

MASSIVE OPEN ONLINE COURSES AS DISRUPTIVE INNOVATION: POSSIBILITY TO HELP EDUCATIONAL CHALLENGES IN CURRENT TIMES?

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Abstract: The ‘massive open online courses’ (hereinafter "MOOCs") movement had already been started in 2008 but became a phenomenon in 2012, which was declared by media as the year of the MOOCs. This paper will discuss one of the notable ‘disruptive’ impacts of MOOCs, which is an increased public debate of online education. However, these debates are often incompatible and very diversely distributed among different stakeholders. Despite of the growing number of publications, some systematic, extensively published research on MOOCs is still missing. Therefore our intention is to provide an overview of existing academic research and available publications related to MOOCs. Our findings indicate that, on the one hand, MOOCs offer various benefits for learners, teachers and providers; on the other hand, there are still many challenges and shortcomings (e.g. questionable course quality and pedagogical approaches, high dropout rate, assessments and credit system, copyright, limited hardware). In regards with the future research activities, we plan to focus more in detail on the position of MOOCs in education systems across the world and how it can be sustained.

Keywords: online education, e-learning, massive online open courses (MOOCs), innovation, the Internet

JEL classification: I21, I25

1. Introduction

MOOCs represent a recent evolving educational phenomenon attracting sizeable public attention due to their swift rise and disruptive potential. Christensen in his Theory of disruptive innovation (1993) explains the ability of technology to disrupt long-established business practices – dramatically changing the landscape of industries by greater openness, decreasing costs, and revolutionized delivery.

This paper brings an overview of the ongoing public discussions, institutional reports, undertaken researchers and other available publications on the potential of MOOCs to disrupt the way universities do business. The aim is to clarify the MOOCs’ movement and its disruptive character, and to examine the influence (trends, challenges and barriers) of MOOCs on higher education institutions and learners. Evidence from this review ought to show that although MOOCs may have had a significant effect on a range of issues (including definitions of viable business models, delivery methods, pedagogical approaches, credits, certification, etc.), more systematic research is needed to assess the range, extent, and steadiness of any disruption that may occur.

2. History of MOOCs

MOOCs are online courses focused on large-scale interactive participation, open not only in terms of enrolment, but also in terms of shared content, design, points of access, ways of application, and definitions of success (Cormier and Siemens, 2010). MOOCs integrate the connectivity of social networking, accessible online resources, the facilitation of acknowledged experts in a field of study, and a collection of freely accessible online resources. Most considerably, MOOCs build on the active engagement of students who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. In comparison to traditional courses materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for the students, professors, and teaching assistants, generally carry no fees, no

prerequisites other than Internet access and interest, no predefined expectations for participation, and no formal accreditation. (McAuley et al. 2010).

