

THE PROMISE AND PROSPECTS OF MOOCs

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Summary

The nature and scope of MOOCs, their history and taxonomy are first briefly described. The major players, mostly from the US, and our National Programme on Technology-Enhanced Learning, as well as the MIT Open Courseware project and Khan Academy are highlighted. Some of the critical issues are flagged, and some cautionary recommendations are advanced. The accreditation and certification as well as grading issues are discussed. Finally, the future of MOOCs is contemplated, whether they represent hope or hype.

I. The nature and scope of MOOCs

“MOOCs are classes that are taught online to large numbers of students, with minimal involvement by professors. Typically, students watch short video lectures and complete assignments that are graded either by machines or by other students. That way a lone professor can support a class with hundreds of thousands of participants”. “The acronym highlights the key components; i.e. that they are online courses which harness the potential for learning in a large-scale, distributed community of peers, through open practices”. (Wikipedia)

II. History of MOOCs

Siemens et al. are credited with creating the first MOOC in 2008, called ‘Connectivism and Connective Knowledge’ (Wikipedia, 2012). “The course was based on a connectivist pedagogy, which aimed to foster the affordances of social and participatory media. Participants were encouraged to use a variety of technologies; to reflect on their learning and to interact with others”.

Andrew Edgecliffe-Johnson and Chris Cook, in their article entitled *Education From Blackboard to Keyboard*, have written that “the MOOC movement began in 2011 when Sebastian Thrun and Peter Norvig tried to create an online version of their 200-student Stanford University artificial intelligence class. Some 160,000 people from 209 countries signed up. Dr Thrun went on to launch Udacity. Like Coursera, which was founded by two Stanford computer scientists and edX, a non-profit institution set up by the Massachusetts Institute of Technology and Harvard, Udacity has created a destination for students seeking online courses.”

“We reached our first million users faster than Facebook,” says Andrew Ng, co-founder of Coursera. Commentators from Clay Shirky, the New York University media professor, to Martin Bean, Vice-chancellor of the Open University, call the MOOC movement “the Napster moment” for higher education. Chris Vollmer, media expert at consultants Booz & Co., says “it’s more of a Netflix moment than a Napster one”. The question is really: is the faculty ready because the students are ready?”

III. Taxonomy of MOOCs

Course offerings, in general, are of the following types:

- Traditional course where no online technology is used — content is delivered in writing or orally.
- Web facilitated : Course that uses web-based technology to facilitate
- what is essentially a face-to-face course.
- Blended/Hybrid: Course that blends online and face-to-face delivery; substantial proportion of the content is delivered online.
- Online: A course where most or all of the content is delivered online; typically courses have no face-to-face meetings.

Variants on the standard MOOCs have emerged (Gráinne Conole, University of Leicester, grainne.conole@le.ac.uk), “collectively known as MOOCs. Examples include: David Wiley’s course on ‘Open Education’, ‘Personal Learning

Environments and Networks’ and ‘Learning Analytics’. The prefix c denotes connectivity.

A second type of MOOC emerged in 2011, namely xMOOCs. “These were primarily based on interactive media, such as lectures, videos and text. xMOOCs adopted a more behaviourist pedagogical approach, with the emphasis on individual learning, rather than learning through peers. As a result a number of companies emerged, such as: Audacity, 15, EdX,16 ,and Coursera,17. These courses tend to be offered by prestigious institutions, such as Harvard and Stanford, the emphasis being on delivery of content via professors from these institutions”.

Gráinne Conole argues that such a classification is too simplistic and has put forward an alternative mechanism for describing the nature of MOOCs. She “suggests a classification of MOOCs 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 centred to teacher-centred 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”.

There is a multitude of MOOCs now available, in a variety of languages (although the majority is still in English). “Recent examples include: the announcement in the UK of FutureLearn (with 21 UK institutions), Open2Study from the Open University of Australia and the EU-based OpenUpEd”.

IV. The major players:

Several start-up companies are working with universities and professors to offer MOOC’s. Currently there are five major players:

edX (<http://www.edx.org/>) - A nonprofit effort run jointly by MIT, Harvard, and Berkeley.

