

EUA OCCASIONAL PAPERS

# MOCs

# Massive Open Online Courses

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**EUA**

European University Association

# MOOCs – Massive Open Online Courses

by Michael Gaebel, January 2013<sup>1</sup>

## Contents

1.	Introduction .....	3
2.	What is a MOOC? .....	3
3.	MOOCs – a not so recent phenomenon .....	3
4.	Who provides the MOOCs? .....	4
5.	How MOOCs work .....	6
5.1	Course design and management .....	6
5.2	Funding .....	6
5.3	Who are the students? .....	7
5.4	MOOCs offer “real” courses .....	8
5.5	Entry requirements .....	8
5.6	Dropout .....	8
5.7	Recognition .....	8
6.	A learning revolution – or a new business? .....	9
7.	Conclusion: What to learn from MOOCs – issues for discussion .....	11
8.	ANNEX .....	14
8.1	Universities that partnered up with Coursera .....	14
8.2	References .....	15
8.3	Links .....	16

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<sup>1</sup> I would like to thank my colleague Andrée Sursock for comments and additions. MG

# 1. Introduction

Over the past year, Massive Open Online Courses (MOOCs) have received a great deal of attention from the academic community and the media. The EUA Secretariat has followed the development of the MOOCs since the beginning of 2012, surveying discussion forums and publications, but also assessing the websites of MOOC providers and participating in several MOOCs in order to gain first-hand experience of this developing phenomenon. The EUA Board discussed this development during its meeting on 30 November 2012.

The paper – slightly altered – was presented and discussed at the EUA Council in Istanbul, 25 January 2013. It provides an overview of the literature on this topic and identifies the key issues in order to inform the Council's discussion. Most of the sources referred to are from 2012 but MOOCs are a quickly moving target; new material presenting new aspects or insights is becoming available on a daily basis.

## 2. What is a MOOC?

MOOCs stands for Massive Open Online Courses. So far, MOOCs can be characterised as follows:

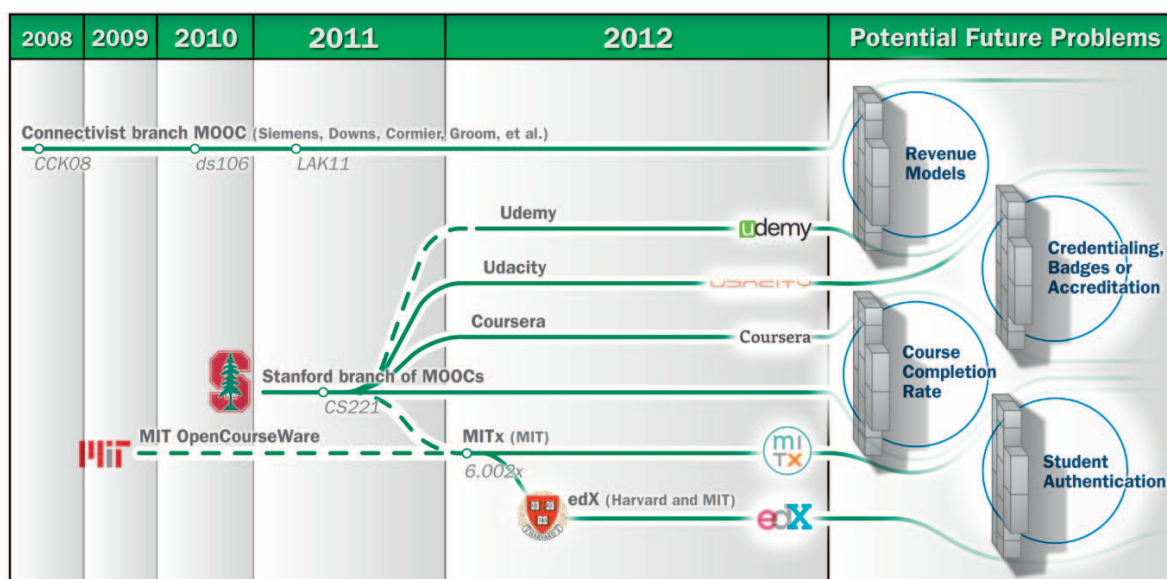
- they are **online courses**
- with **no formal entry requirement**
- **no participation limit**
- are **free of charge**
- and do **not earn credits**.