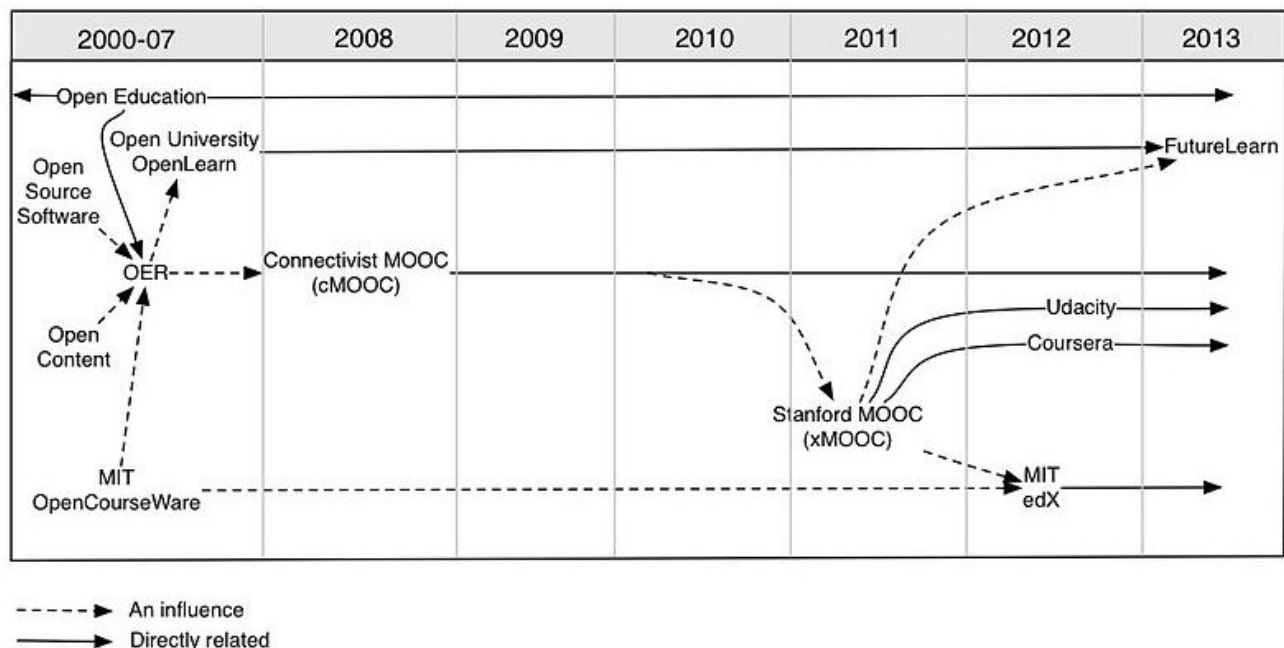
The first MOOC from the open educational resources movement appeared only in 2008, with the launch of an online course experiment utilizing connectivism with a large number of enrolments called "CCK08: Connectivism and Connective Knowledge" introduced by George Siemens (2005), Associate Director, Technology Enhanced Knowledge Research Institute at Athabasca University and Stephen Downes, Senior Researcher at The National Research Council, Canada. This course was presented to 25 tuition fee-paying students in extended education at the University of Manitoba and in addition to more than 2,000 other students who took the online class without payment, which led to a greater awareness of the potential of both connectivism and open online education (Downes, 2008).

The term MOOC itself was created by educational technology researchers Dave Cormier (2008), Manager of Web Communication and Innovations at the University of Prince Edward Island and Bryan Alexander at the National Institute for Technology in Liberal Education in Texas in response to the creation of the above mentioned open online course.

The course credited with catalyzing the buzz around MOOCs was introduced through Stanford's University website in autumn 2011¹. The course "CS 271: Introduction to Artificial Intelligence" facilitated by Sebastian Thrun, a professor at Stanford, and Peter Norvig, the Director of Research at Google was rather an experiment in distributed learning utilizing a learning management system to host short videos, quizzes, tests and discussion boards for individuals - regardless of prior knowledge, experience or socioeconomic status who wanted access to the same material as Stanford students (Rodriguez, 2012). For students attending the face-to-face course at Stanford, the experiment offering a chance to procure content and complete tasks through the Internet, meant a campus migration to the MOOC site, resulting in the online enrolment of over 160,000 individuals from 190 countries with only 30 students attending face-to-face lectures by the end of the term (Watters, 2012). After seeing the potential behind this undertaken experiment, Stanford devoted research hours to developing MOOC platforms and providing courses for other MOOC organizers. For instance Thrun and Norvig created a new business model for online knowledge, the start-up Udacity. Within one year other professors adapted their ideas using own resources, and two more American start-ups for MOOCs appeared: Coursera and EdX. In 2013, the Open University established its own MOOC platform, Futurelearn featuring universities from the United Kingdom and many other independent MOOC initiatives, including Open2Study in Australia and diversity in Germany. Figure 1 below demonstrates a brief historical overview on MOOCs and distance learning.

¹ There were altogether three such courses offered during that semester by the Stanford's University (CS 271: Introduction to Artificial Intelligence, CS 229: Machine Learning, and Computer Science and CS 145: Introduction to Databases).

Figure 1: History of MOOCs development



Source: Yuan and Powel (2013)

3. MOOCs disruption and innovation in education area

The increasing interest of students in MOOCs and their positive feedback attracted the attention of academics, but also the mainstream press and social media, business sphere, and policy makers. Key aspects of debates include the impact of MOOCs on university teaching practice, quality assurance, accreditation, business models; the concept of openness; definitions of successful participation; and the role and development of learning analytics. Common to all of these issues is a discussion that the MOOCs will likely play an integral part in the reorganization of higher education as we know it.

In this part we will focus on the theory of disruptive innovation, i.e. innovations that deliver a physical product or a service to consumers in such a way as to go against market expectations, more in detail then we will explore the potential of the MOOC to disrupt the teaching approaches and business models of education institutions (Conole, 2013; Kolowich, 2013; Rodriguez, 2012).

