

# Towards Understanding the MOOC Trend: Pedagogical Challenges and Business Opportunities

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**Abstract.** Undoubtedly, MOOCs have the potential to introduce a new wave of technological innovation in learning. In spite of the great interest among the educators and the general public MOOCs have generated, there are some challenges that MOOCs might face when it comes to examining and determining the best pedagogical approaches that MOOCs should be based on. Moreover, MOOCs are facing also challenges towards building a consistent business model. The main objective of this paper is to shed more light on the MOOCs phenomenon, by analyzing and discussing some benefits and drawbacks of MOOCs from the pedagogical and business perspectives. Therefore, in this paper we provide an in-depth analysis of MOOCs challenges and opportunities towards determining pedagogical innovations. We also analyze current trends of MOOCs expansion to create new educational markets by overpassing the bricks-and-mortar educational institutions. To do so, we conduct a SWOT analysis on MOOCs. Finally, we provide possible directions and insights for future research to better understand how MOOCs can be improved to lead to greater innovations in the higher education landscape to answer the needs of a knowledge-based economy.

**Keywords:** MOOC · SWOT · Pedagogy · Business model · Challenges · Opportunities

## 1 Introduction

Massive Open Online Courses (MOOCs) represent online courses aimed at unlimited participation and are open access on the Internet. In particular, MOOCs represent a stage that led to dramatic changes in the development of web-based education systems, which have been enabled by the rapid growth of Internet use, and increase in bandwidths over the past decade [1]. MOOCs remained relatively unknown until 2011 when a number of the most prestigious universities in the United States started to offer MOOCs by putting their courses online and by setting up open learning platforms, such as edX, Coursera and Udacity. That year will be remembered as the year of disruptive innovation, when Internet technology enabled the popularity of MOOCs, a form of disruptive or transformative education, currently growing at an alarming rate. Besides

Coursera, edX, and Udacity, many other companies providing different platforms have emerged, such as Course Builder, Khan Academy, iVersity, and every month there seems to be a new platform available. They all claim they are committing their best resources to making education freely available to anyone who seeks it.

Nevertheless, all these platforms are still facing various challenges in many directions, most importantly towards building consistent business models and determining best pedagogical approaches. What is common to each of the platforms is that they are not offering qualifications or degree level programs. Whether MOOCs will achieve the level of success within next five years as some educators are predicting depends entirely on how well the new technology based method of teaching clear some very high hurdles [2]. These hurdles to some extent are remaining unsolved completely in recent times. We address them below with the following questions:

How to manage teaching a course effectively with hundreds or thousands of students? How to pedagogically design courses for such enrollment? How to assess the learning outcomes? How to combat the low completion rate with MOOCs? How to know that a student taking exams and quizzes is really the student enrolled in the course? How does social media like Twitter or Facebook play role in this? How does the big data and learning analytics influence higher education, and how to address this issue? Will MOOCs replace accredited curriculums? How to build financial models for MOOCs? How to understand what the costs are? Shall MOOCs be designed in-house or be outsourced completely? How does open education resources relate to MOOCs?

In this paper, we address some of these challenges in developing and utilizing MOOCs, by providing a thorough analysis of each challenge. Consequently, we believe MOOCs offer the potential to influence the traditional universities in providing improved education even though there are the stated concerns and questions surrounding MOOCs and their use in higher education.

The rest of the paper is structured as follows. Section 2 covers the related work. The SWOT analysis is provided in Sect. 3. Section 4 addresses some of the pedagogical approaches and challenges of MOOCs. In Sect. 5, we discuss the current developments with MOOCs from the business model viewpoint. Section 6 concludes this paper.

## 2 Related Work

MOOCs have been in eLearning business for a while now but whether they are as effective as face-to-face pedagogy and how MOOC affordances such as interactive exercises, social networks, and rich multimedia content can be harnessed in face-to-face education are some of the questions that have intrigued many of the researchers recently.

To understand the effectiveness of MOOCs, which is measured as “meeting the user’s learning goals,” Gamage et al. has proposed a framework to analyze the effectiveness of eLearning in MOOCs from a learner’s perspective [3] using a Grounded Theory (GT) methodology [4]. In their study, the authors have proposed a ten-dimensional framework consisting of pedagogy, usability, motivation, interactivity, collaboration, network of opportunity, support for learner, content, technology, and

assessment. They found that participants showed a keen interest in collaboration and interactivity, and that careful attention to pedagogy and the assessment is an effective support to their learning in MOOC. MOOC affordances are other criteria to measure the usefulness of the system studied by Delgado et al. in their research [5]. The authors have shared some of their experiences combining MOOC-like content in on-campus courses in this study. According to the authors, the effectiveness of the MOOC affordances depends upon the composition of curriculum mode such as interleaved or sequential and the specific needs of the subject. Even though the efficacy and the affordances of MOOCs are an alternative to face-to-face pedagogies [4, 5], other challenges influencing blended learning experience include student's attitude to learning, learner group dynamics, interactions among learners and a lack of well-known learning script [6].

