MOOCs: The Final Frontier for Higher Education?

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Due to the global economic downturn, we are living at a time of economic uncertainty and high unemployment, therefore the need for individuals to upskill themselves to become more employable is critical for ensuring local, regional, national and international social stability and economic regeneration. As a result, lifelong learning has become a more significant aspect of how we learn and when we are able to learn. At the same time, growing availability of broadband and the digital revolution have opened up new forms of learning content delivery: for example online learning opening up ready access to digital content and more recently mobile learning allowing us to change where we learn - anytime and anywhere. This more flexible learning - or new learning - has revealed benefits for learners of all ages and importantly access to education at all ages and stages of their lives.

Against this backdrop, the renewed importance of individuals at all ages of their lives to learn new skills and information, whether at work, home or in study is undeniable. Particularly in fast changing environments where new digital interfaces from mobile to augmented reality appear in our bags so rapidly. But as the pace of life is speeding up so to our need to hold on to meaningful and long lasting learning experiences is becoming more pressing. To allow us to find new ways to fit learning into our lives and capitalizing on the open access paradigm, distance learning has become web-based and social online learning communities have grown in number. As part of this evolution, online learning has a new reach and audiences that no longer need to pay to access to university notes and can find any resources they need to support learning just by a touch of the screen.

Whether this access to digital online content is used to help clarify a difficult idea while studying for a GCSE, or to provide additional explanation for a particular concept while undertaking a graduate degree or indeed if it is to learn a specific soft skill for work, accredited only by a Mozilla Badge, access to open educational resources can be a timely aid for supporting formal and informal, work-based and personal learning tasks. This more flexible learning importantly opens up the possibility of improving valuable soft skills such as decision making and negotiation and can improve employability in a fast changing global environment, but equally it can extend our knowledge base and support pleasurable learning experiences. As part of this more fluid and dynamic model of learning, Massive Open Online Courses - or MOOCs - have emerged. They have the capability to become a significant part of how we learn in the future as they offer a scalable and flexible model for how online learning may be in the future: filling in gaps in formal education, supporting opportunities for upskilling and drawing in new independent learners who may never attend tertiary education otherwise. But while the emergence of MOOCs sounds like the answer to all our issues of widening participation and accesses a new and massive international audience, questions remain as to whether this emergence will be an addition to the higher education sector or whether it will be a threat.

This report aims to observe the current literature around MOOCs and present some case studies that focus upon the history of MOOCs, the current research base and reflect the main themes emerging. While we have seen many threats to higher education: from film to television, radio to the internet, the full capabilities of multimedia presentation have never really managed to permeate the infrastructure of tertiary education to lead to any major reorganization of the sector. But is online learning different? Can MOOCs replace formal education in universities and what can we gain from bringing more flexibility and scalability to our education system?
MOOCs derive from a relatively recent emergence of distance and online learning services, access to broadband connectivity, the dominance of mobile portable technologies and a fast changing socio-economic environment. Together the environment provided an opportune moment for learning to become digital and for social communities to begin to develop to the extent of forming large numbers to access high quality previously inaccessible course notes and materials. But mere access is not always enough for open educational resources (OER) to be effective, the MOOCs model integrates course structure with interactive and engaging course content and stimulation, the use of mini games for example is commonplace.

But when Fathom.com was first launched in 2000, as an open learning platform led by Columbia University with libraries, museums and universities joining together, it was unclear how the development of MOOCs might progress. But just over a decade later, MOOCs have become the new buzzword in education.

While MIT CourseWare really led the way when they evolved the idea in 1999, it is the recent emergence and success of Coursera and EdX that have led to a real drive for collaboration across the university sector to get involved and share the benefits of large student numbers although with no direct financial benefits. This business model had led to the rapid demise of Fathom.com, so how universities can make financial returns for the investment in this economic climate remains to be seen. To address this longevity issue and the need to address it through formulation of new business models and attracting economic investment, different approaches have emerged, partly influenced by the Open Educational Resource (OER) movement.

But notably, the majority of these new initiatives have come from the United States, where paying for education is an established norm. In Europe and the UK paying for fees is a recent or partial offering in the higher education sector. While the UK has adopted this approach for funding higher education recently, the approach has been a notable barrier to uptake of online education outside of the United States, as the need to scale up education due to rising course costs has not been experienced so deeply outside of the United States. For example, a recent report in the UK revealed that:

- UK online distance courses are typically postgraduate professional development or vocational courses delivered in partnership between a higher education institution and a specialist provider and often enroll students from the UK and internationally (Universities UK, 2013, p. 4, quoted from White et al., 2010).

While '[i]n the US, growth in online education has been stronger and there are now over six million students taking at least one online course, making up nearly a third of all enrolments' (Universities UK, 2013, p. 4, quoted from Sloan Consortium, 2010).

The emergence of MOOCs looks set to reverse this situation, and rising growth in online learning is expected in Europe, to meet challenges of growing student numbers as well as meeting higher demand for vocational and lifelong learning in specialist areas. A particular concern in Europe is the growth of unemployment in the 18-25 year old age bracket, which is causing social issues and could cost Europe dearly through the inevitable 'brain drain', costs of unemployment and associated increased crime statistics. The use of online learning delivered for free offers a possible solution for this, by allowing students to upskill in specialist areas and gain higher qualifications in highly competitive areas of employment.

Looking back, early online course delivery had started already by 1994 (Hill, 2012), and was followed by a general uptake of learning and content management systems, such as Blackboard, WebCT, and later Moodle. But many of these early virtual learning environments were rather more repositories for digital
content than pedagogically driven learning tools. While these mechanisms made online learning and distance education easier to deliver, issues around the pedagogic meaning of 'learning objects' and reuse of content failed to really ignite excitement in teachers and tutors, who preferred to develop their own content, and deliver it in modes that they were more familiar with. However, its scalability and cost reductions, coupled with student monitoring capabilities made them the flavour of the month for a long time. But gradually online learning capabilities and e-learning or technology enhanced learning as it came to be known were developing, often in the training and professional development area of university activities, and often fairly task-centred and coming out of CBT or computer based training which used fairly linear and often text based approaches to information presentation punctuated by quizzes and online activities.

