

INTRODUCTION TO MOOCs: AVALANCHE, ILLUSION OR AUGMENTATION?

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CONTEXT

In recent years, online companies have transformed traditional products and services by providing free access to content which previously had a price: Google for search and software, Spotify for music and Wikipedia for reference, to name but a few. At the same time, access to the Internet and broadband has increased rapidly, (as of 2013, 77% of the developed world and 31% of the developing world has Internet access¹) and huge growth in mobile connectivity particularly in the developing world has brought online content and interaction to a global audience. However, whilst free online content has undoubtedly revolutionised access to, and the sharing of, information there are also a number of risks associated with it: exploitation of the user as the 'product', lack of quality control and review, copyright issues, poor protection and/or use of the user's data, and the frequent possibility of overhype.

It is into this arena that higher education is now stepping with the advent of massive open online courses (MOOCs). Higher Education Institutions (HEIs) are no strangers to the delivery of online content (e.g. Open Educational Resources, Virtual Learning Environments) but MOOCs have captured the press and public's interest in a way that few initiatives have in the past and as such have attracted extremes of both praise and skepticism. It is this paper's aim to provide an overview of the history and types of MOOCs, their global scope, and the associated risks and benefits of their use.

¹ http://en.wikipedia.org/wiki/Global_Internet_usage

OVERVIEW: HISTORY

The term, massive open online course, was coined by Dave Cormier and Bryan Alexander in 2008 to describe a particular model of online course developed by fellow Canadian academics Stephen Downes and George Siemens and originated out of the open educational resources movement. Downes and Siemens' course was based on connectivist principles, in which student learning and knowledge emerge from a network of connections, and was taken by 25 fee-paying students at the University of Manitoba along with 2,300 online participants who accessed the course for free. The students interacted via threaded discussions, blog posts, Second Life and synchronous online meetings (Wikipedia, 2013a).

From this relatively modest beginning, MOOCs began to evolve rapidly in terms of pedagogy and platforms and attracted increasingly large student cohorts. In 2011, MOOCs entered the wider public consciousness when a group of Stanford academics – including the founders of later MOOC platforms Coursera and Udacity – demonstrated the potential of MOOCs by opening three courses to public access (UUK, 2013). As an example of this experiment's popularity, Sebastian Thrun and Peter Norvig's course, "Introduction to Artificial Intelligence", attracted 160,000 students (Yuan and Powell, 2013).

These huge class numbers identified MOOCs as something different from the traditional model of delivering higher education content, whether on campus or via distance and flexible learning. Wikipedia (2013a) notes that there are two key features to a MOOC that contrast it with established university course delivery:

1. Open access – anyone can participate in an online course for free.
2. Scalability – courses are designed to support an indefinite number of participants.

Out of the Stanford experiment a number of platforms appeared on which MOOC-format content could be delivered, Figure 1 (UUK, 2013) charts this development. As of June 2013, some of the largest and most widely recognised MOOC platforms are:

- **Coursera** (<https://www.coursera.org/>). Founded in 2012 by Stanford academics, Daphne Koller and Andrew Ng. Coursera is a for profit educational enterprise and is currently the largest MOOC platform in terms of university partners (82), courses (386) and student enrolments (over 3.5 million unique registrations).
- **edX** (<https://www.edx.org/>). MIT launched its MITx platform in 2011, which was subsequently incorporated into a not for profit venture between MIT and Harvard, called edX. The consortium now has 28 members, including: MIT, Harvard, Berkeley, University of Texas System, Wellesley College, Georgetown, Australian National University, École Polytechnique Fédérale de Lausanne, University of Toronto, RICE, TU Delft, and McGill. 63 courses are available and c. 1m students are enrolled.
- **Udacity** (<https://www.udacity.com/>). Udacity was established by Sebastian Thrun in 2011 following his Stanford class MOOC experiment. It is a for profit educational enterprise, and works with individual academics as well as technology firms to develop technology and computer science-related courses. It currently offers 25 courses and has c. 400,000 users.
- **FutureLearn** (<https://www.futurelearn.com/>), **Open2Study** (<https://www.open2study.com/>) and **Iiversity** (<https://www.iversity.org/>) are MOOC platform spin offs from the UK's Open University, Open Universities Australia and a German educational start up respectively. All three are at various stages of platform and course development and have been seen by some as an attempt to produce national competitors to the US-based MOOC platforms.²

