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MOOCs 2030: A Future for Massive Online Learning

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Introduction

In this chapter, we look ahead to the year 2030 and consider the ways in which current visions of massive open online courses may develop into realities. We also look at the changes in pedagogy, technology, and the wider environment that will be necessary in order for them to flourish.

MOOCs are a form of technology-enhanced learning (TEL). Like other successful TEL innovations, we can expect them to mature and transform over a period of many years. Like other such innovations, MOOCs are based on a core vision – of massive-scale open learning – that will keep them focused during this period of extended development. This vision is shaped in relation to the 'TEL Complex' (Scanlon et al., 2013), an interlocking system of technologies, peoples and practices (Figure 1).
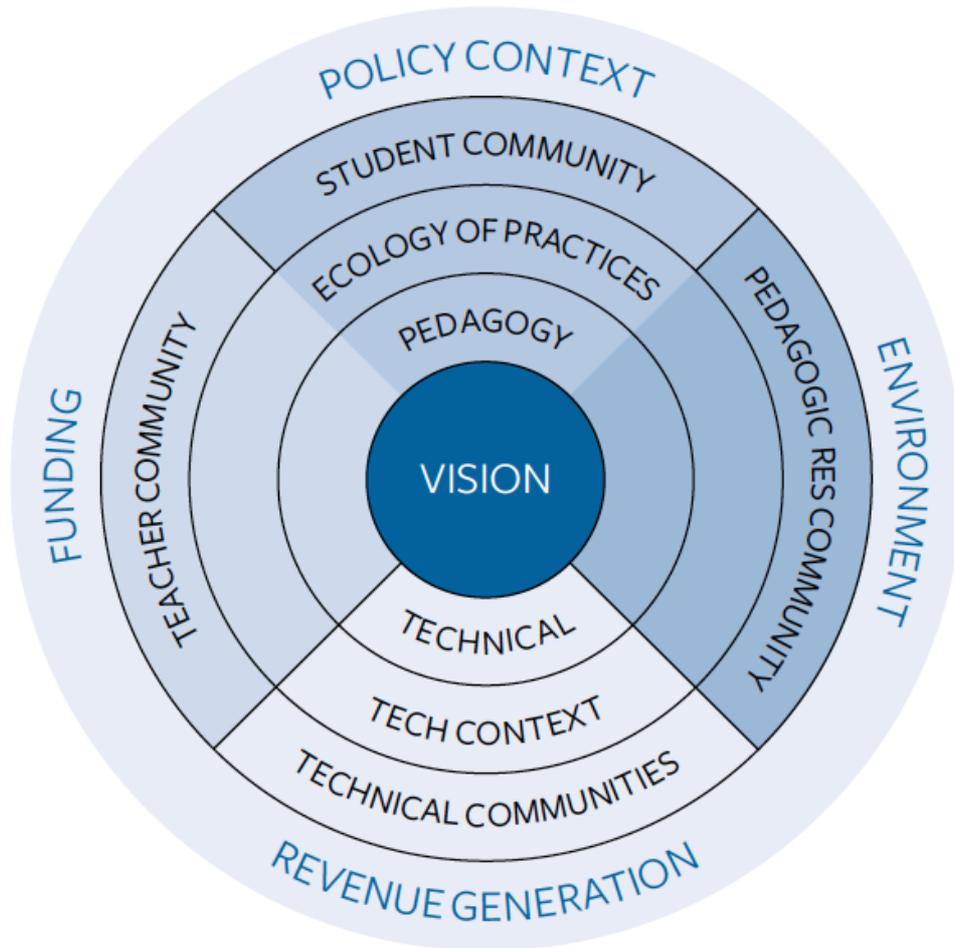
Figure 1: The Beyond Prototypes model of the TEL Complex

The TEL innovations that flourish are those that engage with every element of the complex. As shown in Figure 1, these elements include the wider context of policy, funding, and environment, as well as the different communities and practices that exist within that context. They also include the developments in pedagogy and technology associated with this vision of learning.

For an innovation in TEL to succeed, a persistent vision of educational change is required. This vision gives the innovation a purpose, a direction and a base. In the case of MOOCs, the vision has three elements: (1) meeting global society's need for education, (2) opening up education, and (3) benefiting from education at scale. In other words, today's societies need massive open education for their citizens to develop and prosper.