In 2012, a number of prominent US universities in collaboration with private companies started launching free online courses, open to an unlimited number of students – 50,000 students per course is apparently no exception. Other private companies have been established, which contract university staff and facilitate their courses online.

So far, higher education institutions offering MOOCs have stated that they would not award credits, but only a statement of accomplishment or a certificate. But like many issues concerning MOOCs, this may not remain the case in future.

## 3. MOOCs – a not so recent phenomenon

The point is made that MOOCs actually did not emerge in 2012, but have been developing successfully since 2008, with the clear purpose not only to provide more learning opportunities, but also to improve the learning experience.



Source: Phil Hill, 24/07/2012

Siemens, Hill, Downes, Daniel and others distinguish two different models of MOOCs:

- cMOOC model (c for connectivity), which “emphasises creation, creativity, autonomy and social networking learning” and “focus on knowledge creation and generation”. The cMOOCs stand in the tradition of Connectivist philosophy, and refer to the work of Ivan Illich. As a sharp critic of institutionalised education, Illich proposed in 1970 to establish “learning webs” by using new technology.
- xMOOC model – which is more or less the approach described so far – which “emphasises a more traditional learning approach through video presentations and short quizzes and testing” and “focus on knowledge duplication”. (Siemens, 2012)

Siemens (2012) states that “our cMOOC model emphasises creation, creativity, autonomy and social networking learning”, whereas the xMOOC model emphasises “a more traditional learning approach through video presentations and short quizzes and testing. Put another way, cMOOCs focus on knowledge creation and generation whereas xMOOCs focus on knowledge duplication.”

While the issue of learning innovation is certainly an important aspect that deserves further observation and discussion, as a matter of fact, it is the xMOOCs that caught public attention, and are likely to stir up a debate on innovation of higher education provision.

## 4. Who provides the MOOCs?

All the more recent MOOCs (xMOOCs) involve either for- or non-profit private companies, partnering with universities or individual scholars, and providing services for them. The usual division of tasks is that the universities or the individual academics are responsible for the content (and the quality) of the courses, whereas the company is in charge of the production and its technical facilitation.

The following is a list of some of the companies and consortia that are active:

**Coursera** – a for-profit “social entrepreneurship company that partners with the top universities in the world” (Coursera Website). It was established by two Stanford professors and has contracts with 33 universities, eight of them from outside the US (including the Ecole Polytechnique Fédérale de Lausanne, the University of Edinburgh and more recently, the University of London International Programmes). According to the website, more than two million students participate in Coursera Websites. It has been frequently remarked that the quality of courses offered is very diverse. Apparently, Coursera, but also its partner universities, leave it entirely to the individual academics to decide how they want to teach. Website: <https://www.coursera.org>

**edX** – not for-profit venture established and governed by Harvard and MIT. Currently it offers HarvardX, MITx and BerkeleyX classes. University of Texas System and Wellesley (a selective women’s liberal arts college) are going to join, and apparently, more than 200 institutions have confirmed interest. Harvard and MIT announced that they are principally interested in taking additional universities into the “University X Consortium”, but strictly based on quality standards. They also announced that data is collected to allow an assessment of the learning success, and confirmed that courses will remain free of charge. Website: <https://www.edx.org>

**Udemy** – is a portal that facilitates online courses, mainly in the area of entrepreneurship, IT, software use, design, arts and sports. It invites learners to develop personal and professional skills in a cost-efficient, flexible and more interesting way than traditional study courses. On the provider’s side, it allows everybody to offer a MOOC, and the website announces that its courses are offered by the “world’s top experts, including New York Times best-selling authors, CEOs, celebrities, and Ivy League professors”. It is not clear whether or not these experts are selected, and whether there is any quality assurance – other than users’ demand. UDEMY is financed by “Insight Venture Partners, Lightbank, MHS Capital, 500 Startups and other investors who previously foresaw the internet giants YouTube, LinkedIn, Twitter, Groupon and Yelp” (company website). But it also charges moderate fees for some of its courses. Website: <http://www.udemy.com/about>

**Udacity** – is a for-profit company that has been cofounded by a Stanford professor, who started to offer information science courses online in 2012. According to the website, it is a “digital university on a mission to democratize education”, i.e. to offer high education at a lower price to more people. Courses are free, but fees may be charged for certification. UDACITY started off via a partnership with the electronic testing company Pearson VUE offering final examinations, which would be recognised by employers. Apparently, UDACITY does not have a university partner.