² See <http://www.timeshighereducation.co.uk/422137.article> and http://chronicle.com/blogs/wiredcampus/american-mooc-providers-face-international-competition/44637?cid=at&utm_source=at&utm_medium=en

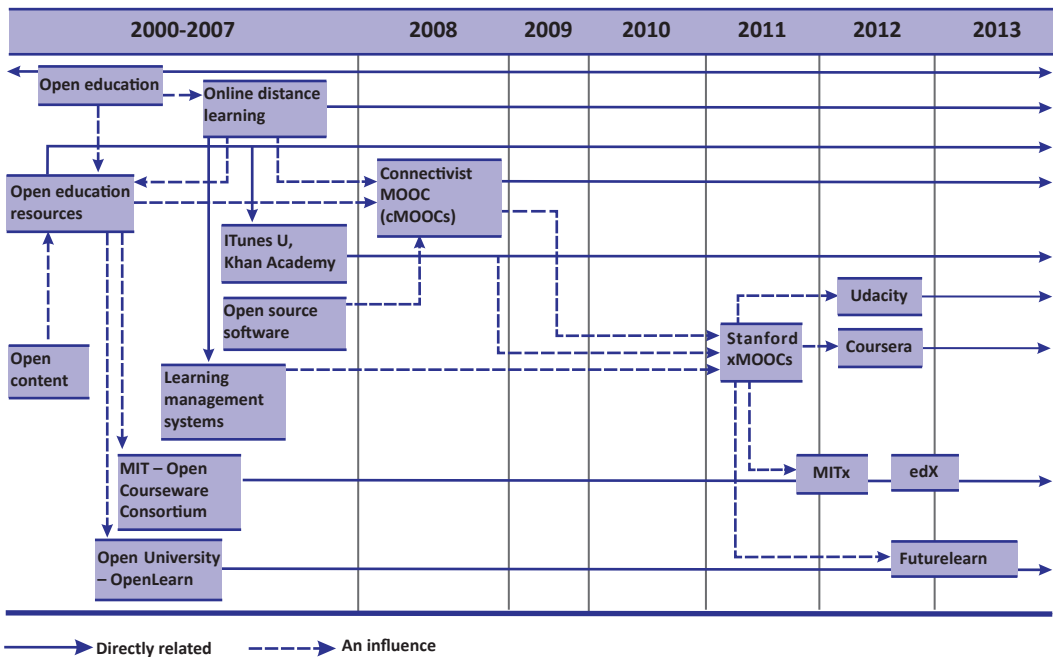


Figure 1: Timeline of MOOC developments

Adapted from Yuan and Powell (2013)

MOOCs and Open Education: Implications for Higher Education (CETIS)

KINDS OF MOOC

From Downes and Siemens' first MOOC in 2008, the literature is in agreement that there are now two MOOC categories, based on different pedagogical emphases and organisational models:

cMOOCs

UUK (2013) states that cMOOCs are courses, 'based more closely on the original "connectivist" distributed peer learning model. Courses are typically developed and led by academics through open source web platforms. Examples include various courses exploring developing online educational practice, such as the original MOOC, *Connectivism and Connective Knowledge*.' In general, cMOOC design appears to have been less favoured by the larger MOOC platforms, likely due to the deeper level of connectivist pedagogical knowledge needed in order to design and run a cMOOC.

xMOOCs

Typically, xMOOC design is used on the large MOOC platforms and is based on a format of minimal, asynchronous support, with a subject expert recording content and planning assessment (i.e. multiple choice quizzes, programming assignments or peer-review exercises) for the student cohort to ingest at a time of their choosing. The aim of this design approach is to allow the platform to repeatedly run the same classes throughout the year on a rolling recruitment basis, with the best performing students from the previous cohort asked to act as community teaching assistants for the subsequent cohort – providing forum moderation, technical support and limited academic guidance.