The MOOC vision: meeting society's needs

Almost 20 years ago, Sir John Daniel, the former Vice chancellor of The Open University, observed that "a sizeable new university would now be needed every week merely to sustain current participation rates in higher education" (Daniel, 1996, p. 4). More recently, at the opening of the FutureLearn MOOC platform, the British Minister of State for Universities and Science noted that "MOOCs provide the opportunity to widen access to our world-class universities and to meet the global demand for higher education" (quoted in Clifton, 2013). This increasing demand for education is partly due to population growth, with the world population forecast to increase by almost one billion people within the next twelve years (United Nations, 2013). It is also partly due to the increasing number of people worldwide who are trying to access the benefits associated with post-secondary education and training.

The first MOOCs, known as 'connectivist MOOCs', were developed as collections of online resources for individuals to develop skills, knowledge and attitudes needed to thrive in a digital economy. Because a connectivist MOOC encourages people to create networks across local, regional, and national boundaries, it aims to increase participation in the lifelong learning and collaborative practices needed by digital citizens (McAuley, Stewart, Siemens, & Cormier, 2010).

More recently, MOOC platforms, including Coursera and Udacity, have also addressed these issues of participation and empowerment. The Udacity website states that 'education should empower students to succeed not just in school but in life […] Udacians are curious and engaged world citizens' (https://www.udacity.com/us). The introduction by Udacity of 'Nanodegrees' is intended to provide a compact way for employees to develop the skills they need to advance their careers. Meanwhile, Coursera's mission states 'We aim to empower people with education that will improve

their lives, the lives of their families, and the communities they live in'
(https://www.coursera.org/about/).

The MOOC vision: Opening up education

In order to educate and empower citizens worldwide, MOOCs need to make education accessible. Anderson (2013) identifies four ways in which they can do that: (1) opening courses up to learners from other areas and countries, (2) opening courses up in terms of academic freedom and free speech, (3) opening up content by providing it as open source software and open educational resources, and (4) opening up enrolment to everyone without regard to demographic data or to previous experience.

Sebastian Thrun, co-founder of Udacity, originally expressed his vision of openness as: "I am against education that is only available to the top one per cent of all students. I am against tens of thousands of dollars of tuition expenses. I am against the imbalance that the present system brings to the world. I want to empower the 99 per cent" (Leckhart & Cheshire, 2012).

In order to match this ambition, learners will need a range of tools, skills and resources, including:

- access to personal computing devices and the Internet

- unrestricted access to key sites

- MOOCs available in a language they understand well, designed with accessibility in mind and designed to support progression

- safe environments for young learners

- enough basic knowledge to be able to begin learning

- skills in digital literacy, online study and social networking

- high motivation and self-efficacy.

Some of these are essential in order to access online learning. Some are necessary for continuing to engage with courses. Others are prerequisites for a productive learning experience. It is already apparent that MOOCs cannot empower everyone. They can, at best, offer a safe, engaging and informative environment for learning. The necessary technology, infrastructure, and learning skills must be developed by societies that value online higher education and can equip their citizens to engage with it.

The MOOC vision: Education at scale

'Massive' provides more than a route to opening up education. For learners, scale offers access to support from a wide range of other learners, to resources provided by those learners, and to a range of perspectives. For educators, scale offers a positive and enjoyable experience, opportunities for increased access to resources, and a motivation to develop teaching practice. For society, scale offers the potential to develop tools and resources for use in other contexts, to change professional practice, to increase access to education and to achieve global impact by solving large-scale problems (Ferguson & Sharples, 2014).

Putting these elements of the MOOC vision together suggests that

by 2030, the systems that develop from MOOCs will be meeting needs of societies by educating millions of digital citizens worldwide. They will open up access to education and enable people all over the world to enjoy the benefits of learning at scale. This can only happen if there is persistent intent not only from MOOC providers, but also from policy makers and educators.

In order to achieve this, all elements of the TEL Complex (Figure 1) need to be taken into account. Changes to practices in pedagogy, technology and the wider environment will be essential. The following sections examine the changes that will be required in these areas.