The main breakthroughs in the field of e-learning however came with the growing research base, a large body of studies was beginning to find 'no significant difference' when comparing e-learning and traditional learning courses, and the number of studies with this finding was enough to fill a book which listed them and became known to those in the field as the 'No Significant Difference Phenomenon' (Russell, 1999a; 1999b). But while many of us thought it strange that this very significant finding was being ignored by the tertiary sector, in the United States inroads into its use and deployment were being driven by economic factors.

As extraordinary as this was, new studies were revealing that blended learning was significantly different and more effective than a single approach which used only face-to-face or online learning modalities. Wind forward a decade, and by 2010, a third of post-secondary US students had studied on at least one online course (Hill, 2012). Furthermore, a recent US Department of Education report (Mean et al., 2010) has found that in its recent meta analysis of comparative studies between online and face-to-face learning, again online learning was found to be at least as effective as face-to-face learning, and blended learning approaches that combine face-to-face and online modes, are considerably more effective than one or other used solely.

Understandably, this report has been widely cited and helped to accelerate the pace of uptake of online learning, at least in the US initiatives. So while it took about a decade for the penny to drop in the US the momentum for online was established and just two years after this report, in 2012, the emergence of MOOCs has transformed the debate.

Most significantly, it has opened up strategic discussions in higher education cabinets and boardrooms about online education (Hill, 2012: 84).

The transformational power of MOOCs has notably received backing from top international universities, investment including venture capital has also been forthcoming, and even strategic backing from politicians has been provided. MOOCs are seen as a potential 'saviour' for tertiary education and its focus upon campus-based education, traditional methods and less sustainable face-to-face teaching methods. While no one is doubting the success of traditional methods, these are costly to deliver, are not very scalable and rely upon an inherent élitism in that small numbers of learners are optimal. However in an environment of open access, growing student numbers and lifelong learning, it is clear that alternatives are required for supporting sustainable and increasingly global education, with this in mind 'access, affordability and personalized learning' are central drivers in the new education debates (Hill, 2012: 84).

It has to be said that the Americans have pioneered most of the early examples of MOOCs, and for whatever cultural reasons that Europe and the rest of the world has been resistant in general to wide scale uptake of e-learning and online approaches, as a result of this until recently many of the early examples are US-based.

The earliest examples of MOOCs were started in 2007-2008 via open online courses. One course was designed and delivered by David Wiley at Utah University: Introduction to Open Education course and the other was produced by Alec Couros at the University of Regina: Social Media and Open Education. They used open wiki technology to deliver their content. The term MOOCs was originally coined by Alexander and David Cormier
when they referred to the famous course developed by Stephen Downes and George Siemens: *Connectivism and Connective Knowledge*. These MOOCs would come to be labelled cMOOCs.

However, the Stanford University type of MOOCs, known as xMOOCs have created more international media attention. In particular, the course: *Introduction to Artificial Intelligence* by Sebastian Thrun and Peter Norvig in 2011 has really ignited this new branch of MOOCs. The attention was attracted by the large number of subscribers to the free course: 160,000 enrolled for the course. The type includes: a web home page, is based upon a learning management system that can be customised and includes lectures and assignments. Thrun left Stanford to set up Udacity (http://www.udacity.com/us), a for profit provider of MOOCs. Similarly, Coursera - another provider (http://www.coursera.org) - was started up by other Stanford Professors who could see the commercial power of the form. Not long afterwards, MIT and Harvard announced their $60 million funding of *not for profit* EdX (http://www.edxonline.org). See Figure 1 for history overview.

![Figure 1: History of MOOCs. Taken from P. Hill 2012.](image)

### 2.2: PEER-LED AND SOCIALLY COLLABORATIVE

Even though when studies comparing e-learning with traditional modes of learning generally found ‘no significant difference’, the online learning project was often regarded negatively and in particular early computer based training (CBT) programmes were regarded as being inflexible and not very interactive. Despite this, blended learning approaches – that combined face-to-face and online modes of delivery – were broadly championed as they didn’t suffer such low retention rates.

Despite resistance, online learning has been used widely in universities for over ten years, and though platforms like WebCT and Blackboard were restrictive and limited in terms of functionality and access to content, the growth of online learning has accelerated. Because of this, the project cannot be seen really as a failed one, particularly in the US where, since 2002, when less than half of colleges and universities polled regarded online learning as critical to long-term strategy, and yet today that figure has increased to almost 77 per cent (Allen & Seaman, 2013).

But learning in MOOCs differs from early CBT approaches and is becoming more collaborative and is often peer-led, which may over time have an impact on increasing retention rates on purely online courses. As the
The prime audience is the non-formal learner. It is the sector’s real threat to the development of MOOCs. Accreditation remains the most critical factor in retaining or transforming the current status quo in higher education. When we begin to see an unravel we will also see the real threat to the sector. Accreditation is still the main separating point between universities and private training providers and while it is thought these markets can coalesce together in perpetuity as they are currently serving different markets, the blur between markets could increase significantly with MOOC development over the next five to ten years. Whether this means the demise of universities as we know them seems highly unlikely though, as universities will adapt and change to the new organisation of learning provision and delivery. But as a sector in need of reinvention in the light of the digital age this process is not likely to be painfree.
The bottom line is that we are just touching the tip of the iceberg in terms of how immersive learning experience can be in the future, and we are just beginning to learn after a decade or so how powerful online learning will be in the future. While there are clear threats to our universities as we know them now, the opportunities in terms of how much better and more inclusive learning experiences will be in the future is surely worth overcoming our self-imposed barriers and starting to explore in a positive, creative and open way. At the heart of it, we would all want our children to be able to go freely anywhere, to learn through experience and doing, allowing for creativity and imagination, extending their horizons to a global scale. Online learning is one of many tools that can facilitate that, but the importance of learning design and experience design, multimedia presentation and engaging narratives will become more central in how we mediate more interactive and peer-led learning (de Freitas, 2013).

