Chapter 15
What (Use) is a MOOC?

Russell Boyatt, Mike Joy, Claire Rocks and Jane Sinclair

Abstract The phenomenon of the Massive Open Online Course (MOOC) has spread with amazing speed. Many universities in the USA and Europe are now joining up with MOOC providers to allow free access to courses. Participant numbers for an individual course may reach hundreds of thousands. Expectations are high for what these courses can achieve in terms of opening access, widening participation and cost saving. In this paper we conduct a literature review to examine what is known about MOOCs (both those following the original connectivist model and the more traditionally didactic variety) and what indications there are that they can live up to such expectations. We discuss concerns arising from the review and identify issues including lack of evidence, absence of pedagogy, lack of support and unrealistic expectations particularly on beginner learners.

15.1 Introduction

Despite its relatively recent appearance on the education scene, the term "MOOC" is now much in evidence in educational institutions, in the press and in the blogosphere. The MOOC, or Massive Open Online Course, offers a prospect of education beyond the confines of individual universities and organisations,

R. Boyatt (✉) · M. Joy · C. Rocks · J. Sinclair (✉)
Department of Computer Science, University of Warwick, Coventry CV4 7AL, UK
e-mail: Russell.Boyatt@warwick.ac.uk

J. Sinclair
e-mail: JaneSinclair@warwick.ac.uk

M. Joy
e-mail: M.S.Joy@warwick.ac.uk

C. Rocks
e-mail: ClaireRocks@warwick.ac.uk

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allowing free participation to large numbers of learners from any geographical location and without the need to satisfy formal entry requirements. Course participants form a network of learning in which knowledge is created and support provided not only by "experts" but by all contributing members of the learning community. Many hundreds of MOOCs across a wide range of topics are now offered by institutions worldwide and it is not uncommon for such courses to attract tens of thousands of enrolments.

MOOC momentum appears to be increasing rapidly. Recently-formed providers such as Coursera [1], edX [2] and Udacity [2] have become well-known names and are expanding fast (with Coursera and edX doubling their university partners in February 2013 [1, 3]. Other initiatives are following suit, for example, FutureLearn is a UK-based platform which has currently (March 2013) signed up 17 UK universities with delivery of courses planned to start later this year [4]. A European MOOC platform is being rolled out by the open courses initiative, iversity [5].

The idea of facilitating wider participation in learning by harnessing the benefits of online technologies, open resources (OERs), distance learning and learning communities is not new. E-learning, m-learning, the OER movement and cloud computing have all contributed to creating an environment and a technology base in which MOOCs may be realised. Further, a greater emphasis on the importance of social context and interaction has led to the development of learning theory and pedagogy in which networking plays a central role. The time and conditions now seem conducive to MOOCs and (in contrast to failed attempts several years ago [6]) the models currently being used are attracting high levels of participation.

In this paper we review the current literature on MOOCs, covering research relating to MOOC pedagogy, use and effectiveness. Given the current high profile of the topic and the way in which so many institutions are rushing to provide MOOCs it might be expected that a good deal of evidence exists to indicate the efficacy of these courses in achieving desired objectives and learning goals. However, there is as yet very little published research. In contrast, there is a large amount of material in press reports and in personal blogs from MOOC participants. In addition to considering peer-reviewed publications, this review makes extensive use of press articles, highlighting the recent developments and expectations surrounding MOOCs. We discuss issues raised by this review and consider areas for future investigation.

15.2 The Rise of the MOOC

The term "Massive Open Online Course" was first applied to the ground-breaking "Connectivism and Connective Knowledge" (CCK08) course facilitated jointly by Stephen Downes and George Siemens in 2008 [7]. The history of the MOOC is generally charted from David Wiley's Introduction to Open Education (IOE07) course in 2007 followed by a succession of courses taking a similar open,

networked approach and tackling mainly education-related topics [8, 9]. In 2012 ("the year of the MOOC") a plethora of press and online reporting testifies to an explosion of activity under the MOOC moniker [10–12]. The platforms provided by Coursera, edX and Udacity allowed universities to adapt or develop courses which could be pushed out to learners worldwide [13]. For example, Coursera currently has 62 university partners and is offering over 300 courses [1]. Young points out the startling contrast: "colleges that usually move at a glacial pace are rushing into deals with the upstart company" [13]. This has been heralded by many as a disruptive transformation of pedagogy set to spark a revolution in education [14]. However, others have been rather more cautious, pointing out problems and highlighting the fact that there is as yet little evidence for the educational benefits of a massive move to MOOCs [15–17]. Daniel [18] refers to the phenomenon as a "Gadarene rush". The rate at which universities have signed up suggests this is a movement in which no one wishes to be left behind [19] and in some cases university heads are being put under pressure by governing bodies to implement change more quickly [20]. There is much talk of the implications and "disruptive potential" for higher education [21].