Pedagogy: Approaches to learning and teaching

If MOOCs are to meet societies' needs, open up education and reap the benefits of learning at scale, by 2030 our pedagogies must take into account new groups of learners, new roles for educators and new approaches to learning design.

Learners

MOOCs emerged from universities, where academics had the time and resources to develop them, but this may not prove to be their natural habitat. Surveys of current MOOCs show that many learners are already well educated. When the University of Edinburgh analysed data from their initial MOOCs, offered using Coursera, over 70% of respondents stated they had a first degree, and 40% had a postgraduate degree (University of Edinburgh, 2013). Although thousands who are unemployed or who have never attended university are registering for MOOCs, the scales are weighted in favour of those who already possess the skills necessary for study at this level.

Changes are beginning to take place as MOOC providers offer courses introducing essential online study skills. Currently, most education above primary level proceeds on the assumption that learners know how to be students, that they know where to focus their attention, what to expect in a learning environment and what is expected of them. However, this knowledge has typically been gained in a face-to-face environment. Future learners will need to know how to take responsibility for aspects of their learning journey, how to function as self-directed online learners, and how to make the most of the possibilities offered by open online learning at scale.

Educators

Educators also need to know how to make the most of these possibilities, and how they can support learners effectively when opportunities for one-to-one contact are very limited. In many cases, content production and presentation will be split up to a greater extent than in face-to-face environments, especially when the same course is presented on many occasions or adapted for different platforms. Educators will spend less time lecturing and more time within discussion forums, where they will be involved in motivating and socializing learners. They will also foster the promotion of information exchange, knowledge construction and learning development.

John Daniel's view is that opening up teaching to public view will encourage many institutions to improve their provision.

> *MOOCs will create popular and public indices of teaching quality. This may expose the teaching weaknesses in some elite institutions. The publicity and scale of the format will oblige institutions to do more than pay lip service to the importance of teaching and put it at the core their missions. This is the real revolution of MOOCs.* (John Daniel, quoted in Haggard, 2013)

This view presents the role of the teacher as the same in MOOCs and classrooms. In reality, there will be multiple roles for educators within the systems that develop from MOOCs. Those trained as teachers and lecturers will apply their skills and widen their repertoire to include online presentation, facilitation and mentoring. Some may choose to specialise in one of these areas, or in learning design. Others will work on content production, together with media producers, animators, social media specialists and others. Librarians will help learners to acquire digital literacy skills, access resources and evaluate sources. All this activity will draw on the work of researchers

whose findings are based on tests and observations related to thousands of learners. By 2030, a MOOC educator will be a member of a skilled team that works together to build on the subject knowledge and professional expertise of all team members.

Learning design

A key role for those whose professional expertise is in education will be the design of courses for effective learning. These designs will take into account the needs of those who could not previously access education due to physical, financial or technical limitations. They will also be aligned with the needs of society, and make use of the benefits of education within massive communities of social learners.

Early evidence from analysis of MOOC activity shows that learners' appetite is typically satisfied with small learning chunks in short-period courses. Today's MOOCs are usually individual units with no clear progression path unless learners are willing to take the leap from a short, free and informal course to a long and expensive formal course. In the future, many highly modular, self-contained courses will be available. These will be based on focused, refined materials. Increased use of learning design and metadata will mean that these courses are used as steps in coherent and personalised learning journeys.

We are already seeing increased interest in MOOCs as a form of continuing professional development. MOOCs can be used to train worldwide networks of specialists, or to share practice across different workplaces. They also offer a way of addressing 'wicked problems' – problems such as climate change or access to safe drinking water – that cannot be solved by individuals or even by small groups.

These possibilities suggest that the systems that develop from MOOCs will move away from the university sector, or perhaps the university sector will reshape itself to

include learning and development in new areas. In order for these developments to take place, innovations in technology will be required.

Technology

There are many technological changes under development that will impact on MOOCs. As information and communication technology expands its reach, the possibility of ubiquitous access to information is becoming a reality. Web 2.0, the read/write web, is giving way to the semantic web, Web 3.0, in which every object is associated with metadata. Beyond Web 3.0, visions of a future in which the web and the human body are united are already on the horizon (Kurzweil, 2005). In the future it will make no sense to talk of mobile technology or mobile learning, because these will be the norm. Technology and the possibility of learning will always be with us.