### 2.3: DIFFERENT MODELS OF EDUCATION DELIVERY

Phil Hill in his insightful Educause article outlines seven models of delivering e-learning and online content worth reproducing here as they give an indication of the varied provision available and highlighting some of the inhibitors with their selection. This is useful for those considering implementing MOOCs and other online learning in their higher education institutions and provides some examples that can be studied further (see Figure 2):

- **Ad hoc online courses and programmes**, which are often difficult to scale;
- **Fully online programmes**, which focus upon a ‘master course’ that can be delivered by different instructors and are usually part of a ‘for profit’ offering. In the formal university setting this approach has been viewed with skepticism, leading to an approach to set up a separate organization to administer this approach. The University of Phoenix is an example of this approach (http://www.phoenix.edu).
- **School-as-a-Service** is another approach to getting around the traditional learning / online education conflict. This approach is where universities outsource online learning development choosing from a growing array of ‘for profit’ organizations that can create master courses and recruit large numbers of students. Organizations such as Pearson (http://pearson.com), Academic Partnerships (http://academicpartnerships.com) and Deltak (http://deltak-innovation.com) are examples of this model. The advances for universities are that they do not get too involved in the content development, but issues around IP and quality need to be considered.
- **Educational Partnerships** involve partners internationally using shared content. The best example of this model is the well established Cisco Networking Program (http://cisco.com/web/learning/netacad/). Here a worldwide cadre of instructors teaches students using the same materials and content. The model is very scalable, there are currently 1 million students on the course in 165 countries via 10,000 partner institutions. The program is a non-profit educational program and focuses upon industrial accreditation.
- **Competency-Based Education** is a relatively under-used approach pioneered by the Western Governors University (http://www.wgu.edu). It focuses upon outcomes and models learning experience around those. Its more vocational in nature and offers flexibility for students who can learn at their own pace.
- **Blended/Hybrid and Flipped Classroom models of learning** combine traditional face-to-face with online modes of delivery. The flipped classroom transfers the traditional lecture to outside of contact teaching time and into online learning contexts. This allows the tutor to focus upon higher cognition development during contact time. One well known example of this approach is the Khan Academy (http://khanacademy.org) which holds over 3,400 videos. While the program has focused primarily upon mathematics education this is set to change with new investment gathered.
MOOCs are the most recent category of new course delivery approaches. The approach transforms the idea of the 'master course' with its duplication of core course materials towards a more flexible centre to the course. The courses are generally massively subscribed to, are offered on LMSs and include interactive content and assignments. While the format of delivery is transforming the potential of higher education, issues with high attrition rates, quality of delivery of content and pedagogic rigor have been debated in the literature (e.g. Allen & Seaman, 2013; Glance et al., 2013). Recorded lectures can vary from 3 minutes to 30 minutes. In xMOOCs, course work is generally computer marked, and direct tutor feedback is unusual except in discussion groups and fora where teaching assistants and tutors may respond to queries (Siemens, 2013). In cMOOCs, there is an emphasis upon learner autonomy. As Siemens describes:

As a consequence of increased learner control, numerous tools and technologies are used during the delivery of an open course. Each learner selects the technologies that he or she prefers to use. Course facilitators provide: an infrastructure for content and administrative details (in the form of a wiki or a Web page); a schedule for synchronous sessions involving guest speakers or live discussions; a means of communicating with participants and providing course updates (often handled through email and blogs); and starting points for learners to form connections with each other (a learning management system such as Moodle) (Siemens, 2013: 8).

Quasi-MOOCs such as Khan Academy offer open educational resources but are not courses per se.

Figure 2: Educational Delivery Models. From P. Hill, 2012.

2.4: CHALLENGES FOR MOOCS
The main challenges for MOOCs are clear. Firstly, what is the cost reclaim or revenue model. This issue is particularly important for cMOOCs, as they can be costly to develop and deliver, as they need more staffing resource available. But xMOOCs also, even in the context of EdX which is a not for profit, will need to raise revenues. The related issue of competition is another clear issue. The universities themselves are setting up competing arms to offer online learning - and these may compete with their own programmes and again have an impact upon cost reclaim models. Currently the revenue models include licensing content and offerings, advertising, subscription rates and direct charges or charging for services.

Secondly, the challenge of attrition rates is problematic for wider uptake of online courses (e.g. Simpson, 2012). The literature has been clear about pointing to the high dropout rates associated with MOOCs, with around 7-10% completing the courses (e.g, Daniel, 2013). The funnel of participation has been observed in all online courses (Clow, 2013). So, while numbers are high for enrollment on the courses, due to their free nature, non-accreditation and minimal tutorial contact students are not engaged, motivated and committed enough and therefore find it easy to simply not complete the course, often dropping out before assignments are due. There are no easy answers for increasing participation or widening the funnel of participation. Although, one of the methods for dealing with this scale of students is to create more opportunities for social interactions and include more interactive assignments, to introduce fees or to deploy accreditation, but these approaches necessarily have associated costs. Worryingly, a recent Doctoral thesis found a positive link between independent study course withdrawal and pre-attendance on an opencourseware course (Stevens, 2012).

