform is still in its developmental stage.

Open Education powered by Blackboard is the company's fully functional course platform that allows anyone to run public online courses or MOOCs. The free platform, powered by the latest release of Blackboard Learn, is a hosted, scalable, online DIY course creation and facilitation service that empowers educators to add a web-based component to their courses, or even host an entire course on the Internet. It is cloud-based and requires no prior coding knowledge. Anyone can set up a course in minutes using the Course Wizard and never have to worry about maintenance or upgrades. Instructors also have the option to “copy” a previously created course or to “import” a course created using other course builder software. The platform is more specifically geared toward instructors within educational institutions. It is a good option for individuals — for example, a teacher who wants to migrate part of a curriculum to an online format — or organizations looking to start experimenting with online courses without having to install anything. It provides one of the best combinations of full functionality and ease of setup. The trade-off seems to be that the courses are branded with the Blackboard logo, and the users must register with Blackboard in order to join a course. [But with over 12,500 institutions, 74,000 instructors, in over 150 countries, using the system, you may wish to play and experiment within an environment they already use and know.]

3. Canvas Network by Instructure – <http://www.canvas.net/>



Canvas Network is another open source MOOC platform launched in 2012 by the American educational software company, Instructure, on top of their open source LMS. Founded in 2008, this Utah-based venture capital-backed learning platform company provides access to free and paid (\$49-\$199) MOOCs through their Canvas Network site. The platform hosts over 80 courses on the site from institutions other than the elite universities associated with the major platforms, such as Brown University, Santa Clara University, Utah State University, Florida State University, UCIrvine, eCornell, and others. Canvas MOOCs include some developmental-level classes which, while intended as remedial courses for new college students, might also be suitable for younger high school students. At the beginning of 2012, they also launched Canvas K-12. There are currently 4.5 million users registered to the network.

Powered by the Canvas LMS, Canvas Network allows both institutions and individual educators to use it as a platform for their online courses. The platform exists in two different versions adaptable to their needs – it is available as an open-source product (self-hosted) or as an SaaS (hosted). In this hybrid model, institutions can elect to take the code freely and host it on their own campus IT infrastructure (servers), or they can use the cloud-based version offered by Instructure (for a fee based upon the size of the institution) and have it delivered to their campus users via the Internet. As a relatively newcomer compared to LMS giants Blackboard and Moodle, the design of the platform is much more modern and is simpler to use. The platform is most suited to individual teachers or small to medium colleges that want to design their own MOOCs.

Canvas Network has a wide course offering, due in part to the openness of the platform, from diverse partners, including private companies. However, the platform has fewer users and courses compared to other LMS providers and most of the courses enforce a limit on student enrollment which restricts opportunities for the courses and the platform to be more widely used. Additionally, while Coursera and edX rely on prestigious university partners for its courses, Canvas Network is less selective as to whom it partners with but does not seem to be exercising quality control on the courses either.

4. Desire2Learn Open Courses – <http://www.brightspace.com/products/open-courses>



Desire2Learn (D2L) is a provider of enterprise e-Learning solutions and develops online LMS's used by more than 15 million users and 1100 institutions in 25 different countries around the world. It began offering MOOCs via the Desire2Learn Open Courses platform in 2013. The platform is a MOOC-enabled extension of its existing integrated learning platform. As the platform is seamlessly integrated into the company's online learning suite, it does not require institutions to create additional vendor relationships. The platform allows colleges and universities to keep the rights to content, data and revenue from MOOCs offered, and to easily offer credits. Additionally, it allows them to control the course direction and to import material for their MOOCs from Desire2Learn's LMS. Open Courses is also available as a standalone cloud implementation. In 2014, the company re-launched and re-named its popular online learning suite as 'Brightspace', but retained the D2L Open Courses MOOC platform as a part of the suite.

5. Sakai Project – <https://sakaiproject.org/>



In 2004, four leading U.S. universities, together with Jasig, the parent organization of the uPortal portal framework, began a collaboration to combine and synchronize their assorted learning software into a collection of integrated, open source tools. Their primary goal was to improve teaching, learning and research by providing an alternative to proprietary learning systems, an innovative platform for learning and collaboration that is produced by and for the higher education community. The University of Michigan, Indiana University, MIT and Stanford University, each contributed existing tools to the project, funded by a grant from the Mellon Foundation. The largest of the universities' contributions was the UM's "CHEF" course management system, which led the original work team to name the project after famed Iron Chef Hiroyuki Sakai. The Java-based open source Sakai project became publicly available in March 2005. The Sakai project was a pioneer of the "community source" model of software development, where institutions and individuals collaborate to help improve the software. Over time, the software has had multiple releases and hundreds of successful deployments, resulting in an increasingly flexible and feature-rich product. More than 300 institutions and 4 million users around the world now use Sakai, and the software has been translated into 20+ languages and dialects. Formerly administered by the Sakai Foundation, Sakai is now a project of the Apereo Foundation, an organization formed by the merger of the Sakai Foundation and Jasig.