However, technology does not exist in isolation. Just as possibilities appear on the horizon, so do barriers. Firewalls and paywalls cut many potential learners off from tools and resources. Ethical considerations prompt us to consider how much data we should collect and analyse about learners and teachers. We will need to work hard to avoid a digital divide that restricts educational access to those individuals and countries that can afford both technology and the infrastructure to support it. Our vision for MOOCs can only be attained if we take these considerations into account as we develop and deploy our technology.

MOOCs are already making use of emergent learning technologies, including:

- learning analytics to improve feedback
- adaptive learning that offers personalised pathways
- social network analysis tools that highlight connections

- discourse analytics that support automated assessment

- semantic web technologies that provide customised support

- virtual problem-based learning that allows learners to develop their skills within immersive environments (Haggard, 2013).

Together, the development of these will provide learners and educators with automated support and feedback, allowing them to focus their attention on problem areas.

These technologies alone will not be sufficient. A transferable credit system, agreed internationally, will allow learners to take badges and qualifications with them as they move between institutions and platforms. For a qualification system to be workable, we need improved authentication technology that will establish firm links between the registered learner, the learning activity and the badge or qualification. Technology will be used to detect plagiarism; this will be a growing challenge if increasing numbers of learners are assessed from limited question banks. There will also be increasing demand for a lifelong learning portfolio that gathers evidence of learning from different platforms, stores them safely and makes them available on demand.

From the perspective of accessibility, resources will need to be available in many languages. The technological solution here may draw on the power of the crowd to carry out crowd-sourced translations. For this to work, MOOC creators will need to pay careful consideration to Creative Commons and open educational resources. At the same time, learners whose physical restrictions have limited their access to face-to-face learning will be expecting accessible online options. Challenges such as providing mathematical notation for those with restricted vision will have to be

overcome. These cannot be seen simply as technological challenges; they will also require changes in environments and attitudes.

Wider environment

The changes necessary to achieve the MOOC vision cannot be confined to universities, learners and educators. These changes will be associated with a shift in our understanding of what higher education is, and who should be able to access it. They will require an increased willingness to learn collaboratively online and to make use of social media in this context. They will also require changes to policy in order to support and drive change.

Changing higher education

For many students, the university experience is focused on obtaining a degree qualification. This focus has been intensified by rising university fees in many countries and the subsequent self-identification of learners as customers. Financial constraints mean that both universities and learners are looking for ways to make savings. MOOCs offer a way of unbundling the services provided by higher education institutions (Anderson, 2013). The traditional package of teaching, student experience and credentials will become less stable as students study online, institutions take into account learning that has taken place elsewhere, and students mix and match courses from different institutions. Just as lecturers have provided pathways through excellent resources in the past, in the future they will have the option of providing pathways through excellent courses.

Many universities run Web-based learning environments for their students to access learning and administration resources. Some traditional universities use these

environments as a means to offer online degree programmes. This extension of campus courses into online environments is accompanied by a merging of MOOC materials into the campus offering, so that campus students have the benefit of accessing high quality video presentations and engaging in online discussion.

The blending of online and campus learning will develop further. Pre-university MOOC courses are being designed to prepare students for academic writing or university-level mathematics. Universities are realising that it is not cost-effective for each faculty or institution to offer a campus course on introductory statistics or study skills. Such courses will increasingly be offered as multi-institution MOOCs, perhaps with additional support on campus. Higher-level classes are being converted to the 'flipped classroom' model where students access core teaching materials online, engage in online discussion and testing, and use campus time for academic discussion and problem solving.

Technologies are also being blended, with virtual learning environments providing sites for MOOCs, and MOOC platforms such as OpenEdx being adopted for campus learning. By 2030, the distinction between a MOOC platform and a virtual learning environment is likely to have disappeared. Students will do the majority of their learning online, visiting the campus for group workshops, intensive discussions, lab classes and invigilated exams. In some universities, these campus sessions may become optional, premium offerings.

Post-school education will no longer be seen as an intensive experience, because lifelong learning will be taken for granted. Learning journeys will offer people different routes through education. An individual might move from just-in-time learning such as watching a video about an immediate concern, to a series of MOOCs

about related issues, to a full-time degree, a part-time postgraduate course and career-spanning workplace training. Such learning journeys will intersect with many others. Learners on many different pathways will use the same resources. During their learning journeys, learners will create resources of their own, which may be taken up by others. At the same time, they are likely to develop skills in collaborating with and mentoring others.