New approaches to engaging students on MOOCs are clearly needed, however there is little in the literature to reveal possible ways forward. Over the last ten years or so, work being undertaken by the author has focused upon game-based learning including pragmatic and cluster-randomized trials that have compared traditional learning approaches with game-based approaches (e.g. Knight et al., 2010; Arnab et al., 2013). The work has broadly indicated strengths with game-based approaches over traditional learning mainly because in the literature immersion, motivation, engagement and immediate feedback have been found to support behavioural changes (e.g. Garris et al., 2002; Kato et al., 2008). This growing evidence based research is increasing the credibility of games as a learning tool for hard-to-reach learners, motivating online learners and improving performance (e.g. Erhel & Jamet, 2013; Schmitz et al., 2012; Snow et al., 2013). Unfortunately, the potential for its use improving retention and completion rates has yet to be quantitatively or qualitatively tested, and there are few if any longitudinal studies available due to the recent nature of the field, however the promise for this seems consistent with the literature findings and the potential for producing new gMOOCs (gamified or game-based approaches used in MOOCs) would be an interesting and potentially profitable line of research, experiment and testing. The marriage between online learning and game-based learning could be a powerful one, and it is certain that venture capital funding may seek to test the hypothesis that games and play can support higher completion and retention rates of students on MOOCs in due course.

Thirdly, the challenge of maintaining quality levels seems significant. If universities are outsourcing their content to others or even setting up subsidiary organizations to deliver their content the issue of quality is a paramount one. Issues such as plagiarism and de-skilling teachers are also parallel concerns raised by Siemens (2013). Plagiarism is rife in all areas of higher education (Larkham & Manns, 2002), but reports recently have highlighted the issue in MOOCs as a particular concern (e.g. Young 2012a). Cooper and Sahami (2013) think that the rise in plagiarism will have an impact upon the costs of the courses.

The issues around moving towards the so-called ‘super professors’ may have a downgrading impact upon teaching quality some think (e.g. Siemens, 2013). Basu in his article quotes from a professor at CSU Sacramento, who envisages that the introduction of the Super Professor:

... would represent a de-skilling of the faculty. It would harm faculty morale and engagement, and it would reduce the dynamism and intellectual excitement of the classroom experience for students. It
would also give administrators an excuse to increase teaching loads and reduce faculty pay (quoted in Basu, 2013).

Undeniably issues around quality need to be understood, and short sound bites and superficial knowledge and plagiarism could undermine significantly the notion of high quality education standards, while the rise of super professors could undermine the teaching profession by reducing the numbers of lecturers required significantly perhaps downgrading their role and worse still leading to large-scale redundancies across the sector. But equally it could just lead to reorganisation of the sector and reskilling existing staffing to deliver education in different ways and through different delivery mechanisms, such as online and blended.

As touched upon earlier, probably the stickiest challenge from the higher education institutions’ point of view is the issue around accreditation. Currently the main unique selling point for choosing a university over any other commercial training provider is the accreditation status that is held by universities. In the future with MOOCs and online learning, overseas offerings, and varied delivery mechanisms for learning, the worry of losing or even sharing accreditation with other non-university organizations is a real challenge to universities. In fact it seems quite likely that it will be the universities themselves who will devolve their accreditation status to other split-off organizations or outsourced organizations representing the university. What this will mean is that universities will no longer have their unique status and students may start to look to more well known overseas brands rather than staying with local universities. This could impact upon universities adversely with a trend of reducing student numbers.

The other challenge for universities is how they are responding to globalization and in the context of higher education specifically to the internationalization of course offerings. The move towards digitization in other sectors has broadly led to access to larger global audiences for content and services (de Freitas, 2013). While UK universities currently host 10% of overseas students, two thirds of students enrolled on MOOCs are not based in the country of delivery (Universities UK, 2013). The potential for up-scaling recruitment and reach of educational content into the global education market seems lucrative and venture capital moving into MOOCs has been significant. But what is the university trying to achieve with developing MOOCs: is it better brand recognition, extending scope and access for students, internationalizing its offerings or all of these? In advance of getting involved in this market, it is essential that strategic objectives are established and funding into the development of online content is targeted to ensure quality delivery and sustain motivated students. There is also a wider concern about what constitutes internationalization in the higher education sector, such as, providing commercial advantage, enhancing the curriculum with skills for preparing students for globalization or gaining market share (e.g. Altbach & Knight, 2007; De Witt, 2009).

Another challenge for the sector is around finding models for sustainable assessment of MOOC, there are a number of models at work in the current MOOC offerings, including the cheaper peer assessment model, machine auto grading and tutorial assessment, the latter of which would be difficult to afford with the current revenue models. Automated assessment tools seem like an obvious choice particularly for scalability within MOOCs, but other forms of assessment including peer assessment would allow for more active participation of students within the learning process.

While this could just be another fad that comes along to threaten the sector, online learning as part of the wider digital revolution does seem different and its longevity and power to persuade the sector after a decade of not quite coming to terms with it does seem to make it a different potential threat. This is because the impact of MOOCs upon the higher education sector has the potential to transform everything we know about course delivery and revenue models in higher education. As the recent Universities UK report (2013) expresses it:

As many aspects of higher education cannot readily be substituted online for free alternatives, particularly the provision of qualitative academic support and the right to award higher education
qualifications, any digital transition may be quite different from those experienced in other sectors. However, the development of free models of online learning may still have implications for the tuition-based revenue model of most higher education institutions (author's emphasis, Universities UK, 2013, p. 25).

What these implications are remains unclear at present, however the impact of offering educational content for free or reduced cost could be maintained if the cost is borne elsewhere. But with increasing fees for face-to-face students, more transparency is required in terms of value for money and quality of service. Most students who are paying very large fees would look unfavourably to other students receiving similar services but paying a fraction of the cost or nothing at all. This is underlined by the fact that the OpenCourseWare and MOOC developments have been so driven by the United States and this is perhaps not surprising at all. As much as MOOCs are offered for free, the cost of a course at MIT would cost the average student around $189,000, this is creating real difficulties as a result of rapidly increasing fees (Kamenetz, 2006). The disparity between the haves and have-nots in education, as well as socially, is widening there. In fact on a recent trip to New York, I was surprised when I met some students who despite having offers from Ivy League universities were unable to go there due to the high costs. In the UK, we are beginning to see the emergence of increasing fees, what this means is that some students simply cannot afford to study at universities and so their needs are increasingly being met by private, online or distance provision.

