THF Working Paper

MOOCs DEVELOPMENT AND IMPLEMENTATION

The Challenges and Prospects for Higher Education in Emerging Countries

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Abstract

The MOOC (Massive Open Online Course) phenomenon has grown extensively since its humble beginnings among Open Courseware and educational experiments. Now universities can no longer ignore this expanding facet of e-learning and are faced with the decision over whether or not to embrace this method of teaching and learning. However the decision to develop MOOCs becomes increasingly difficult if the home of the university is an emerging country. This literature review explores the development stage of creating MOOCs, by reviewing current trends set by universities and MOOC hosting platforms predominantly in more economically developed countries. It assesses how developing MOOCs using previously tried methods could pose challenges for emerging countries and what prospects there are for MOOC development in these regions. Following this there is an evaluation of MOOC implementation methods, focusing on current methods used around the world, how implementation may challenge emerging nations and how future prospects may develop. Before concluding the paper speculates as to the future development and implementation of MOOCs in emerging nations.

Introduction

From the introduction of the World Wide Web to the advent of e-learning, information technology continues to impact on learners' access to information for knowledge and skills acquisition at all levels. Widening participation in higher education has now become a reality. In recent times we have seen MOOCs evolve to become a favoured approach to learning and studying. This has been rolled on to universities worldwide where learners are able to engage and benefit from the teaching of acclaimed teachers and respected academic authorities located at universities anywhere in the world. Recent studies and statistics show thousands of students enrolling on MOOCs despite some of the challenges that face both the teachers and learners. Some of the previous work of one of the author's, Uhomoibhi, [1] reported on the digital divide in education and the need to address some of the issues identified. Recent presentations [2,3] gave detailed treatment of MOOCs in relation to connectivism and the recognised shift in pedagogy with reference to the way in which MOOCs are taught and the way students learn. In this era of globalisation, irrespective of where teachers and students are situated, the expectation is that education provided by higher education institutions are the same, culminating in the award of undergraduate (bachelors) and postgraduate (masters, doctorate) degrees with the expectation that the graduate be fit for purpose to be employed in the world of work. In this paper we report on the current trends in the development and deployment of MOOCs. Focusing on emerging countries, we examine availability of resources, the technology involved with the development and implementation of MOOCs and report on challenges and prospects for the future.

Developing MOOCs

Before MOOCs can be rolled out in any part of the world, they must first be designed. Currently there are two distinct schools of thought when looking to design a MOOC. The xMOOC, made famous by the large MOOC platforms such as Coursera, focuses mainly on teacher-centric teaching[2] and learning styles while the cMOOC, the methodology that started the MOOC phenomenon in 2008[4], bases its teaching and learning style on connectivism. In both cases there are aspects of development that need to be considered. These are:

Technology

Selecting the appropriate level of technology to use can be a balancing act. For example, while the use of high-definition video and audio may make for a more engaging learning experience, it may also limit participation to those with access to sufficient bandwidth to view them.

Pedagogy

The style of learning used in a MOOC is an important part of the MOOCs development. If connectivism is to be used then the method of assessing learning outcomes must be adaptable and more fluid, due to the more freeform nature of connectivism. However if a more teacher-centric method is used there is the risk of complete dropouts from the course, rather than lurkers (colloquially referred to as MOOC-Spooks)[5].

Finance

The area of finance is something that can easily be overlooked when caught up in the decisions over technology and pedagogy, however this aspect is important in the development of a MOOC as this can dictate how the MOOC is run. For example if the MOOC uses video lectures will they be shot using a professional team or by the lecturer running the MOOC and any team they have available. Each option will, unsurprisingly, cost a different amount and it is this variation in cost that a university must review before embarking on a MOOC.

Each of these areas is a critical aspect in whether a MOOC design will be successful. Without addressing each of these key issues a MOOC runs the risk of falling flat before it has even started.

Developing MOOCs in emerging countries: The challenges

The number of potential challenges, facing a university in the development stage of their MOOCs can prove to be difficult to overcome. This is also apparent in emerging nations, who may have pre-existing difficulties hindering their MOOC development.

The first issue that becomes apparent when developing MOOCs is the technology required. The key area of difficulty for an emerging nation is the potential issues with Internet connectivity. Within sub-Saharan Africa there is a drive for technology based learning but this is hindered by intermittent Internet connections with low bandwidth[6]. In the development stage of the MOOC these technological issues must be reviewed before a course is designed.