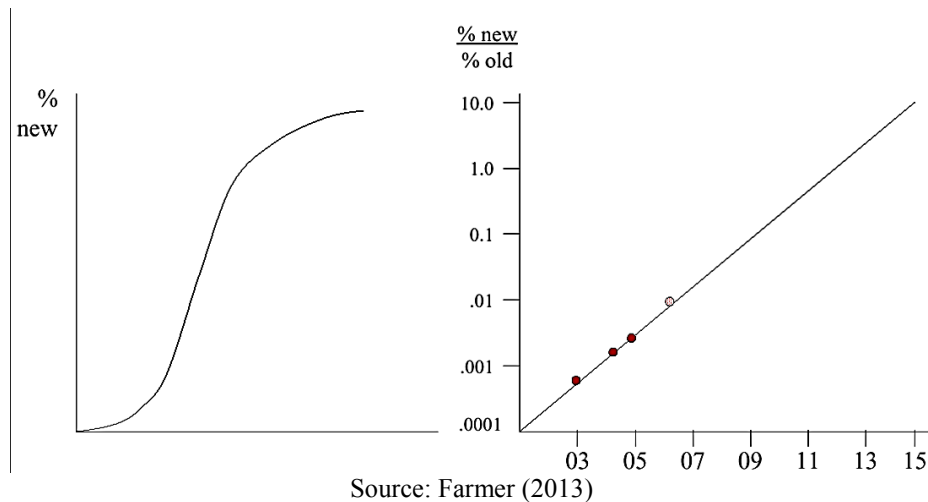
3.1 Disruptive innovation theory

Christensen (2003) defines two types of innovations that affect organisations and businesses - sustaining and disruptive. According to Christensen, a sustaining innovation is about improving the existing system while a disruptive innovation creates an entirely new market, typically by increasing access, cutting costs, lowering price, revolutionizing delivery, etc. Disruptive innovation usually combines a new evolving technology with an innovative business model. It does not represent a breakthrough progress, but tend to be simpler and more affordable than other existing products or services on the market. The customers in the original market usually cannot use it; therefore it brings more benefits to people who are unable to consume the original product, so-called non-consumers. In comparison, sustaining innovations target high-end customers who demand better performance of an existing product or service and are ready to pay more for it – so called undershot customers.

Christensen stresses in his observations the relevance of the widely used S-curve representation of technological substitution (Figure 2). When a new approach or technology substitutes for an old one because it brings a technological or economic advantage, the substitution pace almost always follows an S-curve, as shown on the left side of Figure 2. We can assume that the left graph represents the

number of students taking MOOCs and the right graph shows ratios between the users of new technology to old technology plotted on a logarithmic scale. The model is considered “disruptive” if the data, plotted on a logarithmic scale, is linear. Numbers of users of the new technology create the S-curve. The angle of the data line depicts how fast conversion to new technology from old technology takes place. The nearer to vertical the faster is the conversion (Farmer, 2013).

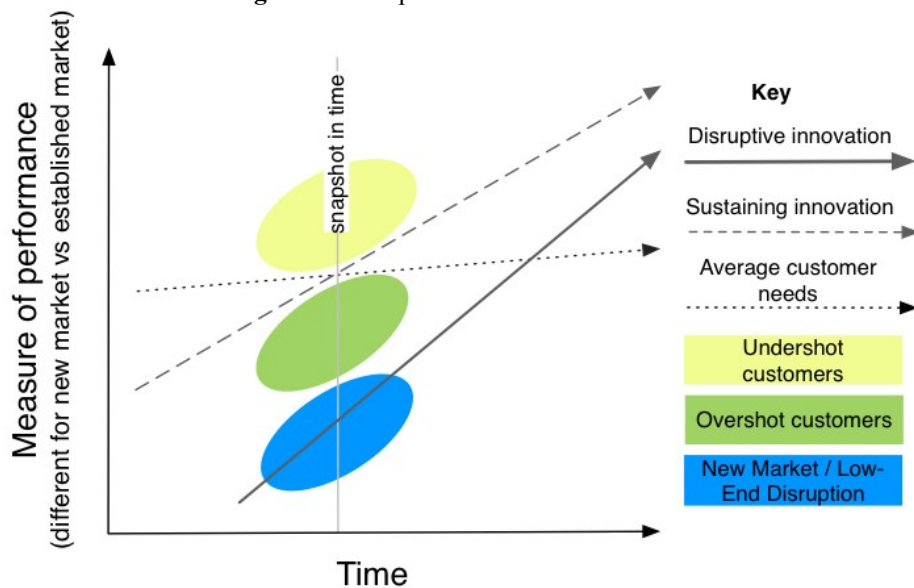
Figure 2: An Example of Christensen-Horn “Disruption Model”