The Sakai technical platform is highly capable and scalable and has proven to be a stable technical platform on which to mount and conduct MOOCs, and has earned a reputation for scalability. The software includes many of the features common to course management systems, including document distribution, a gradebook, discussion, live chat, assignment uploads, and online testing. In addition to the course management features, Sakai is intended as a collaborative tool for research and group projects. It also includes a wiki, mailing list distribution and archiving, and an RSS reader. The core tools can be augmented with tools designed for a particular application of Sakai.



6. Eliademy – <https://eliademy.com/>

CBTEC, the company behind the free online classroom site, Eliademy, was established in Helsinki, Finland, in 2012, by 2 ex-Nokia employees. The company launched Eliademy in February, 2013, as a free, cloud-based VLE, but has broader plans for it to become a leading MOOC platform. The bigger plan, however, is to add a course content marketplace to Eliademy, thus unlocking its true MOOC potential. The company's strategy is to focus on emerging, non-English speaking countries. To that end, Eliademy already supports English, Finnish, Russian, Latin American Spanish, and 22 other languages. The platform is based on the open source LMS, Moodle. Eliademy provides common VLE and MOOC features, such as a CMS for course content, support for file attachments, a task manager, shared calendar, and discussion forums. What sets Eliademy apart from other, traditional LMS's, however, is that its core VLE functionality is both free and cloud-based, and users own the right to the content. The company is yet to formulate a business model, as it is currently strictly focused on growth and product development at this stage. Though privately funded, the company received a small grant from the Finnish government, who it's working with in conjunction with Tivit.fi as part of a strategic initiative to create new disruptive digital services. The platform allows anyone to easily create courses and offer them on the site for free.

Platforms from Other Nations (Non-English)

Asia

- **EWANT** (Education You Want!) is a consortium started by the National Chiao Tung University and four Chinese partner institutions.
- **XuetangX** is the Chinese national MOOC platform developed by Tsinghua University, similar in design to what France has done. Based on the Open edX code.
- **iMOOC** is another Chinese MOOC platform.
- **Schoo** is Japan's national platform.
- **Swayam** is India's national platform launched last month, September 2014.

Middle East

- **Edraak** is an Arab MOOC platform that is an initiative of the Queen Rania Foundation (QRF). Edraak was built using the Open edX source code.
- **Rwaq** is a Riyadh-based Arabic MOOC platform, with content from local professors.

Europe

- **France Université Numérique**, or FUN, is France's national MOOC Platform, based on Open edX.
- **iMooX** is the Austrian national MOOC Platform.
- **OpenCourseWorld** is a platform provider working with German universities and corporations.

Latin America

- **MOOC EaD** is a joint venture between Portugal and Brazil with the shared vision of democratizing education and reducing inequalities in Portuguese-speaking countries.
- **unX** is another Spanish MOOC platform.
- **Veduca** is a Brazilian MOOCs provider.

Adaptive MOOC Platforms

The problem of classifying MOOCs was noted by Sylvia Moessinger (2013) in her article, "*MOOC Around The World, Part 6 – 'MOOCish' Online Ed Resources*". She described the difficulty of classifying MOOCs because they are "offered not only from universities using their own or a shared platform, but also from non-profit organizations, trade associations or single businesses or even from an individual using free online course builder tools to create their own MOOC... [and] the number of MOOCs had grown so much." She eventually classified MOOCs into three:

- Platforms that host their own courses or from multiple universities.
- MOOCs from universities that run them independently outside these platforms.
- Totally unaffiliated MOOCs, not from a university and not on a named platform.

However, she pointed out that “MOOCs are just one form of online education, and alongside them are many interesting and useful resources that have a lot in common with MOOCs but maybe don’t quite fit the definition... Consequently, while working on this [article], I ended up with a list of ‘MOOCish’ online education resources that fell outside” her classification. She uses the metaphor of an extended family to come up with a new category which she called ‘MOOClatives’, online education resources that have a lot in common with MOOCs but do not quite fit the frame because they are either not massive, not entirely free, not really a complete course or do not easily fit in the above classifications. These adaptive platforms are described in more detail in the following section.