The choice of pedagogical method to use within a MOOC further affects the technological challenges faced. If a university is to design an xMOOC they will require the ability to host videos and potentially other media content, placing a premium on storage capacity. However if a university is going to design their MOOCs using a cMOOC template, there is much less to host centrally, as much of the course material will be generated by the students and hosted on other platforms, such as social media and personal blogs[7]. On the other hand the connectivist nature of the cMOOC requires those running the MOOC to be online fairly constantly during the duration of the course, which could cause issues if these teaching staff do not have reliable Internet connections.

This then leads to the question of pedagogy itself. There are potential challenges for universities if they follow a connectivist route in their design. Studies from already developed MOOCs show that students learning with a connectivist model can find the learning experience confusing[8]. Furthermore they can find the autonomous learning challenging and the large amounts of information created for the MOOC impossible to navigate. This could lead to difficulties in certain cultures in emerging countries which focus more on traditional teacher-centric models of learning. For example within India's guru-shishya tradition of music, the student literally sits at the teacher's feet and learns through unquestioned information given to them by the teacher[9]. A further example of teacher-centeredness in a developing nation can be seen in van Putten, Stols and Howie's case study of a teacher in South Africa; despite her deprecation of teacher centric learning, her teaching style remained predominantly teacher centric[10]. As such even in cases where student centred learning is believed to be encouraged, there is still a possibility that this belief is not being turned into solid actions. This in turn could lead students to difficulties when undertaking MOOCs, due to the autonomous and questioning nature of connectivism, if they have been traditionally taught using a teacher-centric model.

A further issue is the cost of building a MOOC in the first place. in developing their own MOOC hosting platform MIT and Harvard University in America jointly funded the project with $60 million[11]. The individual courses hosted on such a platform then incur further costs; the University of London have stated that the development and running costs of just one of their MOOCs was in the region of £10 000[12]. These development costs run the risk of prohibiting universities in emerging nations from engaging with the MOOC phenomenon as anything more than consumers.

Developing MOOCs in emerging countries: The prospects
Although there are challenges facing developing nations in developing MOOCs, these challenges can be seen as opportunities to be innovative with their e-learning designs and practices.One area which could be assumed to be a barrier to MOOCs in emerging countries, i.e. technology, could be the first step to innovation.

In many emerging nations, where limited infrastructure presents a barrier to Internet access for many, the mobile telephone can provide access for those with no landline or even electricity at home, Stork, Calandro and Gillwald[13] stated that it is now the key entry point for Internet use in Africa. This provides an incentive to design

MOOC course materials for accessibility via smartphones and, if possible, their lower-spec cousin the featurephone[14]. This is not a new idea in e-learning - as early as 2001, Ring[15] suggested splitting web-based course material into smaller pages suitable for viewing on mobile phone screens; however it has yet to be widely applied to MOOCs. It could be argued that the cMOOC, relying less on audio-video content than the XMOOC, might be more readily adapted to the limited display space of such devices. Innovative techniques developed to aid phone-based learning could help increase MOOC accessibility and uptake not only in the developing world but, if applied more widely, among Western MOOC providers as well, enabling learners in developed countries to more easily access learning without location restrictions.

Another area where adversity may spur innovation is cost. While xMOOCs such as those developed by the University of London generally require large sums to develop and run, there exist successful MOOCs that cost a tenth of that price. Evidence for this can be seen in the successful cMOOC known as MOOCMOOC which was developed by Jesse Stommel and Sean Michael Morris, for the sum of $1385[16]. Whilst this is still a cost, a university in an emerging nation could in theory design ten cMOOCs for the price of one xMOOC. This would then suggest that in order to keep costs achievable the pedagogy most likely to succeed in emerging nations is connectivism and the cMOOC. This may provide a spur to further pedagogical innovation as universities in developing nations seek to address the difficulties of cMOOCs described above in order to take advantage of the lower costs due to active student participation and content creation and curation.

The MOOC brings other benefits besides a lower cost. Firstly, the cMOOC focuses on connecting students as "nodes" in a learning network[17]; however the dialogue which the connectivist model requires to develop in order for learning to occur, need not all happen at once. For example, rather than a course's entire userbase needing to converse at once via fora and other connected media, smaller groups can connect at any given time (when Internet connections are available), with conversations at the overlapping boundaries of these groups providing the wider dissemination of discussion and ideas.

Another benefit is a potential reduction in the need for centralised storage and distribution of large amounts of data. Most cMOOCs tend to be (though not exclusively) more text and image based than their more media-heavy xMOOC cousins, the latter being largely based around videos. While users must still download course material, the size of each download is potentially reduced from a large video file to that of a text or PDF document. What is more, much of the course material will be hosted in locations other than the course's central site, for example on social media and learners' own blogs[7], reducing the storage requirement for the course's host organisation's own systems, and the impact should the central site be periodically unavailable.