However, the website mentions that it keeps close relations with 20 high-tech companies, among them Microsoft, Google, Facebook and Twitter, and that it is ready to work with companies of any size provided that they have IT departments or a web presence. It also offers students help to find a job (“Our mission is to make direct introductions between employers and students”). Website: <http://www.udacity.com/>

### **Futurelearn**

Futurelearn was established in late 2012, as the first “nationally” defined initiative, and the first one launched outside of North America. According to the website, it “will bring together a range of free, open, online courses from leading UK universities, in the same place and under the same brand.” According to the *Times Higher (TH)*, courses are planned to start in the second half of 2013. Initially Futurelearn will be a limited company financed and owned by The Open University, UK. In a first round, in addition to the Open University, another 11 UK universities will participate (8 Russell Group, 2 from 1994 Group, and 1 non-aligned). According to the *Economist*, the universities of Bristol, St Andrews and Warwick are among them. The *TH* article stresses that Oxford and Cambridge, University College London and Imperial College

London are not among the initial partners; the *Economist* quotes Oxford saying that MOOCs “will not prompt it to change anything”, and that it “does not see them as revolutionary in anything other than scale”, and Cambridge saying that “it is ‘nonsense’ to see MOOCs as a rival” as it is “not in the business of online education”. Other universities are invited to express their interest, and another 15 universities have already done so. The fact that institutions have been selected on the basis of league tables has raised some criticism. (*Times Higher* 20/12/2012)

Website: <http://futurelearn.com/>

For a listing with further MOOC providers cf:

[http://www.bdpa-detroit.org/portal/index.php?option=com\\_content&view=article&id=57:moocs-top-10-sites-for-free-education-with-elite-universities&catid=29:education&Itemid=20](http://www.bdpa-detroit.org/portal/index.php?option=com_content&view=article&id=57:moocs-top-10-sites-for-free-education-with-elite-universities&catid=29:education&Itemid=20) and <http://www.e-learn.nl/2012/12/16/do-we-need-another-mooc>

## 5. How MOOCs work

### 5.1 Course design and management

As the short description of the providers suggest, MOOCs are quite diverse. However, their development might be characterised as follows:

- the institution concludes a contract with a company (e.g. Coursera). It launches an open call among its faculty members and invites applications. A limited number will be selected (note that so far these courses cost money, and do not generate income). The course is produced in collaboration with a Coursera professional team;
- a consortium of universities may set up a company to serve their specific purposes (as in the case of edX);
- companies would have no contractual relationship with a university, but with individual scholars (or other experts) to provide course content – which is the case of UDACITY and probably also for UDEMY (which advertises itself as a portal for facilitating courses);
- the *Economist* reports that Tyler Cowen of George Mason University has launched the “Marginal Revolution University”<sup>2</sup> to provide free economics education, and reminds us that, theoretically, any individual academic could start a MOOC. The basic technical means are a camera, internet access and a computer with the necessary software. The question, however, is whether it would attract enough followers to justify the capital “M”.

### 5.2 Funding

Producing a MOOC can be quite costly, as it usually requires a large production team. It has been estimated, that over the past months, some 100 million USD in funding has been directed toward MOOCs. Harvard and MIT alone have apparently invested 30 million USD each into edX. It is said that Coursera has attracted 22 million USD in venture capital (Paul Fain, 09/01/2013).



The contracts that Coursera offers also contain suggestions for the following business strategies:

- certification (students pay for a badge or certificate)
- secure assessments (students pay to have their examinations invigilated, i.e. proctored)
- employee recruitment (companies pay for access to student performance records)
- applicant screening (employers/universities pay for access to records to screen applicants)
- human tutoring (as opposed to automated) 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.

(see e.g. <http://www.gilfuseducationgroup.com/coursera-will-profit-from-free-courses>)

Another income source would be to sell courses to other higher education institutions, enabling them to lower costs or to make their study programmes more attractive. There are also approaches under discussion where courses would remain free for individuals, but companies using them for staff development would have to pay.