MOOClatives: Open Education Resources (OER)

Open Educational Resources (OER) are freely accessible, usually openly licensed documents and media, that are useful for teaching, learning, educational, assessment and research purposes. Although some people consider the use of an open format to be an essential characteristic of OER, this is not a universally acknowledged requirement. The development and promotion of open educational resources is often motivated by a desire to curb the commodification of knowledge and provide an alternate or enhanced educational paradigm. The focus of these platforms lies in freeing educational content from the publishing industry. In most cases the focus seems to be on content and not so much on learning paths or didactics or pedagogy. The argument seems to be like: “first we need the content, next we can think about how to use it”. The following OERs are the ones that “most frequently get mentioned in the same breath with MOOCs” [Moessinger, 2013], but are not technically MOOC providers.

1. Khan Academy – <https://www.khanacademy.org/>

The now-famous story of the hedge-fund manager who tutored his nieces and nephews online through YouTube is the foundation of this extraordinary initiative of millions of students taught by a faculty of one. Salman Khan started out tutoring his nieces and nephews in junior high math with videos he recorded at home and found himself responding to other people asking for advice on his YouTube channel and ultimately founded Khan Academy. The non-profit educational website launched in 2006 now has currently has over 5,000 video lectures in everything from arithmetic to physics, finance and history. Each video is carefully researched and presented by Khan himself. Universities and schools use these videos as learning objects to supplement and review instruction. The teacher toolkit provides ideas, materials and inspiring stories from teachers. Students and informal learners alike use them independently to build knowledge in thousands of areas. Perhaps most interesting is the adaptive-learning feature of the company. Each time a student works on a problem, the Khan Academy tracks the learning and time on task. These data are used to suggest the next step, whether it is reviewing problems or moving ahead to the next topic in the field. This approach of using data to dynamically program learning assignments leverages the power of data analytics to guide progress. The hugely popular site is often referred to as a MOOC, but the lectures can be more understood as a modular system to pick from and mix, rather than as a course. The lectures are self-paced, and progress is measured with a points and badges system scaled to the degree of difficulty. All of the Khan Academy’s content is licensed under Creative Commons.

2. Saylor.org – <http://www.saylor.org/>

The Saylor Foundation is a non-profit organization which runs the online education site, Saylor.org. The foundation advocates for the open education movement, and content is licensed under a Creative Commons. Saylor.org is a very close relative in the extended family of MOOCs. Their courses are free and on a wide variety of subjects at a K-12 and college level, with a professional development focus. In many ways, their model resembles Udacity's, only not as limited to technology topics, and the content is more open. But, probably because the courses are self-paced and asynchronous, they are not massive, and students generally will be working in isolation compared to most MOOCs. One of the interesting things about Saylor is that they also outline recommended sequences of courses, much like a college student would take in their major. They provide certificates, an ePortfolio, discussion forums and a testing center. Another interesting thing about Saylor is that it is possible to earn college credit for some of their courses through a partnership with a handful of U.S. colleges and universities. Also, several of the classes have been recommended by the National College Credit Recommendation Service.

3. iTunesU – <http://www.apple.com/education/itunes-u/>

Another OER that often gets mentioned alongside MOOCs is iTunes U. iTunesU features materials from more than 150 institutions, including elite universities such as MIT, Stanford and Yale. Sometimes the material is a single lecture, sometimes an entire course. iTunesU also provides a unique LMS that supports audio, video, text, and other multi-media capabilities. Similar to Saylor, the self-paced and asynchronous format means the classes aren't really massive. In addition, iTunesU has a more closed environment. Apple Corporation announced an upgrade in its service to include many more features that allow educators to provide entire classes, rather than merely podcast lectures and other presentations. Unfortunately, since it was initially opened to the public, it has gradually fallen off the radar as a course management platform and potential MOOC venue. However, despite the lack of recognition, iTunesU provides a robust option for creating and managing a MOOC. In addition to having an attractive and well-designed interface, iTunesU also provides a nice mobile version for iPad and iPhone integration. But you need to download iTunes to access the content. However, the free service can be accessed through the web, and through apps on the iPad, iPhone, and iPod Touch.