With this comparison having been made, it should also be stated that the line between cMOOCs and xMOOCs is not as distinct as it might be suggested: Yuan and Powell (2013) propose that, ‘cMOOCs provide great opportunities for non-traditional forms of teaching approaches and learner-centred pedagogy where students learn from one another. Online communities “crowd-source” answers to problems, creating networks that distribute learning in ways that seldom occur in traditional classrooms in universities.’

However, in the author’s experience, Coursera (identified universally as an xMOOC platform) courses often exhibit a number of similarities with cMOOCs, through their use of learner-centred pedagogy (even if by accident, rather than design). Due to the large number of active students, course instructors are inevitably unable to manage all queries and as such the course forums exhibit good examples of crowd-sourced answers, geographical and language-based study groups and networked learning, led purely by the student cohort. It is highly likely that this behaviour is not limited to Coursera courses alone, and will be found on any of the other large ‘xMOOC’ platforms.

In order to add further blurriness to the lines, the goals and purpose of the ‘xMOOC’ platforms cannot necessarily be compared – Harvard and MIT freely admit that EdX is an experimental space, designed to bring innovation to the education of their *on-campus students* (Yuan and Powell, 2013), and not, as in Coursera’s case, to bring education to the world (Coursera, 2013a). This may or may not result in further MOOC categories being identified or refined as different platforms experiment with the model.

MOOC USERS

Publicly available data on the type of students enrolling on MOOCs is limited at this early stage in their development, with Coursera (and Coursera partners) being the primary source for demographic information on their student body. As Coursera is the largest MOOC platform, this should provide a fairly reliable indicator of the student statistics for other MOOC platforms but the source of the data for this paper should be noted.

As can be seen from Figure 2, the overwhelming majority of users on the largest MOOC platform have at least a Bachelor’s degree and a total of 76.7% of users hold an undergraduate or postgraduate degree. This suggests that MOOCs are being used as professional development aids for mature learners³ who are either in higher education already or in employment. This can be seen in the drive towards improved identification verification processes (e.g Coursera’s ‘Signature Track’) for assessment, the development of skills ‘badges’ (as introduced by the Mozilla Foundation), and the introduction of careers services.

UUK (2013) have identified a number of courses that are pitched explicitly at professionals, including Coursera’s Information Security and Risk Management in Context course which intends to equip its students to learn to ‘defend and protect vital company information using the latest technology and defense strategies... [g]ain experience by solving real-world problems and leave the class equipped to establish and oversee information security.’

³ The UK’s Higher Education Statistics Agency (HESA) defines mature learners as ‘those who are aged 21 or over.’ See http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2379

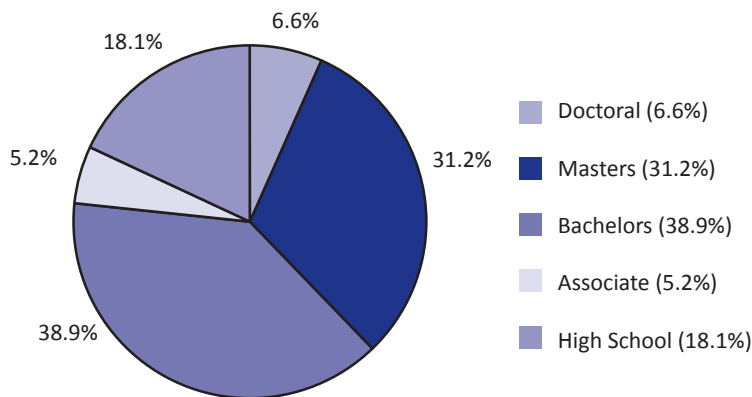


Figure 2: Coursera students' level of education
(April 2013), (Coursera, 2013b)

This is an interesting development for MOOCs as it appears there is a potential for MOOCs to act as supplementary income streams for 'traditional' universities in which they target the professional development market in addition to undergraduate/postgraduate degree students (who can still attend the university as they always have). Indeed, Sebastian Thrun (2013), the CEO of Udacity, has recently stated, 'we project the majority of tuition revenue to come from non-degree seeking students... the present market for degree-seeking students is limited.'