The authors conclude that MOOC technologies hardly support blended learning experiences due to the lack of social interaction, monitoring, and intervention by instructors. There is a general perception and to some extent the expectation that learning technology will be able to solve the problem of worldwide demand for higher education [7]. Having said that, requiring MOOC to be part of learning technology poses another challenge in the field of learning design (LD) i.e. how to design pedagogies to support students on a large scale. This requires addressing all the attributes of the field which were set out in the Larnaca Declaration, as suggested by Laurillard [7]. These include: "the focus on pedagogy in all its forms; the description of LD as computational objects; the sharing of ideas; the scope across all sectors and subject areas; the pedagogic categorization of learning designs; the attention to what students do in order to learn; the mapping to implementations, and the focus on effectiveness". In another study by Goto et al., MOOCs were used to increase pre-service teachers' knowledge about LD [8]. The authors using a case study showed how the reflections of pre-service teachers inform (via LEAP21) the teachers' understanding of LD after going through a 3rd-year bachelor level MOOCs module themselves.

Shang and Zue argue that "the size of the learner population and the heterogeneity of the learner's backgrounds make conventional one-size-fits-all pedagogies inappropriate" [9]. They propose a conceptual model where educational resource linking with the goal of satisfying various learning needs are addressed, by building a rich platform integrating abundant and open online resources. This work is similar to the one presented in [10].

Subbian in his research has identified the key elements of MOOCs that can influence pedagogy and learning in STEM disciplines [11]. Iwamoto, studied the learning infrastructures on businesses in service industries [12]. The authors in [13] have introduced the design of a MOOC for Entrepreneurship education in the form of Serious Games (SGs). In another study, the same authors analyzed the entrepreneurship skills developed in a Game-Based Learning MOOC (GBL MOOC) according to five assessed activities developed during the course [14]. According to them, the GBL MOOC for entrepreneurship studies resulted in an acceptable overall degree of satisfaction with the use of SGs during the MOOC.

### 3 SWOT Analysis: A Way to Understand the Logic Behind MOOCs

We use a SWOT analysis to identify, describe and analyze some of the advantages and limitations of MOOCs, in terms of strengths, weaknesses, opportunities and threats, presented as in Fig. 1.



**Fig. 1.** SWOT analysis on MOOCs

#### 3.1 Strengths

In the strength section, we have identified the following characteristics of MOOCs: source of lifelong learning, reputation and brand recognition, global presence, improving education accessibility, low prices, and creating large online communities.

Taking a MOOC offers a major benefit particularly to lifelong learners. People from a wide range of age categories and backgrounds from all over the world can engage in learning via MOOCs. They provide an advantage to universities to develop a more strategical approach to online learning and to improve reputation by enhancing classroom teaching practices and developing new revenue models. MOOCs represent a fantastic international recruiting tool for the universities having audience from every corner of the world. Additionally, the teachers get an opportunity to reach people around the world like never before and continue to grow themselves through crowd-sourced feedback about their teaching styles and lesson plans, content, and learning outcomes. MOOCs will make knowledge and quality education more accessible for people who would never be able to attend a prestigious educational institute. Classes

can be followed at any time, without a transportation cost and there is no need to participate physically in the classroom. They are generally free of charge [15].

### 3.2 Weaknesses

The weaknesses that we see as significant are: large number of dropouts, certification and accreditation, not suitable for complex education, interaction and creativity, and verification of the learner's identity. Unlike MOOCs are able to enroll more students than the traditional universities, they suffer from much larger drop-out rates [16, 17]. Some of the reasons for the low graduation rates are course methodology, lack of social interaction and creativity. Furthermore, certifications that MOOC companies deliver are not accredited by any relevant quality assurance organization. As suggested by Daniel [18], special organizations with extensive experience in accrediting web based learning should be engaged to certify the acquired knowledge. Teaching a complex engineering class to thousands of students requires professors and teaching assistants to perform labor-intensive tasks such as preparing laboratory experiments, examining project demonstrations and assessments, and performing workshops and consultation with students. Due to the demanding aspects of these activities, there raises the question of the adequacy of MOOCs to meet these specific needs of MOOCs courses.