4. Peer-2-Peer University (P2PU) – <https://p2pu.org/en/>

P2PU is not a traditional university, but a grassroots volunteer-driven open education project that organizes learning outside of institutional walls. Founded in 2009 with funding from the Hewlett Foundation and the Shuttleworth Foundation, it now has more than 50 courses available in almost as many course languages. Openness, community and peer learning are their key values. Leveraging materials openly available online, P2PU enables high-quality low-cost education. At P2PU, people work together and share their knowledge to learn a particular topic by completing tasks, assessing individual and group work and providing constructive feedback. Similar to other MOOC platforms, anyone can create a course as well as take one. All material is provided under the CC Share-Alike licence. Courses are not accredited but learners have the opportunity for recognition of achievements through the Open Badges project. Technically, the platform is called Lernanta (built in Django).

5. TED-Ed – <http://ed.ted.com/>

TED is the very popular video and discussion site that addresses many topics of importance in learning and more broadly in science and society. In response to open online initiatives, TED released a beta project to add learning components to videos. They describe the initiative in this way: “Within the growing TED-Ed video library, you will find carefully curated educational videos, many of which represent collaborations between talented educators and animators nominated through the TED-Ed platform. This platform also allows users to take any useful educational video, not just TED’s, and easily create a customized lesson around the video. Users can distribute the lessons, publicly or privately, and track their impact on the world, a class, or an individual student.”

6. Curriki – <http://www.curriki.org/welcome/resources-curricula/>

Curriki is a non-profit, free, OER service. The name Curriki is made up of the words “curriculum” and “wiki”. Curriki’s mission is to help equalize access to education globally. Therefore, learning materials are freely available to educators and students around the world. Curriki’s model is to develop materials through community contributors and to deliver curricula and OERs globally. A community of 8.5 million global users from almost 200 countries has so far designed more than 48,000 Open Educational Resources (OER), including digital textbooks, learning videos and interactive resources. The material is primarily focused on K-12 education. The material is peer-reviewed to create a culture of continuous improvement. The majority of the OER on the Curriki site falls under a Creative Commons license and can be adapted as needed to particular requirements inside or outside of the classroom.

7. MIT OpenCourseWare – <http://ocw.mit.edu/courses/>

MIT OpenCourseWare (MIT OCW) is an initiative of the Massachusetts Institute of Technology. MIT OpenCourseWare makes the materials used in the teaching of almost all of MIT’s subjects available on the Web, free of charge. The project has been around since 2002, and some of the materials are the foundation of classes now being offered on edX. More than 2,000 courses are licensed under Creative Commons BY-NC-SA. The majority of courses offer lecture notes, activities and exams, and some also include interactive web demonstrations, complete textbooks written by MIT professors and video lectures. MIT OpenCourseWare is accessed worldwide with an average of about 1M visits each month.

8. University of the People (UoPeople) – <http://www.uopeople.org/>

UoPeople, founded in 2009, is billed as the world’s first tuition-free university. It is a non-profit, online academic institution dedicated to opening access to higher education globally for all qualified individuals, despite financial, geographic or societal constraints. A special focus is placed on students from developing countries. Application and examination processing fees vary for applicants depending on their economic background. Tuition, books and materials are free of charge. UoPeople uses technology that can be accessed globally. They’ve admitted more than 1,500 students from 136 countries to date. The university offers baccalaureate degrees in business administration and computer science and has accepted students from 130 countries. In June, the Bill and Melinda Gates Foundation granted \$500,000 to the University of the People to gain regional accreditation.

9. WizIQ – <http://www.wiziq.com/>

Launched in 2007, WizIQ grew out of AuthorGEN technologies, which was founded 2002. WizIQ has over 200,000 teachers and 3 million learners. WizIQ.com is a web service that allows educators and students to meet online in real time for virtual classes. Most courses cost money, but some are free like the Moodle MOOC or the MOOC for English language teachers.

10. World Education University (WEU) – <http://www.theweu.com/>

World Education University (WEU) is a free online university that aims to become a comprehensive, degree-granting institution offering access to college diplomas millions of under-served students around the globe. Offerings will include courses in Business Administration, Engineering, Science, Psychology, Fine Arts, Education, Legal Studies and Health Care. WEU will use an asynchronous, self-paced format. Their proprietary PinPoint Adaptive Learning System (PALS) will adjust content and presentation based on the needs of the learner.