“edX plans to freely give away the software platform it is building to offer free courses, so that anyone can use it to run MOOC’s”.

Coursera (<http://www.coursera.org/>) - A for-profit company founded by two computer-science professors from Stanford.

“The company’s model is to sign contracts with colleges that agree to use the platform to offer free courses and to get a percentage of any revenue. More than a dozen high-profile institutions, including Princeton and the University of Virginia, have joined”.

Udacity (<http://www.udacity.com/>) - Another for-profit company founded by a Stanford computer-science professor.

“The company, which works with individual professors rather than institutions, has attracted a range of well-known scholars. Unlike other providers of MOOC’s, it has said it will focus all of its courses on computer science and related fields”.

Khan Academy (<http://www.khanacademy.org/>) - A non-profit organization founded by MIT and Harvard graduate Salman Khan.

“**Khan Academy** began in 2006 as an online library of short instructional videos that Mr. Khan made for his cousins. The library— which has received financial backing from the Bill and Melinda Gates Foundation and Google, as well as from individuals—now hosts more than 3,000 videos on You Tube. Much of the content is geared toward secondary-education students”.

Udemy (<http://www.udemy.com/>) - A for-profit platform that lets any one set up a course.

“The company encourages its instructors to charge a small fee, with the revenue split between instructor and company. Authors themselves, more than a few of them with no academic affiliation, teach many of the courses”.

The head of edX, the MIT professor Anant Agarwal, who claims that the open source software will allow a “planet-scale democratization of education”, says that Stanford would be offering not MOOCs but “SPOCs,” or Small Private Online Courses.

V. The National Programme On Technology Enhanced Learning (NPTEL)

From NPTEL Proposal Under the National Mission on Education Through ICT – PIs - MS Ananth and K Mangala Sundar

“The National Programme on Technology Enhanced Learning (NPTEL) was initiated by the Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc) Bangalore in 1999 through a joint workshop organized by IIT Madras with participation from four other IITs, four Indian Institutes of Management (IIMs), industry and government officials and Carnegie Mellon University, Pittsburgh, USA. The workshop proposed four major initiatives : on digital library, core curricula or core courses development on the web, joint Ph. D. programmes using distance education and a virtual University. Each web course developed comprises supplementary learning materials for 40 hours, and video courses contain approximately 40 one-hour lectures per course. The 115 new video courses were prepared in a broadcast format and are currently telecast through the Eklavya channel made available by the MHRD exclusively for this purpose”.

“The model AICTE curricula in engineering adopted by major affiliating Universities such as Anna University, Visweswaraiyah Technical University and Jawaharlal Nehru Technological University were used to design the course content”.

“With more than 80 percent of content designed and developed for dissemination through the Web, the programme was formally launched by the Minister for Human Resource Development on September 3, 2006 in IIT Madras. The contents are currently made available free to everyone in India and abroad through the website <http://nptel.iitm.ac.in> maintained by IIT Madras”.

“In NPTEL Phase I, 110 courses with approximately 4800 one hour lectures were developed. Apart from the well known and popular Open Courseware (OCW) Initiative by the Massachusetts Institute of Technology, USA, which has provided access to about 800 video hours, there are no open resources with so many lecture-hours of video courses. In contrast to OCW which showcases available MIT educational resources under open resources, NPTEL is a curriculum development

exercise in electronic form with the specific objective of improving the quality of engineering education in India through distance mode”.

More than 70 percent of the users are from India. The users outside India are mostly from the United States, United Kingdom, Canada, United Arab Emirates and Singapore with the remaining being distributed globally. It has been a year since the site was registered with Google to provide extended data on users.

VI. MIT Open Course Ware (OCW) project:

More than a decade ago, the Massachusetts Institute of Technology started a much-touted project called OpenCourseWare, “to make its entire course materials available free online. But most of those are text-only: lecture notes and the like. Several colleges now offer a few free courses in this way, but they typically have not offered assignments or any way for people who follow along to prove that they have mastered the concepts.”