Sebastian Thrun's statement notwithstanding, this has not stopped his company collaborating with the US University, Georgia Institute of Technology to offer a fully accredited Master's in Computer Science MOOC. The main selling point for this Master's programme is that the MOOC platform and pedagogy enables the total cost of the degree to be less than \$7,000, as opposed to the \$40,000 equivalent on-campus degree. With the huge amount of publicity that this development has brought both Georgia Tech and Udacity (and AT&T, the collaboration's corporate partner), this Master's is unlikely to be the last MOOC postgraduate degree, and the race to be the first institution to offer a fully accredited MOOC undergraduate degree is no doubt well underway.

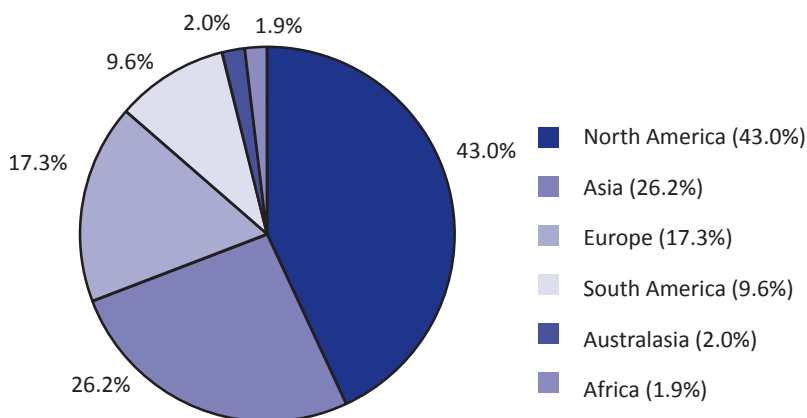


Figure 3: Coursera students' continent of residence
(April 2013), (Coursera, 2013b)

One of the key criticisms MOOCs have faced from commentators is their poor student retention rate (Daniel, 2012), with most xMOOC courses reporting 5-10% of registered students completing. In comparison to on-campus completion rates, the high attrition figures for MOOCs are often used as a primary reason to question their validity as a new pedagogical model. However, this comparison is not quite fair as it does not take into account who MOOC users are, and their motivations for using the platform.

As we have seen above, the vast majority of MOOC users are mature learners who are likely using the short courses to supplement areas of knowledge and are not necessarily interested in receiving a certificate or statement of accomplishment. This assertion is supported by research into a number of MOOCs, which has identified four types of MOOC user (Kizilcec, Piech and Schneider, 2013):

- **'Completing'**: learners who complete the majority of assessments offered in class, similar to a student in a traditional class.
- **'Auditing'**: learners who infrequently took assessment (if at all) but engaged instead by watching video lectures. These students often follow the MOOC to the end but receive no completion credit.
- **'Disengaging'**: learners who start by completing assessment but then have a marked decrease in engagement, usually in the first third of the course.
- **'Sampling'**: learners who typically watch a single video, either at the beginning of the course or when the course is fully underway.

In their own research on Coursera students, Koller and Ng (2013) have identified that up to half of registered Coursera students never actually start their class (i.e. watch a lecture or attempt a quiz) and as such completion rates using initially enrolled figures as a base point may be a misnomer. When the enrolled figures are disregarded, and we use for example the 'Sampling' students as a base point, the completion rate for an 'average' Coursera MOOC jumps to 17%. Regardless of these adjustments, it may be that student completion rates in the traditional sense are not applicable for MOOCs.

All of this evidence suggests that MOOCs should or could be designed with different types of learners in mind, rather than perhaps the undergraduate student as is the traditional HE market.

MOOC BUSINESS MODELS

It is clear that a number of the large for-profit xMOOC platforms are following the typical Silicon Valley start up business model of building a user base fast on the assumption that money will follow. With the exception of edX (established as a not for profit venture between MIT and Harvard), Coursera and Udacity are both primarily funded by venture capitalist firms and as such are in the process of identifying potential revenue sharing options with their partner institutions to ensure sustainability. We have already seen that Udacity will soon be offering the first Master's MOOC with Georgia Tech and AT&T, however what other revenue options are under consideration?