III. PRODUCTION & DEVELOPMENT REQUIREMENTS

Developing an massive open online course requires significant investment. Aside from the technological infrastructure needed to create, deploy and maintain it, regardless whether the MOOC is self-hosted or offered through a commercial platform, integrated course support is required. The Educause executive brief (2013) identify the support requirements as:

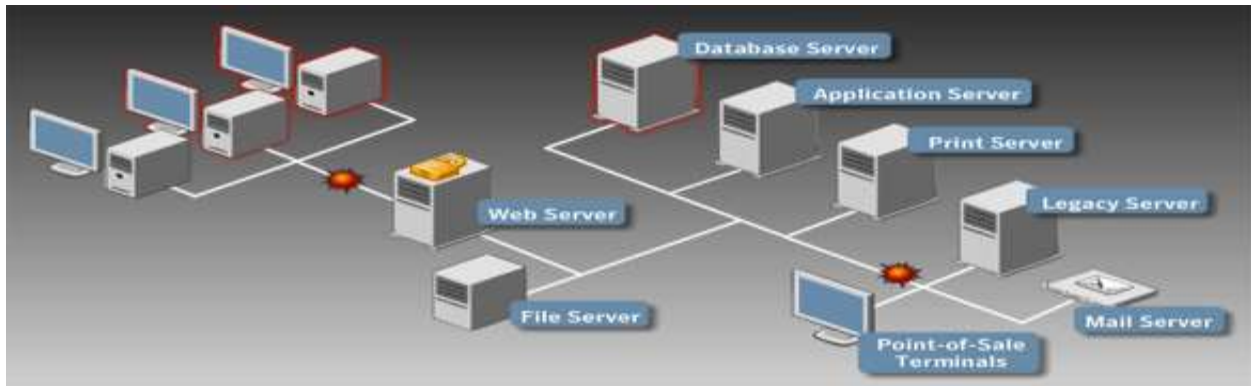
- Technical (e.g., videography, editing, graphic design)
- Instructional (e.g., instructional design, teaching assistant support)
- Library (e.g., resource discovery, copyright clearance)

The requirements are discussed in more detail in the following section.

Technical Requirements – Hardware and Software

The development and dissemination of MOOCs are dependent on several other technologies. These technologies include hardware such as servers, computers and recording equipment, as well as software technologies such as MOOC platforms, development software and the Internet. These requirements are highly dependent on an institution's choice of a platform provider. If a university chooses to allow the provider to host their online course, they will not need much in terms of IT infrastructure and resources. However, if they choose to self-host, this entails additional infrastructure and more interaction.

1. **MOOC Platforms.** MOOC platform providers serve as third-party vendors to host and disseminate MOOCs that have been created and uploaded by institutions or individuals. These platforms may be hosted by the provider, or self-hosted by the institution.
2. **Servers.** Servers are critical to MOOCs delivery. Typical computing servers used in MOOC deployment include database servers, file server, mail servers, web servers, and application servers. Servers are widely available, but may come at a high cost to parties using them.



3. **Storage.** To deliver on the MOOC experience, an institution will also need databases that can scale, as well as hosting for large files such as video. You're looking specifically at good storage, because once you do load balance, you need to make the client data available to all those web servers. What's typically needed for tens of thousands of students is a Network File System solution capable of significant I/O speed and enterprise-grade disks.
4. **Content Delivery Networks.** Cogswell (2013) points out that one common mistake made by institutions offering MOOCs for the first time is to put videos on the same servers that are running the software. Doing so congests the network connections to these servers. Instead, videos and other streaming content should be placed on what are called content delivery networks, which are themselves scalable servers usually owned by commercial companies such as Amazon Web Services. These networks have been fine-tuned to allow you to upload videos and other content to their servers, where it is "pushed out" throughout their networks, making the content highly available and fast. The end result is that, when students watch videos associated with a MOOC, the videos will stream quickly to their computers without interruption and without bogging down the other servers running the rest of your software.
5. **Recording Equipment.** To create the actual lectures, the university will require high quality recording materials including cameras, microphones, and editing software. This equipment can be quite expensive to purchase and maintain, though it is quite readily available.
6. **Course Design Software (Course Builders).** In order to develop a MOOC, universities and individuals use specific software that aid in the creation of an entire online course. This software is available, but limited in options as it is not affordable for all users. Some providers have developed this additional software to allow users to design MOOCs, thus facilitating the creation of courses.
7. **Computers, Internet, and Appropriate Bandwidth.** Both the university and the end users will need computers in order to access MOOCs. It is essential that all of these computers have an internet connection and adequate bandwidth for streaming. This technology is relatively affordable and available to universities, independent MOOC creators, and individual users.