According to this model, initial users of the new technology promote it or convince users of the old technology to change, but the final result varies greatly (from product to product, from organisation to organisation, from environment to environment, etc.). The second graph is used to forecast the first. If the S-curve is an appropriate model, then the ratio of users of the new technology to users of the old over time is extended linearly. The accumulating number of new users creates the S-curve (Farmer, 2013).

Figure 3 below shows a model of disruptive innovation illustrating the development of MOOCs.

Figure 3: Disruptive Innovation and MOOCs



We can see that MOOCs contain key characteristics of disruptive innovation; i.e., they are a combination of new business models with an enabling technology. The initial market segment is represented by non-consuming customers for whom MOOCs offer more affordable solution (by offering free courses to a different set of learners or meeting different needs of existing students in educational institutions). Disruptive innovations have reshaped markets and shifted the power from the established players to new start-ups and alternative providers in the global technology, social media, and music industries.

At this place it is worth mentioning that education is a complex system which involves multiple players, complicated processes, and in some cases highly regulated markets with significant state subsidy and incentive to study with established institutions, therefore using disruptive innovation to explain the phenomenon of MOOCs in education should be applied with caution to avoid superficial conclusions (Yuan, 2013).

4. Implications for Education Policy

There has been recently much coverage of the emergence of MOOCs, and numerous discussions arose about their usefulness as a new learning experience for a wide variety of users, influencing the context of education and learning (Bouchard, 2011).

4.1 Drivers and trends

The emergence of MOOC style innovations indicates a convergence of interests in social, economic, and technology developments in the global context of education (Yuan and Powel, 2013). There is a potential for open education to play a valuable role in ensuring access to education to millions of potential students and addressing the issues that need to adapt to ever-changing environment which is need of new ways to provision and access to education in the future.

These changes include:

1. Globalisation in higher education;
2. Worldwide growth and increasing demand for access to higher education;
3. Emergence of the learning sciences and their application to educational practice;
4. Movement toward competency-based education;
5. Changing learner demographics, experience and demands of the rapidly increasing numbers of lifelong learners;
6. Highly increased access to personal technology and social media;
7. The need for changes in costs, affordability and economic models for higher education;
8. New business models that effectively combine instructional quality, lower cost, and increased access through unlimited scalability.

The evolution of new educational delivery models including MOOCs is another source of pressure for educational institutions, but also offers opportunities for institutions willing to change and develop new provision.

4.2 Challenges and barriers

MOOCs can be excellent learning tools, but as with any other method of delivering information and education, they also have their limitations.

These limitations are as followed:

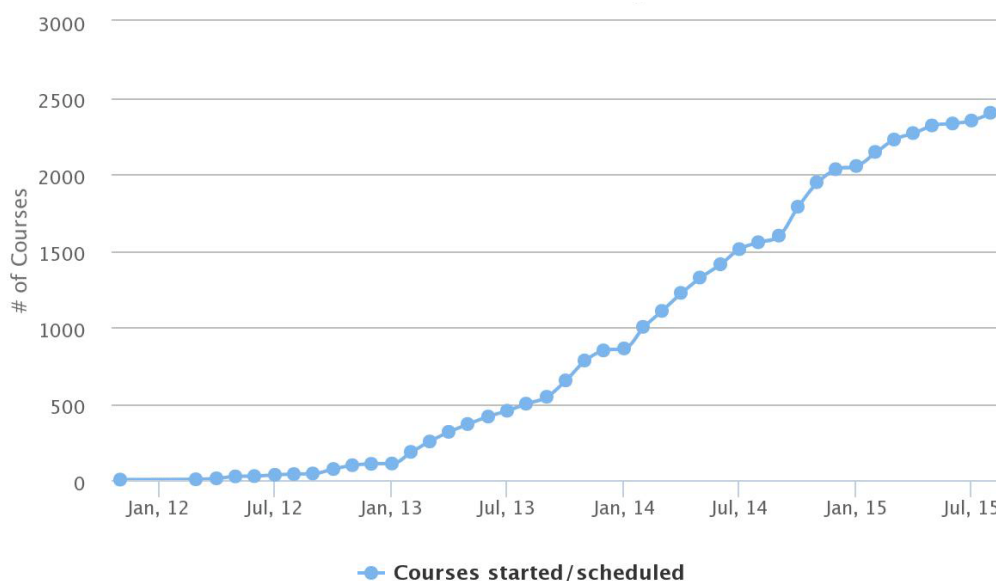
1. Excellent signup rates, but very low completion rates;
2. High possibility to cheat;
3. Inaccessibility in developing countries, due to the lack of infrastructure;
4. Lack of time to study, due to various reasons (work, family, leisure);