Up to now Coursera offered courses for free and did not generate any revenue. However, it has now been announced that Coursera will offer certification for a moderate fee (less than 100 USD) and also start offering fee-based courses in the course of this year (Paul Fain, 09/01/2013). Whether universities would make money from these courses nevertheless remains an open question.

## 5.3 Who are the students?

Students' motivation to sign up for a MOOC can be very different, depending on the course and the topic. A survey carried out among the participants of a Coursera course called "machine learning" revealed that half of them were working professionals, many of them enrolled elsewhere in education. Other smaller groups that could be identified were school pupils and the unemployed. Interestingly, close to 40% of participants signed up because they were curious about the topic, another 30% wanted to sharpen their skills, and only 18% were aiming at a better job. MOOC providers make the point that students come from all over the world. Both Coursera and UDACITY claim that most of their students reside outside the US (74% for Coursera) (Steve Kolwich, 5 June 2012).

edX mentions on its website that more than 150,000 students from over 160 countries registered for MITx's first course, 6.002x: Circuits and Electronics. The age of students certified in this course ranged from 14 to 74 years.

Kris Olds raises three issues related to geography and access: the digital gap between the developed and developing world, the issue of relevance and applicability of knowledge in other parts of the world and the fact that, so far, MOOCs have not been considered as a means of addressing problems in a particular region or city (Kris Olds, 3/12/2012).

## 5.4 MOOCs offer “real” courses

The point has been made that MOOCs are real courses:

- they are not video-taped, but are taught courses with a variety of lectures (which are taped), textbooks and exercises;
- they have a concrete starting and end point, but within these limits allow students to study at their own pace;
- they may involve interaction between teacher and student, and among students. Coursera courses even foresee peer assessment of exercises.

However, closer consideration of a few specific MOOCs shows that there is quite some diversity. Some courses prescribe a schedule, with a starting and end point, and fixed dates for delivering assignments, whereas others do not set any timeline, and come very close to other types of open-source, online learning offerings.

## 5.5 Entry requirements

There are no formal entry requirements. Students can enrol even without prior formal education. But of course, some courses require specific prerequisites — which are indicated. Many courses, however, address beginners and start from scratch.

## 5.6 Dropout

Dropout rates for MOOCs are high. Of 104,000 students who enrolled in the 2011 online machine-learning class which was an earlier version of the later Coursera course, 46,000 submitted at least one assignment, 20,000 completed a substantial portion of the course and 13,000, or 12.5%, passed (Rosanna Tamburri 07/11/2012). To some extent this can be explained by the fact that courses are free of charge, do not award credits and, as mentioned above, many learners seem to sign up out of curiosity.

Course providers also make the point that even if only 10% of the participants achieve the course goals this would still outnumber the regular students who graduated over a decade ago from the same course taught in a brick and mortar setting (“in one Coursera course I’ll teach as many students as I’ve taught in my entire lifetime”, said Rosanna Tamburri 07/11/2012).

## 5.7 Recognition

Course providers have made clear from the beginning that they would not award credits for MOOCs, but only certificates of attendance and completion. Given that courses are free, awarding credits could have a negative impact on enrolment in regular courses, and would also require more staff resources and extensive structures for testing and validation.

This, however, contradicts the spirit of recognition of learning, regardless where and how it takes place and Daniel (2012) criticises that the award of credits is thus not determined “by their (students’) mastery of the



courses, but by the admissions process to the university. This is an untenable nonsense.” As a successful example for a “moderate” MOOC (in terms of participation), Daniel refers to the Academic Partnerships (AP) programme launched in 2008 by Best Associates, a merchant bank based in Dallas, Texas. Students obtain degrees and professional recognition at rates at least as good as their on-campus counterparts.