Human Resource Requirements – Humanware

A MOOC project is a resource-intensive activity requiring a full team, not just a single academic, and this means coordination, human resources as well as a capable technical environment. Building a MOOC does not only require teachers but also a number of very different skills. Teachers are often overburdened, which means that the university has two choices: recruiting new staff (or outsourcing the work) or change the priorities for these teachers. Hollands & Tirthali (2014) noted the human resources required for the development of a MOOC, representative of a typical mid-sized university. Human resources requirements by job title for course development of a MOOC include:

- **2 x Faculty Members:** (Subject Matter Experts)
- **1 x Project Manager:** Leads the project, coordinates all elements of development. Liaise with departments as needed within the institution. Manages the project timetable; keeps project on time and on budget
- **4 x Curriculum Design Team:** *Instructional Designer* (works with faculty to present course content and create a learning environment with it on the course home page). • *Instructional Technologist* (works with instructional designer) • *Video Production Liaison* (works with faculty member in production of videos, and liaise with video production team)
- **5 x Video Production Team:** (for high quality videos requiring a full design team) Production Manager • Camera operators/equipment technicians • Audio-technician
- **Teaching Assistants**

Programmers are also required if an institution chooses an open source, self-hosted option in order to customize and brand it according to their needs. These programmers must be knowledgeable in a number of coding languages, the most common being Python and Django. For example, the open source platform, Open edX, is implemented mostly in Python, JavaScript, Ruby on Rails and Node.js. Canvas Network, another open source application, is implemented using Ruby on Rails. FutureLearn was constructed using frameworks such as Ruby on Rails. Coursera's software, though proprietary, is implemented in Django, Python and PHP/MySQL. Udacity is Google apps, which is effectively a Python stack and framework.

The deployment of MOOCs also requires copyright clearance, which can be costly. When institutions partner with MOOC providers, they should be responsible for copyright clearances and copyright violations. Managing the copyright of course materials can pose a challenge. The "terms and conditions" of commercial MOOC companies must be scrutinized closely by the institution. There exist commercial MOOC platforms that have strict proprietary terms and conditions that claim ownership of the course content and prohibit sharing or remixing of material.

Additional humanware requirements include marketing and technical support, especially if the MOOC is self-hosted by the institution that offers it.

IV. DEVELOPMENT CONSIDERATIONS

An Executive Briefing by Educause [Voss, 2013] urges education leaders to consider their institutional capacity to deliver a MOOC, and the extent to which the MOOC model fits into their organizational strategies. HEIs/SUCs that produce their own MOOCs need a sophisticated platform, the ability to effectively market courses, and the capacity to offer technical support remotely and at scale. These factors must be considered before an institution decides to offer MOOCs.

Building Capacities & Competencies

The development of the required infrastructure – processes and expertise, not necessarily just the hardware and software – is necessary to support an institution’s foray into MOOCs. One of the most common pitfalls of institutions is that they lack the technical know-how and the technology to engage with MOOCs. IT infrastructure is not enough; HEIs also need to build the necessary competencies in, and activities around, new platform technologies for digitally enhanced learning. Just as many universities have adopted and institutionalized traditional LMS platforms in the past, many going forward will have to embrace similar MOOC-related technologies as well as a broad range of more distantly related, computationally-enabled tools.

A key difference is that whereas past platforms had to be adapted and operated on-site, the next generation of tools will be available as "cloud" services. Open edX, for example, is both an open-source system that one can operate locally, and a cloud-based service (running the same open source software) around which a coalition of universities has organized itself. Adopting a cloud-based service has advantages and disadvantages. On the down side, there is some loss of control over system design and operation, and there is a need to engage in transactions with more or less self-interested third parties to obtain such services. On the other hand, securing the benefits of new technologies through the cloud can vastly reduce the need for costly infrastructure and systems support staff. Additionally, the technologies employed may be unfamiliar to participants, obliging them to negotiate a technical learning curve before they can focus on course content. Therefore, allowing a third-party provider to host the MOOC frees up educators to focus on the more important task of teaching.

Given that there is a limited collective experience in working within the MOOC model, faculty members will need to turn considerable attention to redesigning their course to leverage the affordances of MOOC platforms as scale, negotiate its limits and understand key differences between the traditional classroom and online teaching, and between traditional online courses and MOOCs. Instructors should anticipate that their course will need to be re-designed and adapted for delivery in the MOOC context. If copyrighted material is required, it is important to allow plenty of lead time to obtain the necessary permissions. There can be considerable costs associated with obtaining these permissions. It is not realistic for an instructor to undertake the development of a MOOC without a supporting cast that brings expertise to the table across the realms of instructional design, library support, technical support, content expertise, video production, and so on. Team members may bring expertise directly, or provide referrals to the appropriate staff, resources and services. Good online teaching calls for teams that support the academics with a wide range of skills.