Daniel (2012) quotes directly from the Coursera partnership agreement, which includes eight possible monetisation strategies:

- Certification (students pay for a badge or certificate)
- Secure assessments (students pay to have their examinations invigilated)
- Employee recruitment (companies pay for access to student performance records)
- Applicant screening (employers/universities pay for access to records to screen applicants)
- Human tutoring or assignment marking (for which students pay)
- Selling the MOOC platform to enterprises to use in their own training courses
- Sponsorships (third party sponsors of courses)
- Tuition fees

Since these monetisation strategies were published, we have also seen Coursera introduce the 'Signature Track' scheme, an identification verification service whereby students pay between \$50-\$70 in order to link their MOOC assessment scores to their verified identity (using a photo ID and typing pattern test), and receive a verified certificate on completion of their course. With a typical Coursera course attracting between 20,000 – 60,000 registrations (UUK, 2013) and over 300 courses across the platform, it would likely only take a small percentage of students to sign up to Signature Track for Coursera's running costs to be covered.

Additionally, Udacity have recently signed a partnership agreement with Pearson VUE allowing Udacity students to undertake their final MOOC assessment at a Pearson VUE examination centre, for a fee. With the students' identification vetted at the examination centre, this has allowed Udacity to offer transfer credit to some US universities on a number of its MOOCs (Yuan and Powell, 2013).

A final monetisation method appears to be based on licensing MOOC content to third party educational providers. A strategy across all of the main MOOC platforms appears to be a focus on partnering with the elite higher education institutions of the (developed) world. This allows each of the platforms to tout the 'quality' of its courses, delivered by some of the most famous academics in the world. In turn, this quality content can be sold to middle- or lower-tier education institutions wishing to incorporate it into their own syllabi.

GLOBAL SCOPE

Yuan and Powell (2013) list the following drivers and trends towards a more open higher education market:

- Globalisation and the increased momentum for internationalisation in higher education.
- Worldwide growth and increasing demand for access to higher education, with the projection that there will be 120 million students worldwide by 2020.
- Changing learner demographics, experience and demands of the dramatically increasing numbers of lifelong adult learners.
- Highly increased access to personal technology and social media.
- The need for changes in cost, affordability and economic models for higher education.