While in much of Europe fees have not yet really been widely adopted, it is only a matter of time before we too need to find more flexible and cheaper methods for reaching the learning requirements of our post-secondary students, so we need to be prepared to offer different modes of delivery and provide more flexible and accessible methods, such as MOOCs. But, will it be the current home students that end up paying for the internationalization strategy of the sector? Will they have to pay back fees to support global education for millions of the world’s poorest students? Maybe this is a desirable outcome, and is the fairest method for achieving global aspirations for educating the world, but a need to debate this is required, and a clear open discussion about globalization and the internationalization of education seems a necessity.
3.0: CASE STUDIES

CASE STUDY 1: MIT OPEN COURSEWARE: FROM CLASSROOM TO GLOBAL LEARNING COMMUNITY

The MIT OpenCourseWare programme (www.ocw.mit.edu) arose from Faculty discussions in 1999 that centred around how to use the web to support its mission: ‘to advance knowledge and educate students’. The initiative: a publication of all of the MIT courses online, was proposed in 2000 and announced in 2001 in the New York Times. As Dick K. P. Yue from MIT put it:

The idea is simple: to publish all of our course materials online and make them widely available to everyone. (Yue quoted on the MIT OpenCourseWare web site, 2013).

In 2002, 50 courses were published online, and by 2012 the site had published 2,150 courses. With 127 million visits recorded, the initiative can only be considered a major success for university outreach and a model for how other universities can extend their reach and multiply their student numbers (MIT OpenCourseWare Program Evaluation Findings Summary report, 2013).

The initiative originally a MIT-only programme has followed on to become an OpenCourseWare Consortium with over 100 universities participating and committed to making all their notes, course materials and videos available for open access, and has been a driving force in the general move towards open educational resources (OER) (Abelson, 2008; Caswell et al., 2008). In fact, the term 'open educational resources' was first introduced in a UNESCO meeting, foregrounding the aim to ‘develop together a universal educational resource available for the whole of humanity’ (UNESCO, 2002). So from initial Faculty discussions to a global movement, the OpenCourseWare is undoubtedy the major ignition for the rise of MOOCs as we know them today.

As an example of its global reach, its partner organizations have translated more than 800 courses into five languages and the team have distributed 200 copies of the whole web site onto hard drives for learners in Sub-Saharan Africa (D'Oliveira et al., 2010). In terms of users of the course materials, the initial perception that the resource would be used mainly by teachers was found to be wrong in practice, and one early study showed that only 15% of those using OCW were in fact educators, with students from other universities making up 35%, but most surprisingly were the **50% of users who were independent learners with no university affiliation provided** (D'Oliveira et al., 2010). While OCW is not a MOOC in the modern sense of the word, it is a foundational open educational resource (OER) that is supporting independent learning. A more recent study shows that students are now 42% of the audience, educators are 9% and independent learners make up 43% of the visits (D'Oliveira et al., 2010).

Figure 3: Percentage of MIT OpenCourseWare usage internationally.
The findings in these statistics reflect well the weight of evidence that have emerged from the online learning and e-learning studies. The main issue with online learning and e-learning, and importantly with sharing open educational resources, is one of pedagogic relevance and alignment with curriculum objectives (de Freitas & Jameson, 2012). The fact that few teachers are using the resource gives added weight the argument that reusable learning objects debates outlined over ten years ago, and that is, that without context and pedagogic relevance reusable resources have limited applicability. In a recent study undertaken in African universities, this issue was highlighted:

One metaphor of puzzle pieces [of online resources] suggests that freely available lecture videos, images and slides may be potentially useful, but must be distributed with flexible licenses to allow easy pedagogical integration and repurposing. Otherwise they risk being "locked" for use in their initial or very similar contexts (Ng’ambi, D., & Luo, 2013, p. 237).

Context and pedagogic relevance are essential, but this also explains why the majority of users are independent learners, as they are creating their own resources and fitting the pieces of their puzzle together for themselves. However, as we have seen in the reusable learning content debates, this approach would probably not be a successful model for traditional learning, and while it could provide access to new audiences, it is uncertain what the real sustainable benefits would be for traditional learning providers, other than an altruistic aim to engage and widen education to new independent learners, or at a stretch to spread awareness of the brand.

Nonetheless, the drive of the programme has been successful by gaining large numbers of people involved with these open resources, and has provided a new model for implementing and marketing e-learning and online approaches. The future of open learning resources is unclear at present, however it is certain that the ability of universities to produce learning materials and content is now in competition with commercial arms of universities, publishing companies and other commercial companies who see this as the thin end of the wedge for engagement with a global community of learners. The next steps for MIT, and other established universities, is critical and will in all probability shape the future of learning, at least in terms of how educational materials are delivered globally. For universities, it is critical that the correct decisions are made as to where, when and how to engage with this debate and trend. To not engage could mean losing out in the battle for global students, but to make all content available for free could devalue learning content and education as a whole to the extent that universities in the future are transformed into élitist and out of step organizations that suffer from falling numbers of students. Conversely, engagement with new audiences in this way could bring the benefits of larger cohorts of global and remote learners.

CASE STUDY 2: COURSERA: DEVELOPING A SUCCESSFUL BUSINESS MODEL FOR SCALABILITY

Coursera is a commercial venture started by Stanford University computer scientists Daphne Koller and Andrew Ng. The venture was launched in April 2012, and already has three million registered users (March 2013). Coursera has exploited its first in field advantage by establishing partnerships with many international universities including California Institute of Technology, École Polytechnique Fédérale de Lausanne, University of Edinburgh, University of Pennsylvania, Princeton, Stanford and University of Washington (Laplanche, 2013; Universities UK, 2013).