A central feature of the MOOC discussion is that the term is used in (at least) two very different ways. The sense in which it was first employed refers to a specific conceptual framework of networked learning in which a connectivist approach is embodied. The second indicates a more traditional, "expert-led" course being made available on the web for open, large-scale participation. Following Downes [22], these are now generally referred to as cMOOCs and xMOOCs respectively. The differences in the two, in concept, pedagogy and practice, mean that when discussing issues relating to MOOCs it is often necessary to make the distinction clear.

15.3 The cMOOC

A cMOOC "integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources" [23, 7]. Each of the potentially many participants is responsible for setting their own learning objectives and pathways. Some structure (such as a general timeline or basic suggested learning resources) is provided but it departs from the traditional idea of a "course" in that it does not attempt to set out a fixed curriculum or even to assume that the "experts know best" [24, 25]. Through social interactions, participants share responsibility for developing the direction(s) of the MOOC, generating knowledge within the network and supporting mutual learning. Levels of participation may vary according to a learner's personal preferences, background, time and learning objectives. There is no notion that passing a course assessment represents success, with anything else being failure.

The CCK08 MOOC provided an early opportunity for learning, networking, creativity and research [26, 27, 16, 28]. Subsequent MOOCs in this tradition include Personal Learning Environments, Networks and Knowledge (PLENK) [29–31, 27]

Mobile Learning (MobiMOOC) [32–34]; Critical Literacies (CritLit) [30] and Online Education (EduMOOC) [9]. A collection of resources relating to these and other cMOOCs is provided by the MOOC Guide [35]. The abundance of resources, research and discussion relating to cMOOCs reflects the nature of a community in which technology-mediated interaction, collaborative knowledge-generation and the production of digital artefacts is central [27, 7]. There are rich and abundant online sources in blogs and forums containing a wealth of personal experiences, comment and ideas. However, far less exists so far in terms of more "formal" analysis (that is, with a clear methodology directed at exploring specific research questions).

McAuley et al. [7] use a narrative enquiry approach, providing a shared reflection on the relationship of MOOCs to issues of the digital economy and digital skills. The wide-ranging discussion highlights many features, opportunities, connections and challenges presented by the MOOC model. A number of studies have been based on the early CCK08 course, such as the survey of active participants conducted by Mackness et al. [16] to investigate learners' experiences relating to autonomy, diversity, openness and connectedness/interactivity. All four characteristics were developed within the MOOC. However, areas of tension were also observed: lack of structure and poor support led learners to retreat to more traditional, closed group working. Both a user survey and concept mapping from blogs and forums relating to CCK08 were studied by Mak et al. [28] and indicated that learners' preference for use of blogs or forums related to their personal learning styles. Forums were largely unmoderated but blogs were aggregated and distributed daily. Many users were dismayed by unacceptable behaviour in forums. In a further study based on CCK and PLENK, Kop et al. [27] investigate issues of learner support. They conclude that "creation of a place or community where people feel comfortable, trusted, and valued" is central to providing the necessary support structure for learning.

Work has also started to emerge relating MOOCs to other aspects of learning and pedagogy. Research based on PLENK conducted by Kop and Carroll [31] combined information from user surveys and data analytics to investigate creativity in learning and how this can be promoted in a MOOC setting.The need to build confidence within the learning environment was seen as critical to active and creative participation, and this is promoted by interaction with others and seeing the artefacts they are sharing. Survey information from participants of MobiMOOC was also used by de Waard et al. [33, 34] to investigate MOOCs in the context of mlearning. The two are seen as being well-aligned in that "both learning forms allow for knowledge creation to happen over time without being tied to a particular space and contexts". A further analysis of information from MobiMOOC participants considers aspects relating to chaos theory, emergence, and complexity theory [32].

Another area of investigation for any topic related to online learning and learning environments is the technology itself. Interestingly, there is as yet very little formal comparison and analysis of this for MOOCs. Sadigh et al. investigate automatic exercise generation [36]. Fini [26] considers technology from the users' perspective, using survey information from CCK08. Opinion was divided as to whether the wide choice of tools was "complete" or "confusing and too rich".