5. Lack of faculty support, lack of face-to-face interaction with teachers and other students, and lack of access to laboratories, research facilities and other resources.
6. Lack of advanced study skills, digital literacy and a high level of self-discipline.

4.3 Possible future trends of MOOCs

There have been some key developments in recent years in the MOOC ecosystem. Students and teachers are continuing to attend and deliver MOOCs in growing numbers. Universities across the world are investing in online courses development (the growing trend is depicted in Figure 4).

Figure 4. Growth of MOOCs – cumulative number of courses started/scheduled



Source: Shah (2014)

MOOC providers are developing and improving their business models in order to bring in even more revenues and here comes an important question about MOOCs: “*How can universities make a profit when offering all this content for free?*”

As already mentioned in regards with the disruptive innovation, MOOCs are likely to change significantly over the next few years, through the establishment of a new business model. The fact that the most well-known universities are in a competition to offer more and better MOOC courses as a complementary to its traditional courses (24 of the 25 top colleges according to *U.S. News and World Report* are offering MOOC courses) is an indication that MOOCs will not disappear in the short-term but rather be modified and may disrupt the whole (higher) education sector.

In order to make them profitable and tailor-made, the future trends point to a direction where MOOCs use a “freemium” model to keep their costs low, account for their high upfront (sunk) costs and sell “standard” services freely to most of their students, and upsell students and related organisations and bodies seeking for premium features, such as an official certificate comparable to that of the students participating in traditional courses obtain. This can be interpreted as a kind of price segmentation strategy with the aim of, on the one hand, attracting as much students as possible (who may not have had the access to higher education beforehand) and, on the other hand, serve the “premium” students with advanced opportunities (Swope, 2013).

In addition to an overall positive effect of providing quality to previously unserved segments of society, this raises the question of equity to access in education, which will surely be debated from a social point of view in the coming years.

5. Summary

This paper represents an attempt to explore the nature and implications of the MOOC phenomena promising to open up higher education by providing accessible, flexible, affordable, high quality resources for free or at a low cost for learners who are interested in learning.

The potential of the MOOC to disrupt the way universities do business was chosen as a central topic. The main aim was to review the existing literature to clarify the disruptive innovation theory, and to examine the MOOCs implications on higher education. The review has shown that there are still significant barriers to a large scale adoption of MOOCs that need to be overcome (low completion rates, authentication, motivation and self-discipline, faculty support, lack of infrastructure and digital literacy, etc.). With the popularity of MOOCs, higher education institutions will need to rethink how to make their education concepts and curriculum delivery models flexible and accessible, use more cost effective technologies enabling access to courses and materials to self-direct their own learning beyond their institutions. The new models of education will also bring new opportunities to Internet services providers and mobile application developers.

Due to the above mentioned facts our future research will be focused more in detail on the role MOOCs can play in particular countries (mainly in the EU): whether they can help improving the quality and value of online and traditional courses for students, employers, and the whole society. The other bulk of research will be oriented on the financial and pedagogical issues, i.e., how to ensure a sustainable viable business model and an appropriate pedagogical concept of developing and running a successful MOOC and what are the wider implications.

At a national and international level, new frameworks for funding structures, quality assurance and accreditation to support different approaches for delivering higher education will be required. Policy makers will need to address openness and make education more affordable and accessible for all and at the same time be profitable for the institutions in an open education ecosystem.

Understanding the process and implications of disruption shall be essential for university administrators and policy makers.

Acknowledgement

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