VII. The Khan Academy

(How Khan Academy Is Changing the Rules of Education By Clive Thompson July 15, 2011):

Khan Academy is an educational website that aims to let anyone “learn almost anything—for free.” Students can watch some 2400 videos in which the site’s founder, Salman Khan, “chattily discusses principles of math, science, and economics (with a smattering of social science topics)”. “The videos are decidedly lo-fi, even crude: generally seven to 14 minutes long, they consist of a voice-over by Khan describing a mathematical concept or explaining how to solve a problem while his hand-scribbled formulas and diagrams appear onscreen”. “ In addition to these videos, the website offers software that generates practice problems and rewards good performance with videogame-like badges—for answering a “streak” of questions correctly, say, or mastering a series of algebra levels”.

VIII. Interactive Learning Online (ILO)

Lawrence S. Bacow, William G. Bowen, Kevin M. Guthrie, Kelly A. Lack and Matthew P. Long, in their article, *Online Learning Systems in US Higher Education* (May 1, 2012), describe. Interactive Learning Online as highly sophisticated, interactive technologies in which instruction is delivered online and is largely machine-guided.

IX. Some online resources to reshape education

Rachel Swaby points out that the Khan Academy is not the only site changing the way we learn – and teach:

- “Engineer Guy: In his dazzling video series, University of Illinois Engineering Professor Bill Hammock explains the working of everyday objects , like a computer hard drive or a light bulb – engineerguy.com
- Connexions : This open source site lets users assemble educational materials – videos, documents, charts – in one place. Called knowledge chunks, these lessons can then be shared with the public for revising and remixing. – cnx.org
- ITUNES U: With Stanford, Oxford, MIT and some 800 other Universities offering lectures on iTunes, one can carry lessons on a wide variety of subjects on one’s iPhone – apple.com/education/itunes-u

X. Some critical issues

MOOCs raise questions about: the future of teaching, the value of a degree, and the effect technology will have on how colleges operate.

Additional questions include (I. Elaine Allen and Jeff Seaman, “Changing Course - Ten Years of Tracking Online Education in the United States”, January 2013. Internet source):

“Is online learning strategic?”

How many students are learning online?

Does it take more faculty time and effort to teach online?

Are learning outcomes in online comparable to face-to-face?

Has faculty acceptance of online increased?"

XI. Some cautionary recommendations

In the article *Before You Jump on the Bandwagon* in *The Chronicle of Higher Education* (September 3, 2012), Alison Byerly cautions that “to achieve the intended benefits, you will need to consider whether your MOOCs will attempt to replicate what you offer on campus, supplement it, or do something else entirely. Given that your public audience may differ significantly from your on-campus audience of enrolled students, you will need to consider how responsive you want the faculty to be, if at all, to external demand”.

XII. The learner experience and quality enhancement

Gráinne Conole of the University of Leicester (grainne.conole@le.ac.uk) has reflected on what characterizes good learning. An understanding of this is expected to help frame the extent to which these facets of learning are realized in MOOCs for providing a more quality assured approach to the design of MOOCs.

In essence, the characteristics of good learning (Conole 2013) are that it: “Encourages reflection; enables dialogue; fosters collaboration; applies theory learnt to practice; creates a community of peers; enables creativity, and motivates the learners”.

“Technologies offer many ways in which these can be realized; through interaction with multimedia and through communication and collaboration with peers”.

XIII. Accreditation and certification of MOOCs

As of now, very few MOOCs have been accredited; although the American Council on Education has said it would consider five to 10 MOOCs for certification, allowing them to count towards degrees.

The American Council on Education is reviewing a handful of Coursera's classes for credit equivalency; once approved, universities can choose to grant credit for them (or not). Freiburg University in Germany gives credit for a Udacity course. North Virginia Community College has started awarding credits for introductory college courses provided for around \$100 by Straighter Line, a for-profit online-education firm. Students can transfer these to George Mason University.

XIV. Some adverse experiences

Dropout rates are reported to be far higher online than on campus. Coursera says 70 per cent of the students who complete the first week abandon their courses, while just 14 per cent of those who signed up to Dr Norvig and Dr Thrun's "Introduction to Artificial Intelligence" completed it.