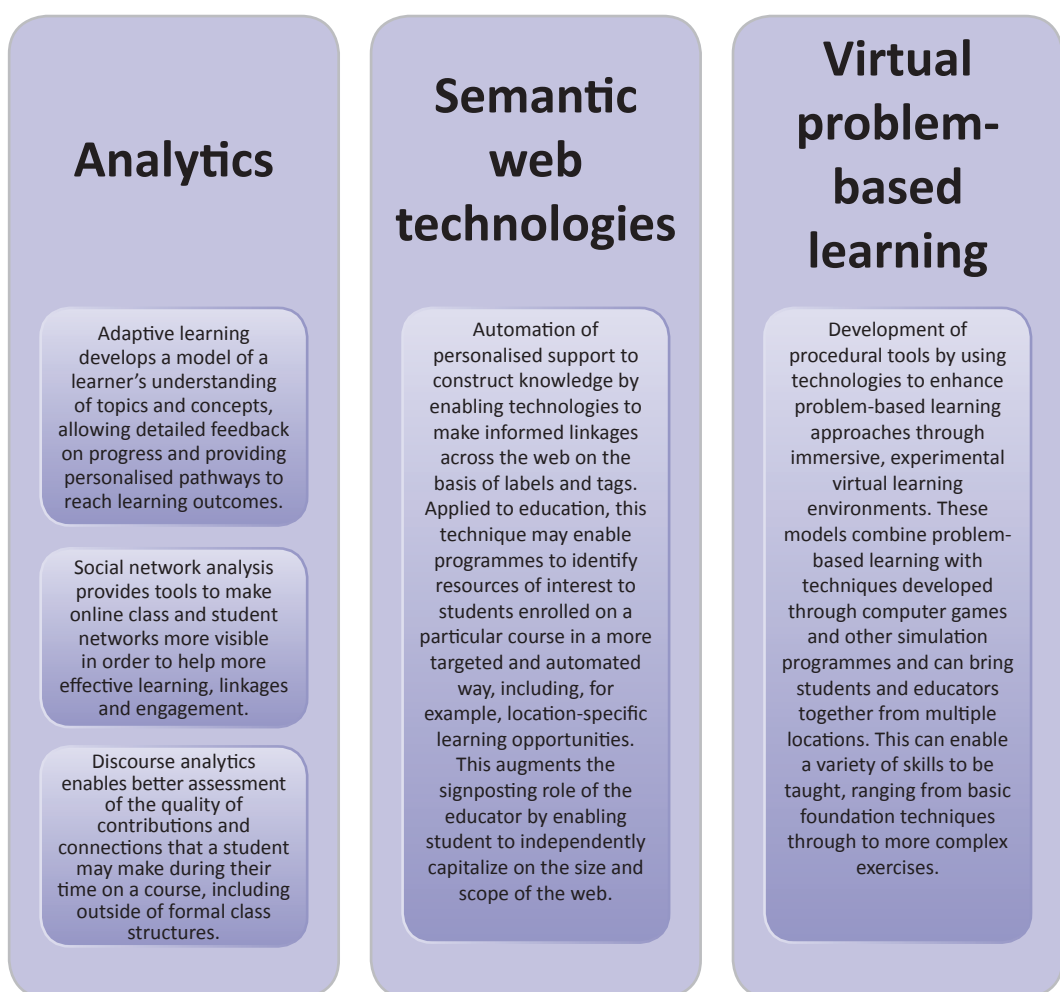
FUTURE DIRECTIONS

Taking these global drivers above into context, how might we expect MOOCs and MOOC platforms to develop in the near future? As already noted, the MOOC world is evolving extremely quickly with new pedagogical types emerging, a new spectrum of potential users and the gradual maturation of the concept.

In the first instance, the broader accreditation of MOOCs by external bodies and university providers is highly likely. We have seen that transfer credits are already available for some Udacity courses, while Coursera recently announced that the American Council on Education would be recommending credit for five of their MOOCs. On the assumption that the external recognition and/or validation of MOOC assessment verification services (such as Signature Track or Person VUE's examinations centres) will increase then acceptance of MOOC qualifications by universities or employers will likely follow.

In addition to accreditation, it is probable that we will see some integration of MOOCs with ‘traditional’ provision e.g. campus-based universities that use MOOC platform technology to support their fee-paying students: small private online courses (SPOCs), rather than MOOCs. Key to this development will be the ability of tutors to utilise MOOC platforms’ data monitoring capabilities, which will allow the identification and targeted support of weaker students. This ‘flipped classroom’ model⁴ also presents opportunities for tutors to improve their MOOC-based assessment processes, as the platform analytics provide tutors with the ability to assess where students are going wrong when completing assignments.

Linked to student performance monitoring via MOOC platforms, is the increasing use of automated learning technologies. UUK (2013) provides an extremely useful summary of these emergent tools:



Analytics

Adaptive learning develops a model of a learner’s understanding of topics and concepts, allowing detailed feedback on progress and providing personalised pathways to reach learning outcomes.

Social network analysis provides tools to make online class and student networks more visible in order to help more effective learning, linkages and engagement.

Discourse analytics enables better assessment of the quality of contributions and connections that a student may make during their time on a course, including outside of formal class structures.

Semantic web technologies

Automation of personalised support to construct knowledge by enabling technologies to make informed linkages across the web on the basis of labels and tags. Applied to education, this technique may enable programmes to identify resources of interest to students enrolled on a particular course in a more targeted and automated way, including, for example, location-specific learning opportunities. This augments the signposting role of the educator by enabling student to independently capitalize on the size and scope of the web.

Virtual problem-based learning

Development of procedural tools by using technologies to enhance problem-based learning approaches through immersive, experimental virtual learning environments. These models combine problem-based learning with techniques developed through computer games and other simulation programmes and can bring students and educators together from multiple locations. This can enable a variety of skills to be taught, ranging from basic foundation techniques through to more complex exercises.