Further to this, although there may be countries which maintain a teacher-centric model of education, there are progressively more countries moving to a student-centred learning model. This is seen around the world from countries as diverse as, Uganda (Africa)[18], Peru (South America)[19], Malaysia[20] and Indonesia (Asia)[21], to name but a few. With these changes to predominantly

Problem Based Learning (PBL), the use of cMOOC becomes less of a pedagogical upheaval for the students of these regions. Whilst there are differences in the two pedagogical methods of PBL and connectivism, key principles such as group collaboration and independent study are both paramount in the learning process[2]. This would then suggest that, were a university to develop a cMOOC model, there is theoretically a lower risk of these connectivist model MOOCs alienating the target demographic.

As such whilst there are challenges for an emerging nation in developing and designing their own MOOC courses, this should be seen not as an impediment but as a chance to think outside the box. By embracing different learning styles and adapting to available technology, universities of emerging nations potentially have the power to create successful MOOCs.

Implementing MOOCs
Once a MOOC has been design the next step is to implement it. There are many routes to take when implementing a MOOC, depending on each step of the design phase. Questions must be asked, such as 'will this course be attracting hundreds or hundreds of thousands of people' or 'what level of interaction will teaching staff have with the MOOC and its students'. There is also the issue of whether to running the MOOC as an independent organisation (such as MOOCMOOC), or to place the course on the platform of one of the big MOOC hosting organisations such as Coursera, Udacity and similar.

Technology
If a university is to go it alone, so to speak, there are critical areas that must be reviewed at the implementation stage. These are:*Technology* If the course is to be hosted on the university's own systems, careful consideration must be given to the likely number of concurrent users and how they can be supported. One approach might be to consider optimising the course to reduce per-user resource requirements. If hardware is to be purchased specifically for hosting the course, capacity-planning methods such as Transaction Cost Analysis(TCA)[22] could also be used to tailor the system specification to the expected requirements of the course.

Management of the MOOC
A MOOC cannot run itself and the maintenance and support course needs to be planned and budgeted for. The amount of time and funds required will depend on factors such as pedagogical style, for example a text and student input heavy cMOOC could require more man hours to successfully support the learning process.

Accreditation
The decision to accredit a course is also an important issue at the implementation stage. If such as decision is taken this leads to further decisions as to proctoring methods for examinations and what weighting the accreditation will take.

Implementing MOOCs in emerging countries: The challenges
The areas for consideration in the implementation of MOOCs as laid out in section 3.0 are equally valid for emerging countries. However, as with development, there are implementation challenges faced by universities in emerging countries that would not of necessity impeded universities in the developed world.

   Technology can prove to be particularly difficult for universities in emerging countries. In one particular online program in Cape Verde, Africa, the students had to often switch from internet-based correspondence and use phone and mail based method instead due to the poor connectivity[6]. This can easily be seen as a problem when dealing with Massive Open Online Courses, while although connecting with a handful of students via the telephone is possible, connecting with 161 000 is less viable.

   A further challenge when reviewing MOOC implementation in emerging countries is to look at who exactly will run the MOOC. Within the MOOCs developed for The University of London, they had staff available to cover the time required to run their MOOCs[12]. However this university were able to set aside time in their teaching staff's timetables to support the MOOC without it being detrimental to their pre-existing roles. The development time for a MOOC can take over a hundred man hours, and in some institutions this is often expected without additional time being allocated within the working day for the task[23]. This could be draining for any teaching academic; in emerging countries this could prove almost impossible. The reason for this is lain out is several studies that show evidence that academics in developing countries struggle under the requirement to teach, research and publish within universities that are often underfunded and under-resourced[24]. With both types of MOOCs taking hours of maintenance each week, even after production[23], it is possible to argue that teaching academics from emerging nations do not physically have time in the day to undertake all that their job requires of them while successful running a MOOC.