Instructors will also still need to be allowed time to be trained in the creation and the use of the MOOC platforms and user interface in order to oversee and manage their MOOCs. The process of setting up a MOOC itself may require training in order for faculty members to be familiarized with the technology.

Designing courses in a very new style for broad range of learners is very challenging and time consuming task that inevitably diverts the time of teachers from other academic activities such as research, committee services, or traditional teaching. Expecting individual faculty to develop online courses alongside their classroom offerings may be too much. Good distance education pedagogies call for teams that support the academics with a range of skills. These include instructional design, material development, videography, and additional teaching assistants, to name just a few.

Production Costs

Higher educational institutions will also have to grapple with the high costs of MOOCs production. Developing MOOCs is not free; typical costs today for MOOCs being delivered by the likes of Udacity and Coursera cost thousands of dollars to produce per hour of video content, and many tens of thousands per course (\$50K for a typical university course). Creating slick multi-media content with very high production values can be prohibitively pricey. One need only look to the investments required to produce quality movies or video games: the sky is the limit in terms of costs. It is hard to see that universities will be willing to bear the costs of high-end production, at scale, on top of their existing commitments, without new business models. A few courses for advertising is one thing; transitioning a significant fraction of current courses to MOOC format seems prohibitively expensive.

On the other hand, with the right concepts, methods, and tools, content of adequate quality, akin to that in many current MOOCs, is within financial reach even for individual faculty. The variety of open source (meaning free) and inexpensive tools allow educators to create courses at a fraction of the cost. With video hosting provided by the likes of YouTube and Vimeo, some experience with photography and video, and something good to say, a one-person MOOC at a level of quality approaching that of current MOOCs, albeit with less of the polish provided by professional videographers and editors, is in reach of the individual faculty member.

Choose a Platform: Buy, Build, or Borrow?

Logistically, the first consideration has to do with the choice of a platform: should a university adopt an existing MOOC platform or should it develop its own? Should it partner with a commercial provider and forget about buying expensive equipment, systems administration, user registration, bandwidth requirements, and so on, but end up tied to a for-profit company and its constraints? As the name suggests, self-hosted solutions require more action from the administrator's side and in general, administrators must know quite a bit about what is going on behind the scenes. The upside of self-hosted solutions is of course far bigger control when it comes to branding, customization and so on. With this in mind, a university would have to evaluate the choices available to it, and make an appropriate selection, based on its current capabilities and competencies. The choices include Buy, Build, Borrow, or the LMS option.

Option 1: “Buy”

Commercial companies such as Coursera, Udacity and Udemy provide MOOC platforms as shared services to universities to run their courses for learners who are interested in studying for free or paying fees for additional products and services. These MOOC platforms host courses from academics in top universities, who may or may not benefit financially, and the institutions usually maintain copyright and may choose to use creative commons licences.

Coursera is currently the world’s largest MOOC platform provider for a reason. First, they make things easier for institutions. Second, it makes sense to host the MOOCs with an established third-party provider as their expertise and core business is hosting multiple sources compared to a university that generally only understands hosting their own LMS. To offer a MOOC is a stretch for many universities as it changes their traditional mode of operations and to extend that to hosting multiple courses offered by multiple providers really challenges their traditional systems. There is also a change in scale, since the average university has between 20,000 and 60,000 students across a range of programs, whereas MOOCs could have over 100,000 people registered for a single MOOC. Commercial platforms also provide institutions with a greater reach – the more partners they have, the more users are enrolled. The presence of elite, partner institutions is especially attractive to smaller colleges and universities. One educator said, “With all the platforms floating around out there, we might as well base decisions on prestige and publicity.” Commercial platforms also offer excellent support systems, such as marketing, technical and maintenance support. As one professor succinctly put it, “The division of labor makes sense, they build the market and scale it while we pay attention to what matters most to us - human capital and content.” There are risks, of course, but these risks are mostly associated with revenues and copyright, both which are handled equitably.

Option 2: “Build”

The most obvious advantage in building your own platform is the customization it affords. Language barriers? Then change the language. Don’t like the user interface? Let’s tweak it and make it more sleek. Want your own logo? Check! Some have predicted that the MOOC movement, much like the LMS revolution and evolution that preceded it, would move towards “openness” – meaning open source, customizable, free. Indeed, as we are seeing today, various open source social media services and tools can be used as platforms for delivering MOOCs. For example, the first MOOC – CCK08 – started by being primarily centered in a Moodle discussion forum (Moodle is also open source). And that movement remains true today – Google has committed to the development of Open EdX, an open-source version of the edX platform that universities and educational providers can use to support their own online learning initiatives without having to install an instance of the software. Institutions retain control of their own branding, and their relationships with their students and other users. The downside? You need lots of technical people to customize the software, e.g. Open edX uses several different components all written in different languages. And programmers charge high fees. And customization takes time. But national platforms EWANT (China), FUN (France), and Edraak (Middle East) were all based on the Open edX code. So choose your pill.