It was found that issues of time, language and IT skills were major influences on users' choice of tools with the result that "learners favoured the passive, time-saving mailing list over interactive, time-consuming discussions forums and blogs".

15.4 The xMOOC

The xMOOC model, as evidenced by Coursera, edX and Udacity, comes from the perspective of making courses from respected institutions available in mass, online mode for free and with no barriers to entry. While recognising the importance of peer support and open access, these are more in the mould of traditional university courses in which there is a set curriculum defined by experts and definite learning objectives and assessments (and possibly certification) relating to achievement of the learning outcomes [18, 9]. Learners may participate in the learning community through social media such as blogs and forums. They also share responsibility for support and feedback, for example, in Coursera's peer assessment mechanism.

Because the rise of the xMOOC has occurred so recently there is little published work so far. There is however a large amount of material in the form of newspaper articles charting the latest developments [11] and blogs giving accounts of personal experiences or reflecting on MOOC issues. This provides an interesting context, however each blog is a single perspective of one learner's experiences and newspaper articles may be little more than reports based on company press releases.

Some published studies relating specifically to xMOOCs are starting to emerge. The most comprehensive report so far comes from a Cousera course on Bioelectricity offered by Duke University [37]. Of the 3,576 respondents to the initial survey (out of about 11,000 enrolments), roughly two-thirds had at least a first degree. A similar proportion had previous experience of the topic either from formal education or their own exploration. The end of course exam was taken by 346 students, with 313 passing all course requirements to obtain a certificate. A "low conservative estimate" of 620 h of staff time is given for course preparation and delivery. Authors from other disciplines have discussed affordances for MOOCs in their areas, including Engineering [38], Medicine [25, 39] and Library Studies [40, 41].

Although many MOOCs are often lumped together under the xMOOC tag, some commentators have pointed out that there can be significant differences between them. Armstrong [42] concludes that MIT's offerings within edX, embedded in a long institutional history of online course strategy, bears the hallmarks of disruptive innovation likely to lead to fundamental transformation. This contrasts with how Coursera is currently being used by many institutions which "stick a toe into the water without making a commitment".

15.5 Comparisons and Other Models

There are obviously common features between the two types of MOOC as suggested by the shared name. "Massive" may be interpreted literally, or as the potential to reach large numbers, or as being able to reach significantly more learners than traditional means could [43]. "Open" indicates lack of barriers to joining including no formal prerequisites or fees (at least not for basic provision). However, Rodriguez [44] argues that the interpretation of openness is a main dividing point between cMOOCs and xMOOCs. In a cMOOC, openness also refers to the legitimate participation of learners at any level of involvement: an openness of practice [24] supported by "a mechanism that allows a given perspective to be entered into the system, to be heard and interacted with by others" [45]. In an xMOOC material may well be licensed more restrictively and the expert-led model means that learner interaction and input may be encouraged by some but is not central to all [44].

Not all xMOOCs take the same approach: the model can be used in different ways. Daniels [18] refers to some being "more cMOOC in approach" than others and believes that MIT's strategic xMOOC development is a move towards cMOOC methods and philosophy. However, others argue that "the two current branches of MOOCs are different and will not merge" [46]. The cMOOC ideology "emphasizes creation, creativity, autonomy, and social networked learning" with a focus on shared knowledge creation rather than knowledge duplication [47].

Whether it is possible or not for an xMOOC to be "a bit connectivist" it is likely that different visions and models of MOOC are yet to emerge. Vihavainen et al. [48] report a computing MOOC where a high degree of support is provided by current on-campus students who can themselves obtain course credits for acting as tutors. Other proposals include "enhanced" MOOCs in which payment gains the student access to extras such as more support and formal, accredited assessment [49].

15.6 Issues of Teaching and Learning

The cMOOC approach embodies a connectivist theory of learning as described by Siemens [50] and Downes [45]. Connectivism focuses on the networks of the digital age in which learning "is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing" [50]. Learning is seen as a process of identifying and making connections. It relies on "the ubiquity of networked connections between people, digital artefacts, and content" supplied by the World Wide Web [51].The emphasis on both interaction and the creation of digital artefacts shows links with both constructionism and social constructionism [51].