There are already some indications that other providers are assessing their options:

- Antioch University announced that it would award credits for students that attend its own MOOCs, for which it will charge tuition fees, albeit lower than the one for its traditional courses.<sup>3</sup>
- UDACITY started to offer, through partnership with electronic testing company Pearson VUE, final examinations which would be recognised by employers.
- San Jose State University announced a pilot project with Udacity to award credits for MOOC courses for a substantially lower fee than usual.<sup>4</sup>

Daniel also makes the point that students could seek recognition elsewhere, albeit often at high costs. This is apparently already happening: the Council for Education (ACE) in the USA, which is traditionally committed to lifelong learning, announced recently that it would assess the possibility for the ACE College Credit Recommendation Service (ACE CREDIT) to provide college credit for selected Coursera courses.<sup>5</sup> According to the *Economist*, the University of Freiburg in Germany has been awarding credits for Udacity courses.<sup>6</sup>

## 6. A learning revolution – or a new business?

A *New York Times* article states, “in the past few months hundreds of thousands of motivated students around the world who lack access to elite universities have been embracing them (MOOCs) as a path toward sophisticated skills and high-paying jobs, without paying tuition or collecting a college degree.” (Tamar Lewin, 04/03/2012)

But critics remark that MOOCs as such are not really revolutionary in that all their elements already existed beforehand. Even the combination of top research universities providing online courses to a larger number of students is not new, as Daniel (12/2012) points out, referring to the unsuccessful Fathom and AllLearn initiatives in the mid 2000s.

He and others make the point that many of the present MOOCs are rather traditional in their pedagogical and didactic approach, and often also of low quality. Thus, Daniel states: “A first myth is that university brand is a surrogate for teaching quality. It isn’t. The so-called elite universities that are rushing into xMOOCs gained their reputations in research. Nothing suggests that they are particularly talented in teaching, especially teaching online.”

<sup>3</sup> <http://www.antioch.edu/antioch-announcement/antioch-university-becomes-first-us-institution-to-offer-credit-for-mooc-learning-through-coursera/>

<sup>4</sup> [http://chronicle.com/article/California-State-U-Will/136677/?cid=at&utm\\_source=at&utm\\_medium=en](http://chronicle.com/article/California-State-U-Will/136677/?cid=at&utm_source=at&utm_medium=en)

<sup>5</sup> <http://www.acenet.edu/news-room/Pages/ACE-to-Assess-Potential-of-MOOCs-Evaluate-Courses-for-Credit-Worthiness.aspx>

<sup>6</sup> <http://www.economist.com/news/international/21568738-online-courses-are-transforming-higher-education-creating-new-opportunities-best>

The edX website announces “self-paced learning, online discussion groups, wiki-based collaborative learning, assessment of learning as a student progresses through a course, and online laboratories and other interactive learning tools. The platform will also serve as a laboratory from which data will be gathered to better understand how students learn. Because it is open source, the platform will be continuously improved by a worldwide community of collaborators, with new features added as needs arise.” But while Coursera promises students to “Interact with thousands of other students”, the general learning approach of their courses is announced as “Learn with videos, quizzes, and assignments”.

Doug Guthrie (17/12/2012) criticises the fact that “the Coursera model doesn’t create a learning community; it creates a crowd. In most cases, the crowd lacks the loyalty, initiative, and interest to advance a learning relationship beyond an informal, intermittent connection.” He emphasises that “Whether face to face or online, learning occurs when there is a thoughtful interaction between the student and the instructor.”

This is not to deny that individual teachers may feel a real vocation for innovative learning and new interactions with students, but many critics comment that there is a focus on knowledge reproduction rather than knowledge creation, and that – besides videos, quizzes and tests – the main approach is traditional lectures.

But if it’s not new and better education, then what is the purpose of MOOCs? And why are some of the top universities that did not succeed in online courses only a few years ago so eager to try again?

Alex Usher writes that MOOCs are “an interesting addition to the spectrum of continuing education offerings, and they’ll exist so long as venture capitalists and large, big-brand universities feel like subsidizing the hell out of them. Period.” He questions whether our interest should be really about making the existing “old” education cheaper – or rather about making education more meaningful and relevant for 70% of the young people, who have to find a job after graduation (Alex Usher, 21/12/ 2012).

Philip Butler, senior e-learning adviser at the University of London Computer Centre, is quoted in the *TH* expressing his hope “that Futurelearn did not become a marketing exercise for more prestigious universities”; he notes that “Increasingly, it feels that universities finding themselves in a competitive market for attracting students have seen Moocs as a commercial opportunity...focused on business goals rather than pedagogical [aims]. Those who have strong, established brands will hold the advantage.” (*Times Higher* 20/12/2012)

## 7. Conclusion: What to learn from MOOCs – issues for discussion

Besides the curiosity of the phenomenon (courses of 160,000 students, exclusive education for free etc.), an interesting question is obviously what will be the transformative power of MOOCs on learning processes, education and, of course, the higher education sector and its institutions.