Various control mechanisms are required for incorporation into MOOCs platforms to ensure and verify correct identity of learners. Formal exams also demand a connection between student and exam and makes institutions responsible for issuing certificates only to persons actually taking exams. In this context, Coursera applies biometric identification methods to verify students through photos and text samples [19]. The challenge here is on managing and administering biometric data while preserving the privacy of people whom provide such data.

### 3.3 Opportunities

Through developing MOOCs, universities have the possibility to extend reachability and accessibility of their teaching activities globally. Having the ability to create large online communities MOOCs allow capturing large amounts of data. Such data may bring useful information to institutions in many different ways. For instance, having early access to global talent pool can help employers in their recruitment process in finding desired profiles. Companies may also see MOOCs as flexible and cheap options to train their most enthusiastic workers with desire to advance their knowledge. MOOCs also can help higher education institutions to enhance learning outcomes, thanks to new pedagogical innovations and research. Besides, advertisers can also benefit by having access to these platforms. Due to the large amount of time that learners spend on such platforms, advertisers can simultaneously receive more clicks on their ads.

Finally, the abundance of data collected on MOOC platforms enable institutions to identify and facilitate various learning patterns of learners. Collection and analysis of data about learning patterns and contexts is referred to as learning analytics process.

### 3.4 Threats

While there are many positive aspects that MOOCs can offer, there are also ethical and privacy implications arising from various initiatives. Some of these concerns are listed by Marshall [20], including commercial exploitation of learners, as well as research ethics concerns arising from analysis done by academics and institutions. The lack of quality and standards can damage the reputation of an institution. Consequently, this brings a false picture of MOOCs as being the best e-Learning choices for universities. Moreover, new technological and policy solutions are required in practice in order to protect and secure learner's data, to maintain anonymity of such data, and to ensure data is not shared or served as a subject of commercial purposes.

Since MOOCs are massive and open, it is difficult to maintain copyright laws. So far, definitive answers and solutions are lacking in terms of having proper copyright laws in place. The authors in [21] give the suggestion of shared copyright vision to best allocate and manage copyrights in online courses. The assessment of learning and cheating in MOOCs is also a major remaining challenge, and mature solutions to address this issue are still lacking [22].

## 4 Pedagogical Challenges and Novel Teaching Approaches

The MOOC phenomena has produced a lot of interesting information and experiences about course design and delivery in online context. The most popularized categorization of MOOCs is based upon two distinct pedagogical foundations: connectivism (cMOOCs) and behaviorism (xMOOCs) [23]. The literature reports that in MOOCs development, to some extent, all the three learning theories, behavioristic, cognitive, and sociocultural theories have been taken into consideration. Regardless of this, we believe that the sociocultural component, which puts emphasis on the interaction between lecturers and learners, cannot be fully applied here. MOOCs pedagogy is lacking in innovation since it is limited to video-watching, testing knowledge via multiple choice questions and provides little guidance to the students. Up to now, research is very scarce towards examining and determining the best pedagogical approaches that MOOCs should be based on [24–26]. In this context, there are numerous factors and challenges we have identified:

- MOOCs platforms, from the technological point of view are still not close to replicate the interaction and community building, taking place in the traditional higher education sector, which represent the heart of the education.
- Due to large number of audiences, such massive learning is not suitable for focusing on the particular needs of each learner. Limited feedback is provided to learners on individual basis.
- New instructional design is required for assessment and promotion of interaction with the MOOCs content.
- Application of social learning is necessary to take advantage of online collaborative learning tools and to keep learners motivated.
- In spite of interactive user and discussion forums MOOCs provide, students need to use learning content as a context to engage in intellectual discussions, to debate,

to argue and to develop critical thinking skills. New methodologies of utilizing MOOCs in blended learning need to be examined.

- Students are offered continuous support in terms of guidance, mentoring, and providing instructions in traditional education. This support cannot be fully emulated by MOOCs.
- Quite a low number of students actually take assessment exams at the end of a MOOC which makes it difficult to assess whether students joining a MOOC are actually learning the content, and hence whether the MOOC is achieving its goal.

Among research proposals towards identifying significant opportunities for using new alternative pedagogical approaches that would take full advantage of MOOCs, we consider the work by [27], where authors address pedagogical opportunities and learners' choices. Some of the novel aspects offered by MOOCs in this context are given in Table 1. However, there is not much research work related to using MOOCs as a basis for developing novel teaching approaches.