Some question whether connectivism is a really a new learning theory, suggesting that it is more at the level of curriculum and pedagogy [52, 53]. A number of pedagogic challenges have also been noted within constructivist MOOCs including the difficulty of forging a path in a confusing proliferation of possibilities, the need for a good level of critical skills and confidence, heavy reliance on charismatic network leaders and the difficulty of helping learners engage and maintain social presence [51, 15, 30]. Anderson and Dron note that "connectivist models are more distinctly theories of knowledge, which makes them hard to translate into ways to learn and harder still to translate into ways to teach" [51]. Tschofen and Mackness argue that diversity of personality and learning preferences (such as differences arising from introversion and extroversion) need to be further explored within connectivist environments [54]. They reflect that the question of legitimate participation may have more to do with ideology than the complex needs of individual engagement.

Whereas cMOOCs arise from a very definite ideology, the opposite is true for xMOOCs. Many show little evidence of pedagogic consideration or instructional design and display a "continual lack of recognition of the research, design and best practices that have come from earlier work on online learning" [23]. Many xMOOCs use a lecture-dominated format, lack support and feedback and employ narrow assessment methods [42]. While some MOOC providers such as MIT do have a history in elearning development, many do not [18]. It is not the case that MOOCs will be good quality simply because they come from acclaimed institutions [8]. Armstrong interviewed provosts from two institutions providing xMOOCS and found that "they were not providing any pedagogical help in the preparation of the courses (in fact, they looked confused about the question)" [42].

15.7 MOOC Issues

In recent months, a number of press articles have reported failed MOOCs and staff disagreements [55, 56]. While this may be no worse than for any other type of course it serves as a reminder that the MOOC format may raise some problematic issues.

Direction, difficulty and support

Many blogs point to difficulties in finding a learning path through a "stuff swamp", not being able to understand the material and being unable to gain the necessary support to make progress when work becomes difficult [15, 57, 58]. One respondent in Mackness et al's study said: "The reason I stopped is because I cannot understand the issues being discussed any more" [16]. In most MOOCs, the very high number of students per instructor means that it is impractical for the necessary support to come from "the centre", but peer support also founders when the material is hard: "the questions of the confused majority will not be answered quickly enough, and the faculty are too outnumbered by the 100,000 students to keep up" [58].

Attrition

MOOC dropout rates are generally quoted as 90 % or more [18, 59]. However, there are different levels of MOOC engagement [60] and many users may be happy with less active participation. There is currently little information available on why so many people drop out or fail to engage. In particular, it is unclear how many students leave because of factors such as level of difficulty, time requirements or lack of support. Without such information, it seems unfair to castigate MOOCs for high attrition. However, it also seems misleading to claim that hundreds of thousands of people are "participating" when this may be nothing more than an idle mouse click. McAuley et al. point out that with a MOOC, "filtering of participants happens after the course starts, rather than before" [7]. It may be a point of principle for MOOCs to be open, but it might be useful for courses to provide better information on prerequisites to enable users to make an informed choice at an earlier stage.

Other people

Mak et al. [28] found that "bad behaviour" put many participants off using forums. One participant stated (p. 278) that they were discouraged by "Xs appalling behaviour and XXs patronising and teachery posts and actions". Lack of moderation led to behaviour unacceptable to the majority which was reflected in participants abandoning the forums and which created barriers to connectedness and interactivity [16]. One xMOOC participant comments: "too many of the postings were at the dismal level of most anonymous Internet comments: nasty, brutish, and long" [61]. As in many online social forums, a minority do not observe etiquette which, if unchecked, can be a serious barrier to participation and learning for the majority.

Accreditation

While most MOOCs still offer no more than a badge, there is increasing focus on awarding university credit for successful MOOC completion. In July 2012 the University of Washington became the first to announce "for credit" MOOCs, for which payment is required. The American Council for Education has now passed five MOOCs as creditworthy and although the details of how exams will be taken have yet to be decided, it will involve payment [62]. It is also likely that for-credit courses will have capped numbers. It thus becomes difficult to see a distinction between this concept of "MOOC" and any other distance learning course—except that the MOOC may come with fewer instructors and less support. Concern is already being expressed that California's proposal to encourage public higher education institutions to accept MOOCs for credit could be an excuse to hire fewer teachers [63].