As MOOCs proliferate, the importance of constructing and accrediting learning journeys will grow in importance. Successful universities will be active in these areas, and will include them in their business strategy. They will build learner communities that maintain engagement with the institution over time. The divide between students and alumni will be reduced; those who have finished one course will be encouraged to take others over their lifetime. Cohorts will carry on communicating, with MOOC platforms forming a hub for social media. People who have studied together will be able to continue their conversations, sharing experience as they put their learning into practice. Importantly, these conversations will feed into the next iterations of the courses.

MOOCS already model and build capacity for collaborative networks that transcend both time and space (McAuley et al., 2010). By 2030, the top universities will be those with learner communities that function as effective think-tanks. Their learners, whether in student- or alumni-mode, will enjoy discussing the big issues of the day with a large worldwide community, and these debates and the universities' expert knowledge will be combined to produce reports and recommendations that go far beyond what was possible for smaller, national groups.

Policy: Quality assurance and regulation

In order for such large-scale change to take place, changes in policy will be necessary, particularly with regard to quality assurance and regulation. Currently, MOOCs are largely unregulated and quality is highly variable. This will offer an increasing challenge as MOOCs become more closely linked with formal education, workplace training and accreditation.

Daniel notes that quality assurance agencies around the world take very seriously the rate of course and degree completion. "They take the view that students seek not merely access, but access to success, which the institution should do everything to facilitate while maintaining standards" (Daniel, 2012). Hence the current concerns about drop-out rates from MOOCs. However, it is increasingly clear that course completion is not the only measure of success. As with other forms of informal learning, learners set their own goals, and these do not necessarily align with the outcomes set out by the educator. People may register to gain access to a single piece of content, or to a series of discussions, or to find out more about open learning. Their paths are multiple and traditional criteria are unlikely to prove sufficient.

Just as MOOCs prompt higher education institutions to consider and unbundle their offerings, they prompt quality assurance agencies to consider the needs of different user groups. Learners are investing time in education and will be looking for a reliable assessment of what they can expect. A crowd-sourced ratings site, like the TripAdvisor site currently used for rating travel experiences, will be more useful and up to date than a series of formal reports. Employers, on the other hand, will be investing in MOOCs by allocating staff time to them and by hiring on the basis of the credentials gained. They will be looking to quality assurance agencies to provide unbiased assessments of course design, educators and outcomes. Overall retention

may not be an issue, but employers will want to know that learners on particular learning pathways complete courses and programmes successfully.

Government-approved organisations will also have an important role to play in the qualification system. This is an international form of education, so the credits that can be gained should be recognised worldwide. Some of these will be associated with professional bodies, but countries will need a way of ensuring that qualifications are consistent, that they are assessed rigorously, and that the potential for cheating and misconduct is reduced as far as possible.

Governments will have an important role in agreeing, regulating and funding quality assurance and qualification systems. They may also have a role in ensuring that sufficient MOOC educators are trained, and that school curricula prepare children to be lifelong learners. Governments will also be able to take a lead in encouraging the development of open educational resources and the sharing of publicly funded research. They will ensure that MOOC providers take a responsible attitude to child protection, to the curation and analysis of personal data, and to the moderation of online debate. Through funding, legislation and research, they can enable the development of MOOCs that open up education, meet society's needs and make use of the benefits of learning at scale.

By 2030, it is unlikely that we will still be using the term MOOC. What MOOCs have initiated is an understanding of how higher learning can be offered online at massive scale. As universities, companies, governments and non-government organisations enter this world of massive online learning, they will encounter not only economies of scale, opportunities to enter new education markets, and ways to disseminate their ideas worldwide, but also the traditional education issues of teacher education, course

design, quality assurance, examination, and accreditation, recast for a global body of students. The roles of universities will change as they seek to expand their programmes for online learning, with all the issues associated with students from many locations and cultures engaging in learning at a distance. Nevertheless, the university will have a place in this new mix, not only as a site for premium campus services but also as a trusted examining body. Universities will also play a significant role as leaders of research into innovative pedagogical practices.

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