⁴ Wikipedia (2013b) defines the flipped classroom as ‘a form of blended learning in which students watch lectures online and work on problem sets with other students in class. This approach allows teachers to spend more time interacting with students instead of lecturing. This is also known as backwards classroom, reverse instruction, flipping the classroom and reverse teaching.’

RISKS AND BENEFITS

A brief summary of the risks and benefits of MOOC involvement are detailed below:

Risks

- Quality assurance of courses – just because most current MOOCs are from research-intensive universities, this does not equal quality of teaching or pedagogy.
- Potential tension between altruistic aims of MOOC platform founders (i.e. educate the world, for free) and motivations of venture capitalist backers.
- Issue of most MOOC learners being mature graduates, rather than pre-tertiary level students. This has implications for the marketing aims of education partners, open education goals of founders, or for the potential evolution of MOOCs into credit-bearing courses (on the assumption that is the direction of travel).
- Sustainability of current model – current estimates of development costs for a MOOC range between \$30-\$75,000 (€23-€58,000/£20-£50,000). This could limit participation of many universities unless fee-paying students are introduced (and limiting the market means MOOCs are no longer as 'massive' or 'open') or other cost reimbursement schemes developed.
- Potential for the xMOOC for-profit business model not to be sustainable, resulting in a drop in revenue options, venture capital funding, or students, any of which could end in closure for a platform over time.
- The MOOC phenomenon may be overhyped. There are many past examples of renowned higher education institutions becoming involved with new online learning platforms or technologies which failed to deliver (e.g. UKeU).

Benefits

- Providing free and open access to educational content to students anywhere around the world meets the widening access aims of many higher education institutions.
- MOOCs are currently high profile and attract a lot of media and public attention. Handled appropriately, successful involvement with a MOOC could bring a number of financial and recruitment benefits to an HEI.
- Shifting focus to online course development will allow HEIs the opportunity to study new pedagogical methods, delivery formats, and develop skills and understanding in course design, which could impact both on campus and online programmes.

Flipping the classroom allows the MOOC model to remain for professional development learners and incorporates the widening access agenda by allowing younger students at less 'prestigious' institutions access to content provided by leading academics in their field as part of their classroom-based curriculum; this also addresses the business sustainability issue through charging licensing costs to institutions wishing to incorporate the MOOC material into their syllabus and brings a profit share to both the MOOC platform and the partner institution.

POLICY IMPLICATIONS AND RECOMMENDATIONS

Peter Norvig, Sebastian Thrun's co-instructor on one Stanford's first xMOOCs, when asked to comment on MOOCs said, 'it's a confusing or an exciting time... I think schools are experimenting and they don't quite yet know what to do' (Azevedo, 2012). At this stage in their development, it is not clear whether MOOCs are a disruptive technology which will alter the face of higher education, or an overhyped and/or transient phase in educational learning and delivery.

Regardless of whether they are here to stay or not, University UK's 2013 MOOC report identifies five key aims an institution should consider before engaging with massive open online courses:

- **Mission:** what role can MOOCs play in communicating knowledge and expertise, and raising the profile of your institution and its departments around the world?
- **Recruitment:** what role can MOOCs play in diversifying recruitment pathways (if that is an institutional aim)?
- **Innovation:** what role can online models of delivery play in improving the quality and value of online and traditional courses for students, employers and society?
- **Sustainability:** what are the costs of developing and running MOOCs and what are the wider implications of a shift towards free course content for existing business and pedagogical models?
- **Pedagogy:** how can an institution add value to the educational experience of students beyond the standard MOOC platform experience, and facilitate access to a variety of social and professional networks?

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The New York Times labeled 2012 'The Year of the MOOC'. Less than 24 months after the launch of the first massive open online course (MOOC) at Stanford University and with potentially over 5 million students around the world now registered with a MOOC platform, massive open online courses would appear to be a new and significant force within higher education (HE). However, it is still unclear what effect, if any, MOOCs will have on the HE sector in the longer term and whether their explosion in popularity has enough momentum to sustain their method of educational delivery.

This Policy Brief aims to provide a background to the expansion of MOOCs, explain their differences and similarities, identify the types of students using MOOCs, investigate their business models and potential direction, and finally to scope the risks and benefits associated with their development.

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