The for-profit start-up company has been funded primarily by investment from venture capital firms Kleiner Perkins Caufield & Byers and New Enterprise Associates, raising an estimated $22 million investment from these sources. The start-up has also raised significant equity stakes from its university partners. The advantage for universities is that Coursera makes its platform available for free for university course offerings and there
are no upfront costs, although Coursera can develop content for universities (Universities UK, 2013). The business model of free courses did not put off the investment capitalists, John Doerr explained how he saw a strong business model:

...[e]ven with free courses. From a community of millions of learners some should 'opt in' for valuable, premium services. Those revenues should fund investment in tools, technologies and royalties to faculty and universities (Markoff, 2012).

Clearly the model established by Coursera has been accepted as viable, sustainable and scalable, and Udacity, Minerva and Udemy have all adopted the same approach (Markoff, 2012; Clarke, 2013).

The main innovation from Coursera seems to be a move away from the video-based 'static model' of online learning, and towards short 10 minute bursts, with online interactive puzzles for testing. But the main weakness of the offerings seems to be the reliance on peer assessment as the main assessment approach used, so multiple students mark one another's papers. This has led to broad accusations of plagiarism and cheating, and undermines the validity of MOOCs as a credible alternative to traditional education (Young, 2012a; Cooper & Sahami, 2013). This in turn led to Coursera recently announcing its anti-plagiarism software is to be introduced. edX and Udacity two other similar platforms have partnered with publishing heavyweight Pearson VUE to address this issue, and are considering the use of testing centers, as in the Cisco Academy Program approach (Parry, 2012).

Figure 4: Percentage of international students on Coursera courses. Reproduced from Young, 2012b.

While there are question marks about the efficacy of peer testing, at least as it is currently implemented in Coursera, the research evidence around repeated testing to reinforce learning seems convincing (e.g. Karpicke & Roediger, 2008) and the focus upon active learning and research-led teaching approaches seems substantially more effective than traditional lecture modes of delivery (e.g. Deslauriers et al., 2011). So while questions remain about the peer assessment only model, the general approach adopted by Coursera seems sound. Maintaining the flipped classroom idea of Salman Khan, this allows learning that is lecture focused to
be kept outside of the classroom and into the online domain and in the classroom there is more time for active learning.

Undoubtedly the major contribution of Coursera has been to test out the business model of MOOCs as being delivered for free. But it seems unlikely that fully free services will be maintained indefinitely if higher quality and retention and more effective assessment are to be attained. The debate about business models for supporting MOOCs is set to continue, and whether this model is maintained or not, it has been an important step off point for widening the global access to high quality online learning.

**CASE STUDY 3: EDX: LEARNING FROM LEARNERS THROUGH LEARNING ANALYTICS**

Like Coursera, edX was set up to capitalize on growing participation in online courses. edX was started as a collaborative venture between MIT and Harvard, after the success of MITx electronics and circuits course (January 2012). Like Coursera, edX has maximized its reach simply through collaboration with other international universities. Its current offerings include courses from Australian National University, Berkeley, École Polytechnique Fédérale de Lausanne, Georgetown, Harvard, McGill, MIT, University of Toronto, TU Delft and Wellesley College. The first courses started in October 2012 and like Coursera cover many different subject areas.

The critical difference between the two is that edX is a not-for-profit organization owned and funded by Harvard and MIT. The investment from the two universities was significant and larger than Coursera totaling $60 million. In addition to this investment, they have benefited from a technology platform developed by Berkeley and funding from the Bill and Melinda Gates Foundation. edX provide equity investment for its partner institutions and utilizes two different arrangements: a) direct payment of quarter of a million dollars to edX to put courses onto platform in addition to no less than 70% of gross revenue, or alternatively b) a self-service model where the partner shares revenue of up to 50% after the first 50 thousand dollars are paid directly to edX. The online course platform is also made available via open source arrangements.

![Figure 5: edX offices in the United States. Source: Markoff, 2013.](image-url)
An interesting study undertaken by Susan Goldstein at Harvard University compared four courses, two at Coursera and two at edX (Goldstein, 2013). All the courses used video lectures, only one used peer assessment (Coursera). All of the courses used discussion forums and advertised other collaborative tools. All the courses used Twitter feeds, but Goldstein notes that this channel was rarely used in practice. The Facebook groups however seemed quite active, particularly for the foreign language learners.

**Issues of accessibility** were complicated by the fact that for those speaking English as a second language, they had to turn off the course and access the web separately which was time consuming and disruptive to their train of thought. A need for translation of the courses is clearly needed. Also older learners found the technology at time disruptive and felt left behind at times. Possible grouping by self or other measures might help learners to be more comfortable (Goldstein, 2013). While, Skiba in her paper (2013) outlined a preference for the live webinars recorded for later perusal, these would also have limited value for those with poor English speaking skills or with hearing disabilities.

Realizing the **issues with peer assessment**, edX has perhaps more sensibly opted for testing centers to avoid the issues with plagiarism and to ensure quality results for its learners. However, the main elements of the courses always seem to include: access to centralized resources, discussion groups and assessment through automation of performance in quizzes and through assignments as a general formula.

One area of real future innovation for MOOCs as a whole is in the area of **data and learning analytics** (Siemens & Long, 2011). This area is a relatively new field of interest and focuses upon new ways of gathering data and using it to inform design and learning experiences (Buckingham Shum & Ferguson, 2012). In the e-learning and games area, we have been looking at mass data through accessing web log analysis data for some time (e.g. Dunwell et al, 2012), primarily as a way to chart social interactions, improve usability and enhance the game/learning experience. In MOOCs this possibility has been considered by Seaton and colleagues (2013) who correlate time spent on assignments (homework) with decreases in activity in the course resources, and an increase in discussion forum activity towards the end of the course around homework assignment assessments. This area is just beginning to be used, as part of real-time analytics, and future research may yield significant advances in terms of feedback modelling in online courses and real time monitoring and support extracted from activity and interactions.