Option 3: “Borrow”

Some platform providers give institutions and individual instructors the option to have their online courses hosted on their sites. This service is generally offered for free, as part of the provider’s efforts towards the openness of education, without contract obligations or outside of revenue-sharing agreements. The cost incurred for the institutions is in terms of the production of the course, i.e. video presentations, course creation, etc. However, some of these providers do require a partnership agreement. In other words, become a member of our network, our fraternity, or you’re out. Examples include (initially) FutureLearn and Miriada X. These online learning providers —colloquially referred to as “universities in a box”—essentially act as outsourcing entities, allowing institutions to quickly offer complete online courses and degree programs without having to invest in institutional infrastructure. Under the banner of the institution or a consortium of institutions, these providers typically offer a complete line of services, including marketing and student recruitment, student admission, enrollment, faculty course design and support services, and course hosting and Internet services. In many cases, they also offer 24/7 support. This “full service” model allows an institution to provide online programs without any impact on the existing campus IT infrastructure, course design, or faculty and student support resources. However, in order to join the network, institutions typically have to pass through stringent reviews before being accepted. Think of it as initiation rites, if you will.

Option 4: The LMS Option

A witty observer noted, “MOOCs are beginning to look more and more like LMSes; and the LMSes want to look more like MOOCs.” Since late 2012, there has been conversation about the overlap between the LMS and MOOC platform markets. While most of the education technology community continues to focus on the major MOOC platforms, each of the major LMS makers now has a solution for teaching MOOCs as well. Blackboard’s CourseSites has offered “open enrollment” courses since April 2012, the very month Coursera was founded, although the organization’s official press didn’t mention the acronym “MOOC” until early/mid 2013 (Blackboard has since released a dedicated MOOC platform called Open Education). Instructure launched Canvas Network in 2012. Desire2Learn held their first Open Course in August 2013, although their solution wasn’t officially announced until October. Moodle held a MOOC on their LMS MOOC platform called Learn Moodle in September 2013. Sakai remains the outlier, coordinating no centralized MOOC effort or course catalog, though in November 2013 Sakai began being used as one university’s own MOOC delivery platform.

What is interesting about each of these efforts is that to some degree, anyone can now teach a MOOC – even individuals with no university affiliation, using traditional LMS software. LMS makers have reported MOOC enrollments into the thousands and in some cases tens of thousands of students. And while some LMS makers limit access to their MOOC platforms to instructors from their own current client bases, they have not appeared to exhibit the same contractual elitism as Coursera has in only allowing certain institutions to teach MOOCs. And unlike edX, MOOC teachers can use these platforms without any “pay to play” obligations; no LMS maker directly charges for use of its MOOC platform at this time.

LMS-based MOOC platforms offer a unique opportunity for instructors. Rather than having to rebuild course content within the walls of Coursera or edX or entering into new, complex legal agreements, these platforms jump start the course delivery experience and can even use the native export/import tools of institutional LMSs to bring existing course content into a familiar LMS product. Similarly, taking a MOOC on an LMS MOOC platform can give instructors another unique experience – that of using a traditional LMS as a student.

LMS makers, however, should be more concerned about the successes of the MOOC platforms, as they approach online courses from a very different angle – one that begins to put the experience of the course and its content first rather than the features of the platform through which it is delivered. The traditional LMS makers have always had an edge in terms of the capabilities of tools to support and enhance the online learning experience, but these organizations themselves do not have the edge on content. They do, however, have a significant network of instructors who use their products and may be willing to teach MOOCs.

Other Considerations for Platform Consideration

Since there are so many hosting services and possibilities, we tried to find some dimensions that are important to us in order find which hosting service makes the most sense. Other aspects and services that may be of value include:

- Cost:** How much will it cost to create and provide the content?
- Revenue:** What are the terms of the revenue-sharing agreement?
- License:** Who owns the course?
- Assessment:** Are assessment systems provided by the platform?
- Student Authentication:** How do you verify a student's identity?
- Community:** Is there an active community around the platform?
- Audience:** Is there a large audience using the platform?
- Support (Technical & Marketing):** Is there active support from the platform?
- Economic structural factors:** Non-profit or For-profit?
- Technology:** What technologies are required by the platform?

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