A major challenge facing MOOCs is: "how to provide human feedback to thousands of students". The human review is essential, Robert C. Miller, MIT associate professor, who teaches software engineering and human-computer interaction, asserts, "because people can detect things that computers can't, like hidden bugs or poor design".

XV. Some issues in grading

Anant Agarwal, an electrical engineer at MIT who is president of EdX, predicted that "the instant-grading software would be a useful pedagogical tool, enabling students to take tests and write essays over and over and improve the quality of their answers. He said the technology would offer distinct advantages over the traditional classroom system, where students often wait days or weeks for grades". "There is a huge value in learning with instant feedback," Dr. Agarwal said: "Students are telling us they learn much better with instant feedback."

"My first and greatest objection to the research is that they did not have any valid statistical test comparing the software directly to human graders," said Mr. Perelman, a retired director of writing and a current researcher at M.I.T.

He is among a group of educators who have circulated a petition opposing automated assessment software. The group, which calls itself Professionals Against Machine

Scoring of Student Essays in High-Stakes Assessment, has collected nearly 2,000 signatures, including some from luminaries like Noam Chomsky. The group contends : “Computers cannot ‘read.’ They cannot measure the essentials of effective written communication: accuracy, reasoning, adequacy of evidence, good sense, ethical stance, convincing argument, meaningful organization, clarity and veracity, among others.”

XVI. Minnesota bans free online education

Eva Pereira, Forbes Staff writes: “Invoking a decades old law that requires any degree- granting academic institution to obtain a license to operate in the state (and pay a hefty fee for the said license), Minnesota has banned universities from offering free online courses through the education site Coursera. Coursera has been informed by the Minnesota Office of Higher Education that under Minnesota statutes, “a university cannot offer online courses to Minnesota residents unless the university has received authorization from the State of Minnesota to do so. If you are a resident of Minnesota, you agree that either (1) you will not take courses on Coursera, or (2) for each class that you take, the majority of work you do for the class will be done from outside the State of Minnesota”.

However, The Washington Post has an update dated 10/20/12: “Yielding to common sense, the state has revised its position stating that Minnesotans should feel free to pursue online learning and that legislators will work to update the 20 year-old statute”.

XVII. The future of MOOCs – hope or hype

Many people believe that “Online courses are transforming higher education, creating new opportunities for the best and huge problems for the rest”. The timing of the appearance of MOOCs is especially opportune. Bricks-and-mortar campuses are unlikely to keep up with the demand for advanced education: according to one widely quoted calculation, “the world would have to construct more than four new 30,000-student universities per week to accommodate the children who will reach enrolment age by 2025 (see go.nature.com/mjuzhu), let alone the millions of adults looking for further education or career training”.

“Some of Europe’s best schools are determinedly unruffled. Oxford says that MOOCs “will not prompt it to change anything”, adding that it “does not see them as revolutionary in anything other than scale”. Cambridge even says it is “nonsense” to see MOOCs as a rival; it is “not in the business of online education”.

One potential casualty of MOOCs is considered to be the cross-subsidy between teaching and research. “MOOCs will make it far harder to overcharge students, especially undergraduates, in order to subsidize research that nobody else will pay for”.

One way of generating revenue is a “freemium” model, in which the course is free but the graduation certificate is paid for. Udacity, for example, charges \$89 for an examination invigilated by Pearson VUE, an electronic-testing firm.

“Some argue that they open up access to education and hence foster social inclusion, others cynically suggest that they are merely a marketing exercise – more about ‘learning income than learning outcomes’ and point to the phenomenally high dropout rates (typically between 95-98%)”.

The bad thing about MOOCs, it is argued, is that “the student is just a number. Professors aren’t building relationships with students—the kinds of relationships that allow them to see what a student can actually do with an idea”.

“Early results for such large - scale courses are disappointing, forcing a rethinking of how college instruction can best use the internet”. “A study of a million users of MOOCs released recently by UPenn Graduate School of Education found that, on average, only about half of those who registered for a course ever viewed a lecture, and only about 4 per cent completed the courses”.

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