**Table 1.** Pedagogical approaches [27]

Pedagogic dimension	Dominant	Emergent opportunities
Academic role	Lecturer	Instructional designer, facilitator and co-learner
Assessment	Teacher assessed examinations and essays	Automated assessment and peer and teacher validated portfolio
Teaching design	Content focused, teacher controlled, specified tasks	Learner determined curriculum with full use of open educational resources and online communities

As far as blended learning is concerned, we believe that the integration of MOOCs with classroom teaching as part of blended learning, rather than full replacement for traditional courses, will be an interesting and innovative pedagogical alternative. Research initiatives towards this issue are in very early phases [28] and little information exists on using MOOCs for blended learning.

## 5 Are Business Models for MOOCs Sustainable?

The creation of consistent business models for MOOCs is one of the most discussed issues that has arisen so far in MOOCs history [29, 30]. From the early stages of their development, commercial MOOCs adhere to what is known as 'freemium to premium' business model. This model offers core services and products to a large group of users being initially free of charge. Once a consumer base has been established, a fee is then charged for premium or advanced services and products to a smaller portion of this user base. In the context of funding, MOOCs were established by funds originating from venture capitalists, universities and foundations, which aim to generate revenues by taking advantage of the innovative approach these platforms provide.

As is usually the case for Internet start-ups, where there is no “one-fits-all” business model for the sector, MOOCs are also facing challenges on adopting business models in order to generate revenues in a sustainable manner. In addition, only few potential business models of MOOCs are proposed in literature. Recently, Fischer et al. [31] analyze the business model of Coursera, edX and Udacity by applying the business model concept of [32]. They propose this model to be used as a conceptual framework while analyzing and comparing business models in order to extrapolate a best practice business model. Belleflamme and Jasqmin [15] see MOOCs as multi-sided platforms by identifying four groups or sides that are likely to gravitate around MOOCs, i.e., students, professors, universities, and private actors. Moreover, authors describe five potential business models to monetize the value of these platforms: certification model, freemium model, advertising model, job-matching model, and subcontractor model. The most promising way that authors suggest to monetize MOOCs businesses is the subcontractor model, potentially combined with some elements from the other models. In his work of potential future business models for MOOCs [33], Kalman refers to the sale of learners’ data, advertising, and income from “superstar faculty” giving video lectures. Van Dijck and Poell [34] go further to acknowledge that the freemium model will cause a disruption of the entire educational system, also considering that it may not be long before MOOCs implement personalized ads in online educational environments and sell the learners’ data to businesses competing for global talent.

Presently, three of the most preferred motivations for introducing and offering MOOCs include charging for certificates, linking students with potential employers, and charging for additional services. Table 2 provides a broader overview of current business models by three of the most famous xMOOCs, i.e. Coursera, edX and Udacity.

**Table 2.** Variety of xMOOCs business models

Coursera	edX	Udacity
Certificate fee	Certificate fee	Certificate fee
Sale of participant data	Self-service fee	Recruiter program for companies
Sharing learners CV with companies	edX-supported fee	Sponsorships or fees for high-tech courses from employers
Secure assessments		Job match services
Training courses for employees		
Course sponsorships		
Tuition fees		
Advertisements		

Despite all the mentioned research efforts carried out towards establishing business models for MOOCs, we still lack coherent and systematic knowledge on creating a fully-fledged business model, which will overcome the uncertainties about how to monetize MOOCs platform businesses and qualify them as a valid alternative to traditional higher education institutions.

## 6 Conclusions

The aim of this paper was twofold. Firstly, it provided a SWOT analysis on MOOCs in general. Secondly, it aimed at identifying and analyzing the MOOCs challenges and opportunities from pedagogical and business standpoint. The analysis also includes the current trends of MOOCs expansion to create new educational markets for both supporting and sometimes overpassing the traditional educational institutions. Nevertheless, in doing so, MOOCs providers face challenges that need to be overcome even if partially to benefit from the foreseen opportunities of MOOCs. Such challenges include the sociotechnical aspect, since MOOCs are still not close to replicate the interaction, and community building taking place in the traditional higher education sector. As far as learning challenges are concerned, we see that learning is not customized for individual needs and differences, and feedback provided to learner is limited. New instructional designs are required to promote interaction. Social learning needs also to be promoted where students will engage in intellectual discussions, debate, argue and develop critical thinking skills. More guidance and mentoring, continuous support and instructions should be offered to learners. Furthermore, encouraging more learners to take assessment exams and when necessary understanding the reasons for learners to avoid taking exams is required. Considering the business challenges, developing business models in order to monetize MOOCs is another challenge to overcome since MOOCs business models are far from being sustainable.

Currently, as regards achieving pedagogical innovations with a basis in using MOOCs, a lot of research is underway on applying machine learning approach on building assessment techniques followed by smart and interactive interfaces. In this context, big data learning analytics is another flourishing area as the candidate for promoting pedagogical innovation.

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