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**CASE STUDY 4: FUTURELEARN LTD: EXPLORING THE INTERNATIONALIZATION OF EDUCATION THROUGH ONLINE LEARNING**

FutureLearn is a platform which was started up by the Open University, as a kind of response to Coursera and edX, it also has a bedrock of partnerships, in this case it has the involvement of 21 universities, including Bath, Bristol, Cardiff, Exeter, Glasgow, King’s College London, Southampton and Queen’s University Belfast. Additional non-university partners include: the British Library, British Council and British Museum, they plan to offer access to their digitized collections. FutureLearn is set to start delivering courses online by the second half of 2013.

Their business model is similar to those noted above, but the FutureLearn Ltd company is a *for-profit* though third party owned, it is funded wholly by the Open University. The advantages for universities joining is that there are no upfront costs. But a model of contribution in kind by partner institutions to develop courses is perhaps less attractive than the edX model, though the novelty of a UK run company would potentially be more appealing to UK Higher Education Institutions. Assessment is expected to be via testing centres, but the details have yet to be announced (Universities UK, 2013).
FutureLearn and the other MOOC initiatives offer a chance to look at internationalization in greater detail, that is international outreach and internationalization of the curriculum. For example, as part of their mission and strategy, many universities are trying to establish physical and virtual bases over the world, and this approach has particular benefits including: recruitment of overseas students, understanding of regional and national priorities and refining curriculum requirements. But it is also having an impact upon the content as well as delivery of learning materials. The internationalization of higher education content is a definite drive and has an impact upon what is learnt, as well as how it is delivered. The emphasis upon active learning, immediate feedback and learning in smaller chunks have all had a massive impact upon pedagogy (e.g. de Freitas & Jameson, 2012), and this will continue further, as we move towards shared or global education priorities and curricula.

FutureLearn and these other initiatives are in their infancy but it clear that they do represent a real alternative to traditional learning, and while in the past a general approach of piecemeal development within universities is commonplace, some universities are just not equipped to ramp up development of online content at the levels of quality that are currently required. While many universities have opted to use Coursera as their chosen platform, FutureLearn does offer a different opportunity, based more upon local connections, but quality of delivery is as much about pedagogic advance as being first in the market, and inevitably while Coursera and others have market lead in this field, it will be the formula that works with learners that will ultimately win through, which is why development of content in-house still is an attractive option for universities, if the quality is high enough then all the delivery agents will want to adopt it into their systems, and using more than one delivery channel may still be possible.
The internationalization of educational content is a significant factor in developing new online content, rather than specialist areas, the inclination may well be towards more popularized and general approaches. Also the division of learning into smaller chunks has huge pedagogic implications in terms of ensuring pedagogic context and relevance. While the FutureLearn initiative has just been launched and we have yet to fully see how it will be structured, it has the hallmarks of Fathom.com, in particular the partnerships with the British Library and the British Museum. We hope that this time, the moment is right for the approach to gain momentum, but it is essential that if it is to succeed that consideration of the key objectives are maintained: a consideration of the learner and their requirements, a consideration of the usability and ease of access of the system, a good balance of high quality pedagogic and technical knowledge in the content provision and a flexible approach to the curriculum is maintained. For this to work it is not enough to simply align current practices and strategies, internationalization brings with it new uncertainties and new challenges that need to be fully understood: language translation, regional political sensitivities and a notion of global education need to be developed in tandem.

4.0: DISCUSSION & FINDINGS

This report has reviewed the most up-to-date papers and reports in the area of MOOCs, but due to its relatively recent nature understandably there was a dearth of academic work and study available. However, through early academic papers, newspaper articles and some unpublished reports, the picture that has emerged is that the US is very much trailblazing the area with most of the 'start ups' (for profit and not for profit) based there. This is perhaps at least partly driven by rising costs for students learning on traditional courses in the US, but also parallels the strong scientific evidence base that shows 'no significant difference' between e-learning and traditional face-to-face learning and 'significant difference' in favour of blended learning (Altback et al., 2009; Means et al., 2010). But while the trend is United States focused at present, initiatives like FutureLearn Ltd in the UK, demonstrate that the problems with scaling up education to meet the challenges of rising student numbers and reducing education budgets is not restricted to the United States.

A critical challenge for all MOOCs seems to be whether they can deliver the completion and retention rates in the future, notably without the blended element will pure online MOOCs really threaten the effectiveness of the blended model? As the UK Open University, which itself traditionally blended distance learning, media-rich materials and face-to-face sessions, showed can be such an effective and powerful approach to learning. In the drive for scalability, the adherence to quality and a close proximity with knowledge of the research in the field therefore is also critical.

The growth and establishment of lifelong learning and distance education provides reasonably large numbers of independent learners already out there, and interestingly, it is these independent learners rather than teachers or students on traditional courses that are currently making up the largest cohorts for open educational resources, as the MIT OCW initiative indicates (D'Oliveira et al., 2010). Online learning has two main advantages: it can scale well and it can provide flexibility in terms of times and places for accessing content and delivering assignments. While online learning and e-learning have met problems and early approaches such as computer based training (CBT) were rightly accused of being too static and unengaging, new approaches that make better use of 1) video lectures and stored course materials and notes, 2) activities for engaging learning such as quizzes, games and interactive digital media content, and importantly 3) social interactions with other students through social media channels and peer assessment provide a potential model for commercialization of all online learning. Getting an equal balance between these three elements makes sense, and using good quality tools and materials, usable resources and interactive digital content seem key to making the second generation of online learning more accessible and more meaningful to many new and established learners. The author proposes this as a 'Third model' for MOOC and online learning
development, using a third of recorded materials, a third of activities including quizzes and assignments and a third of time for social interactions. This model needs to be tested but if provided will ensure retention and completion rates are significantly higher.