Plagiarism

Concerns have been raised over the level of plagiarism within MOOCs, although some point out that there is no evidence to indicate that it is any more of a problem than for traditional courses. When encountered within peer assessments, it is demotivating for students who find it and who feel that the platform does not

provide suitable mechanisms to deal with it [64]. The major xMOOC platform providers are making provision for measures such as identity checking and examinations held at formal centres. This also relates to issues of accreditation and cost.

Sustainability

It is not yet clear how MOOCs will make money. Coursera has set out a list of eight possible sources of revenue which includes payment for certification and optional extras [18, 13]. Universities are currently working "in the hope and expectation that well be able to build a financial model" [19]. Some are using MOOCs to recruit for traditional courses. Sustainability also relates to issues of staff input. Many staff have been giving large amounts of their own time to produce and run MOOCs and some are refusing to continue with MOOC involvement unless the time spent is reflected in their workload [65].

15.8 Discussion

In contrast to the burgeoning number of MOOCs and press articles, there is a striking lack of formal published research, and currently the answer to many questions regarding MOOCs is "we just don't know". This points to the need for more research and evaluation. MOOCs are already providing exciting opportunities for many, but some of the current expectations are speculative at best. As demographic information from previous courses indicates, the promise of opening up opportunities to new constituencies of learners is not yet being realised. It would of course take time and it may be said that it is too early to see the true effects of MOOC openness. The co-founder of Coursera, Daphne Koller states: "What we're doing is one instructor, 50,000 students. This is the way to bend the cost curves" [13]. This may be a good way to provide information for those capable of absorbing it, and may be just what budget-holders want to hear, but there is no evidence that it is suitable for all (or even most) learners. Martin asks "how can we intentionally direct ourselves toward learning something new, when we necessarily do not yet understand nor are we even able to perceive the very thing that we seek to know?" [66]. Beginners often need a good deal of support and those with lower levels of motivation, confidence and skills are likely to require even more. However, in some areas, lower-level courses are being targeted as particularly appropriate for MOOC delivery: the proposed solution to overcrowding in Californian community colleges "would only include popular, introductory courses, which are often overbooked" [63].

Current MOOC models have been criticised for not addressing individual learning needs. In order to reach wider demographics, pedagogy is required which encompasses individual styles and preferences and which can provide targeted support for specific needs. One possible avenue is building greater adaptivity into xMOOCs. However, building adaptive courses is generally acknowledged to be a very difficult enterprise and does not replace personal support and feedback.

15.9 Conclusions

MOOCs (c, x and other) are already opening up opportunities of which many learners are taking advantage. Just like any other course, a MOOC might be "good" or "bad" not because of the platform itself but because of the set-up, the skill of the facilitators, the suitability of the pedagogy and the objectives and capabilities of the learner. To evaluate whether an endeavour is achieving its aims there needs to be a clear idea of what those actually are. This is likely to differ for different roles and individuals involved, and at the moment, is often very unfocused at all levels. Some institutions and staff do not appear to know why they are engaged in MOOC activity apart from a fear of being left behind or that they have been told to do it.

Even for MOOCs which are not intended to be expert-centric, the structure, support and direction provided by those who set up and facilitate the course can be crucial to successful learning. Providing (or pointing the way) to good quality, open learning materials is a first step and may for some be the key needed to unlock the educational door. However, for many, the leap to joining the learning ladder may currently be too great. There is a danger that the "openness" on offer hugely privileges those who already have the skills and the "right" approach to learning rather than representing a true democratization of education.

Frequently, learners' comment about the need for support, and staff note the large amount of time and effort required to provide even the current levels on offer. There seems to be a discrepancy between this and the expressions of hope that MOOCs can meet the need for mass education and solve cost problems at the same time. While the financial debate continues, we should be cautious about regarding MOOCs as a "cheap option". There is a danger that MOOC-learning may not be viable for all and yet resources are channelled towards them. MOOCs are also not a cheap option in terms of learners' time and, although the opportunity and flexibility offered is to be welcomed, learners need to have realistic expectations of commitment.

The rush into MOOC provision means that much activity is going ahead without due attention to appropriate pedagogy and little or no attempt at evaluation. Obviously it is still very early days, but the speed with which institutions are joining the MOOC rush is in stark contrast to the lack of evidence of their effectiveness, or even a real understanding of what that would be. Pedagogy is needed to organise effective learning for possibly thousands of students with a single facilitator. As argued by Hill [67], the current xMOOC can be seen as challenging the status quo but the format for transformation of higher education may have yet to emerge.

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