### i. Are MOOCs a new model?

- One may question whether the distinction between xMOOCs and cMOOCs is as clear as suggested above. While innovation in learning and teaching may not be the immediate intention behind the launch of MOOCs by Ivy League universities and private companies, it is nevertheless hard to understand why innovative teaching as described above cannot be done, for example, through a Coursera course.
- It is a fact that while MOOCs have been in existence for a while they did not receive much public attention until Ivy League universities and start-up companies became involved.
- Another observation is that the initial push for MOOCs did not come from the universities, but rather from individual (young) faculty members well acquainted with the technical and business world of information science and the media, who launched companies such as Coursera and Udacity outside of the university. What is taking place at the moment is that university leadership and industry are seeking possibilities to get involved in distance and e-learning, but without having yet a clearly defined idea of the economic or educative model to be followed.
- As an initiative of Harvard and MIT, edX came a little later. However, the remark has been made that many of the big players – in spite of past unsuccessful forays into e-learning – have been experimenting with MOOCs (Daniel 2012) as they felt under pressure to act and did not want to lag behind the others.
- Universities consider MOOCs for various reasons: lowering the cost of education; using existing resources more efficiently, e.g. by supplementing traditional classroom education with MOOCs (blended learning); offering traditional students more flexible learning opportunities; or reaching out to new learner groups, thus for enhancing visibility and for self promotion. If more universities start getting involved, they will have to develop their own models for providing an education to their students that is both relevant and sustainable.
- Demand plays a role in terms of what and how people (want to) learn. Experience from the software industry indicates that markets respond to powerful brands, and do not necessarily adopt the best solutions. Therefore, to what extent will MOOCs, if they continue, develop in line with the university mission, or be shaped by private enterprise? The latter development could also, to some extent, influence the demand.
- Coursera also offers courses provided by scholars from universities not listed as their partners (e.g. a professor from Leiden University). Could MOOCs contribute to a new type of virtual teaching mobility and teaching cooperation among academics?
- With the exception of edX (and probably Futurelearn) the predominant business models are not those of university consortia but as indicated above, business-driven. Therefore to what extent is it the intention to promote collaboration and pooling resources between universities, as it has been sometimes suggested?

- Questions of responsibility and quality assurance have not been addressed hitherto, although it may be that as long as credits are not awarded these issues need not rise to the top of the agenda.

## ii. Why have MOOCs been successful in the US, but not elsewhere?

- Interestingly, MOOCs have been mainly successful in the US, and so far very few universities in other parts of the world participate.
- It has been pointed out that one driver for MOOCs is to cut costs, given that the cost of higher education in the US is today five times higher than in the 1980s. Thus, this new approach could save money both for institutions (e.g. regarding campus facilities, and probably also teaching staff), and also students, who may accept MOOCs in return for paying lower fees.
- Futurelearn in the UK is, to our knowledge, the first MOOC platform established outside the US, and distinguishes itself by the fact that it is run by an open university, and recruits partner institutions at national level.
- Given the developments indicated above there are many open questions concerning the potential interest in and take-up of MOOCs in Europe, in particular given the importance of public funding and different policies on tuition fees.

## iii. Language diversity?

- Another crucial issue is obviously language diversity. So far, MOOCs have been delivered in English, and interestingly, this has not been an issue of major debate, and has not raised doubt about the effectiveness of global knowledge dissemination.
- It would hardly be possible to deliver Coursera courses in several languages. The current experience of the Khan Academy seems to indicate already the limits – as some of its coursework in maths and natural sciences has been translated in several languages – but not the social science coursework.
- The use of languages other than English might well depend also on the purpose and the target group of MOOCs: it could be imagined that MOOCs in widely spoken languages would become a means of internationalisation.