In terms of the audiences for this content, we are still at the beginning of the development of the area, so it is hard to predict who the main audience will be, but in general there should be a mix of: learners in formal education, teachers and educationalists, researchers and independent learners. Mixed age groups and mixed cultural groups will be a matter of course and how each institution responds to this challenge will be interesting. While FutureLearn for example gives emphasis to reaching out education to the currently unprovided in its presentations, in reality OpenCourseWare has managed to reach out to the poorest parts of the world with its content, but while this is laudable this does not remove the need for teaching guidance and pedagogic context and relevance. Of course the impact of internationalization will be significant upon globalising education and this must be a driving force for these kinds of approaches as this could pull some of the poorest parts of the world out of peril, but to achieve this the extent of the impact upon the actual content taught would be expected to move away from English language focused work towards more multicultural and multilingual presentations. Making learning global is not a tried and tested approach so involvement with different communities whilst developing content seems like a sensible strategy for appealing to wider audiences and avoiding an Americanisation of culture.

It is notable that most of the MOOCs under review here share similar core functionalities including: centralized open access to course materials, notes and assignments, webinars, video lectures, discussion fora, other social software support such as Twitter and Facebook groups, translations of some content into different languages, quizzes for assessment, automated assessment tools. But to ensure retention rates are higher, future MOOCs would do well to integrate a suite of additional tools, including: automatic translation tools, data capture learning analytics and games and gamification elements to enliven course materials and assignments, as this would have a significant positive impact upon retention.

The decision about whether to join existing consortia or going it alone may already be decided in your own institution, and would be a strategic senior management decision. However, the main considerations would be: whether you would be included in an existing alliance, inevitably there will be elite groups and lower tiered ones, but this could lead to a global stratification of the higher education sector which may not benefit the general drive towards democratisation of digital content and open access an could damage or restrict innovation and evolution of newer universities, equally some of the top universities may exclude themselves making them seem out of step with the sector as a whole. The better strategic approach might be two pronged: to negotiate to join existing consortia and at the same time developing high quality content offerings in-house which would be compatible with other platforms - maybe adopting a multiplatform approach rather than a more passive wait and see mode.

With service orientated architecture and open data standards in place, the benefits of running your own platform could be significant allowing for control over quality of content, and this approach could be more lucrative in the longer run as all the funds would come to the university and IP would be retained. Also developing in-house capabilities would be useful, as some content production in-house would invariably be useful at least for piloting content and innovating content presentation and delivery modes to meet student requirements. However the main issues of branding, quality assurance, mission statements and budget planning need to be considered. The benefits of producing and delivering content in house would be the continuity of staffing expertise, retention of IP over content produced, benefits for face-to-face student cohorts through access to materials and a unique branding opportunity. However in the race for ensuring the future of the Higher Education sector it is an important consideration not to be left standing. Ultimately the decision must include an understanding of the university's mission, its internationalization agenda and program objectives and an understanding of the implications of MOOCs upon pedagogic relevance and
context. In addition the implication on staffing could be significant, so human resources, data protection and intellectual property issues also need to be considered.

5.0: CONCLUSIONS: WHAT FUTURE FOR HIGHER EDUCATION?

The democratisation of learning by the availability to everyone, everywhere of high quality learning resources comes at a time of transformation and uncertainty in the history of higher education. Against this backdrop, the emergence of MOOCs as a new phenomenon is perhaps overstated. Instead, the emergence of MOOCs should be regarded as more of an extension of the move towards online learning provoked by growing numbers of students, reducing learning and teaching budgets and scientific research which shows improvements of blended over traditional learning approaches. These step changes will inevitably continue with, for example the use of gamification, and studies there have already shown a significant improvement of game-based approaches over traditional learning (Knight et al., 2010).

Advances in higher education efficacy will clearly drive change in the sector, not just in terms of the content and its delivery, but crucially to the shape and structure of the institutions themselves. Clearly this move towards open access education is not a new one, and despite tendencies to want to adopt new approaches, it is clearly critical in this case that the impact upon the institution is a central consideration. However, it is impossible to put the genie back into the bottle and for this reason alone, a sensible strategy for higher education is to add online learning opportunities as a part of their overall offerings. While it is unclear how higher education will look exactly in 20 years time, clearly the impact of digital technologies, digitization of content and use of social and digital media are transformative inherently, surely the goal of all universities is to share and extend knowledge to all global communities. Bearing this in mind then, the best approach to take to MOOCs and online learning in general is to be part of the revolution.

This report notes the importance of the scientific research, and the fact that education can be improved cannot be ignored by educational technologists, tutors, educational leaders and policy makers. However, it is within our control to ensure that pedagogy is a central consideration in any new developments, that learners receive the best quality education that they can and that we utilize the research and technological advances to the utmost of our ability. It seems unrealistic to think that higher education could be swept aside by MOOCs, online learning and other innovations, but as we have seen in publishing, with libraries and with the postal services, sectors that do not respond to globalization can be reorganized to their detriment. But learning does not seem to be going away in fact the tendency for more learning has been well observed. There are currently 150.6 million tertiary students in the world, that is an incredible 53% increase since 2000 (Altbach et al., 2009), we expect that number to increase substantially over the next ten years.

Where will higher education be in ten years? We do not know for sure, but with rising student numbers, reducing national budgets and increasing global challenges, we need to find ways to be more flexible in our institutions and to learn to adapt to the requirements of our learners today and in the future. The role of MOOCs and e-learning against this backdrop can only serve to assist us to reach out globally, to meet these challenges and to learn to work more closely together to increase global wealth and to inform and educate the whole international community: whether they are rich or poor.
6.0: REFERENCES


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