   The subject of accreditation, and whether MOOC can ever be valued the same as their paid-for counterparts, is a topic of much discussion. There are certainly many who think that accrediting MOOCs will not work, including the co-founder of Coursera Andrew Ng[25]. In one interview he is quoted as saying that MOOCs will not ever bear the same weight, as qualifications, as degrees achieved at a brick and mortar university. Further to this the majority of academics teaching MOOCs believe that these courses should not merit course credit[23]. With either no qualification or credit at the end of the course, or any qualification gained through MOOCs being regarded as a lesser qualification, this raises questions as to the importance of implementing MOOCs. Whilst some universities are willing to offer examinations and course credit following MOOCs, such as the case detailed in Fini's study[7], this is still a rarity. Where proctored examinations and identity verification are used, such as Coursera's signature track system (https://www.coursera.org/signature/guidebook), this also comes at a cost. Whilst those in the developed world may be willing and able to spend extra for an accredited qualification whose acceptance by employers is uncertain, students in emerging nations do not of necessity have this luxury.

Implementing MOOCs in emerging countries: The prospect
Whilst there may be difficulties in introducing MOOCs in emerging nations, there are a number of ways to simplify the initial introduction of these online courses. One possibility would be to use a two-phase approach, with the initial phase being to promote students following existing MOOCs from Western providers, while investigating the key benefits and difficulties encountered by local students engaged in these courses. The findings of these investigations could inform the second phase, wherein universities in the emerging nation use the lessons learned to implement their own MOOCs tailored to support the specific needs of the local population. At this point students and lecturers in the emerging nation would have the advantage of being able to choose between acknowledge courses run by large Western MOOC providers and more tailored MOOCs run by their home country's universities.

A possible route by which to approach MOOC accreditation might be via partnerships between MOOC providers and academic institutions or other accrediting bodies, whereby MOOC completion might not carry course credit per se but instead entitle the student, if desired, to pay to sit a proctored exam accredited by the institution. While still costing money, this could be an attractively inexpensive route to the qualification compared to a residential course; while the institution could benefit both from wider exposure and from a larger student throughput without the requirement to expand their physical campus.

The partner organisation need not necessarily be an academic institution. Other possibilities include NGOs - for example first-aid MOOCs accredited by the Red Cross or Médecins sans Frontières - or professional bodies. As an example of the latter could be if the BCS (British Computing Society, The Chartered Institute for IT) were to partner with a local organisation running MOOCs which, when taken in combination, covered the topics on the syllabus of one or more of their accredited qualifications; while the MOOCs would not themselves confer a qualification, the two organisations could co-operated to run proctored exams which could be accredited. If the partnership were to be agreed at the course planning stage, the MOOC course material could be produced in collaboration between the two organisations, ensuring that the topics were covered to a level acceptable to the accrediting partner.

Examples of these are the various BCS [26] qualifications, which can be taken as multi-choice questions online or via conventional examination at centres in many different countries. Examples of the latter are the BCS Certificate, Diploma and Advance Professional Diploma qualifications which are approximately equivalent to the first, second and final year of a computing degree course. The author, Ross, prepared successfully, by distance learning, students including those in Africa, for all of these qualifications. Further examples of the multi-choice style of courses are the ICDL (International Computer Driving Licence) or ECDL (European Computer Driving Licence) aimed at competent IT users. There is a selection of Foundation certificates aimed at particular skills or tools and are usually taken by those in employment or potential employment which are relevant to the particular qualification. The majority of these are based on on-line multi-choice questions. Examples of these BCS

Foundation qualifications include Business Analysis, Testing, and Service Management.

An additional benefit for the use of pre-existing MOOCs in the early stage of development is that of accreditation. With most MOOCs not holding any actual qualification at the end of the course, this runs the risk of students in emerging countries not engaging with these courses in favour of credit bearing modules. If however a MOOC was taken not as a contained course, but as a learning tool to assist with the learning required for a worldwide recognised qualification, this could diminish this possible issue. This could then assist universities in implementing their own MOOCs to mirror the syllabi for examinations run by the BCS and other partner organisations.

With a stepped introduction, and the formation of collaborative partnerships with professional organisation and NGOs, universities in emerging nations would have the opportunity to test and retest their ideas on providing culturally appropriate MOOCs without, of necessity, committing to large expenditures of capital and man hours at high risk. As such this could theoretically be a practical way to introduce MOOCs within an emerging country.

Conclusion

When a university in an emerging country begins to think about MOOCs, there are many points that could prove daunting, from finance to staff workload, however there is also great promise. MOOCs could potentially lead the way to assisting students to gain meaningful qualifications, such as those as the administered by the BCS. In doing so this stepping stone into the world of MOOCs could prove a solution to many of the difficulties that potentially obstruct universities developing their own MOOCs. By reviewing and adapting the teaching methods of pre-existing MOOCs to suit their local populations, universities in emerging countries could begin to produce their own MOOCs without falling into pitfalls of technology, pedagogy or finance.

Note

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