## iv. Is this the end of universities?

- This is what some people believe: Clayton Christensen, a Harvard Business School professor and author of “The Innovative University”, predicts “wholesale bankruptcies” over the next decade among standard universities. Sebastian Thrun, a German computer science professor who left Stanford and founded Udacity predicts that in 50 years there will be only ten universities left in the world (*Economist* 22/12/2012).
- If they are to replace or supplement traditional learning provision, MOOCs would have to offer credits, and indeed, more and more institutions and organisations are contemplating this step.

## v. Are MOOCs paving the way for new means of knowledge dissemination?

- This appears to be the case to the extent that they are clearly used by a large number of people who find them beneficial. But the question is probably more about the degree to which they will supplement traditional education provision or even replace it.

- Other questions concern the degree to which MOOCs will promote the wider use of e-learning, raise demand for e-learning and also its public recognition.
- Finally, will the development of MOOCs encourage institutions to provide more distance and blended learning opportunities?

## vi. Can any university have a MOOC?

Will MOOCs in their present form come to constitute a specific model of education that can be made sustainable and be replicated by other universities, and if so, under which conditions:

- The popularity that these courses enjoy and the high number of enrolments are due at present to the fact that they are online, have no formal educational requirements, and are free of charge.
- The fact that they are offered by rather prominent and exclusive universities enhances their attractiveness.
- If funding were to come from student fees this might weaken the popularity of the approach, and result in much lower participation. The introduction of tuition fees would also require institutions to award credits.
- Companies such as Google, Facebook, etc. have an interest in MOOCs, but will this interest persist in the future, and under what conditions? And would they partner with just any university? Would this result in further commodification of HE?
- The most recent edition of a regular US survey on online education reported that “only 2.6 percent of higher education institutions currently have a MOOC (Massive Open Online Course), another 9.4 percent report MOOCs are in the planning stages” (2012 Survey of Online Learning).
- This survey also mentions that academic leaders “remain unconvinced that MOOCs represent a sustainable method for offering online courses, but do believe that they provide an important means for institutions to learn about online pedagogy”.
- This is underpinned by the fact that online learning has experienced a steady growth over the past decade, with more than 30% of HE students participating in at least one online course — despite the fact that the majority of institutions are not yet involved in the provision of online education. (2012 Survey of Online Learning)

Obviously, the two most crucial issues at stake are currently the question of the business model, and the issue of awarding credits. But in whatever way MOOCs may develop in the long run, the fact that they currently get so much attention and cause controversial discussions gives hope that this might inspire a much broader debate on learning and teaching in higher education that seems long overdue.

## 8. ANNEX

### 8.1 Universities that partnered up with Coursera

1. Berklee College of Music
2. Brown University
3. California Institute of Technology
4. Columbia University
5. Duke University
6. École Polytechnique Fédérale de Lausanne
7. Emory University
8. Georgia Institute of Technology
9. Hebrew University of Jerusalem
10. Johns Hopkins University
11. Mount Sinai School of Medicine
12. Ohio State University
13. Princeton University
14. Rice University
15. Stanford University
16. The Hong Kong University of Science and Technology
17. The University of British Columbia
18. University of California, Irvine
19. University of California, San Francisco
20. University of Edinburgh
21. University of Florida
22. University of Illinois at Urbana-Champaign
23. University of London International Programmes
24. University of Maryland, College Park
25. University of Melbourne
26. University of Michigan
27. University of Pennsylvania
28. University of Pittsburgh
29. University of Toronto
30. University of Virginia
31. University of Washington
32. Vanderbilt University
33. Wesleyan University



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## 8.3 Links

- **Overview on existing MOOC platforms and companies**

[http://www.bdpa-detroit.org/portal/index.php?option=com\\_content&view=article&id=57:moocs-top-10-sites-for-free-education-with-elite-universities&catid=29:education&Itemid=20](http://www.bdpa-detroit.org/portal/index.php?option=com_content&view=article&id=57:moocs-top-10-sites-for-free-education-with-elite-universities&catid=29:education&Itemid=20)

<http://www.e-learn.nl/2012/12/16/do-we-need-another-mooc>

- **A chronological overview of the MOOC developments in 2012**

<http://hackeducation.com/2012/12/03/top-ed-tech-trends-of-2012-moocs/>

- **On Coursera contracts**

<http://www.gilfuseducationgroup.com/coursera-will-profit-from-free-courses>



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