TECHNOLOGICAL DEVELOPMENTS AND TERTIARY EDUCATION DELIVERY MODELS:

The arrival of MOOCs
Massive Open Online Courses

MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

Tertiary Education Commission
Te Amorangi Mātauranga Matua

Contents

Executive summary

Introduction

Internationally, a number of emerging technologies and associated developments are becoming available that could have far-reaching effects on the delivery of tertiary education and tertiary education institutions' operation, particularly their infrastructure requirements. These emerging technologies include mobile devices, virtual or augmented reality, simulations, gaming and social media, and associated data analytics. They can also achieve economies of scale in tertiary teaching and learning.

This paper examines one development, the Massive Open Online Courses (MOOCs), rather than doing a general overview of emerging technologies. The paper focuses on MOOCs because of their potential to disrupt tertiary education and the significant opportunities, challenges and risks that they present. MOOCs are also the sole focus of this paper because of their scale and the involvement of the elite United States (US) universities.

It is intended that this paper will be the start of an ongoing dialogue between and among government agencies, institutions, employers and learners on the appropriate policy settings and institutional operations so that these emerging technologies can more effectively support tertiary education. This process is likely to evolve over the duration of the New Zealand *Tertiary Education Strategy 2014–2019* (Ministry of Education, 2014) and potentially beyond.

MOOCs phenomenon

MOOCs have their origins in previous distance education delivery, online learning ventures and the Open Educational Resources movement. However, there are important differences including the large numbers of learners, the involvement of elite institutions and the trialling of alternative revenue schemes. Unlike earlier online efforts, MOOCs are also typically fees-free, generally do not offer formally recognised credits and often do not have any prescribed teacher–student interactions.

MOOCs are now being offered primarily through US-based consortia but are also being established in other countries. In New Zealand, three institutions have recently become involved with MOOCs: Massey University, through the Open Universities Australia consortium, the University of Auckland, via the United Kingdom's FutureLearn consortium, and the University of Waikato (an internal effort focused on a specialist area of provision).

Implications of MOOCs

The impacts of MOOCs could be far reaching because they can disaggregate teaching and learning processes, including assessment, and offer new services. This unbundling could, for example, allow learners to undertake a fees-free course while paying for assessment and accreditation. In respect of new services, the largest MOOC consortium is offering identity and assignment verification for learners.

For tertiary institutions, MOOCs present various opportunities, including the ability to extend their brand and reach to a large international audience. MOOCs allow institutions to experiment with innovative pedagogical approaches to improve their provision. They allow niche provision to be offered at scale, which can make them financially viable. MOOCs can also potentially reduce costs.[1]

New Zealand institutions that have high international rankings in particular subjects or disciplines can offer these through MOOCs to a large international audience as an entrée and use them to attract learners. MOOCs allow institutions to engage more easily in collaborative ventures where resources and expertise can be pooled and allocated more efficiently to support improved learner outcomes.

For learners, MOOCs can provide alternative pathways to 'just-enough, just-in-time and just-for-me' knowledge and improved connections to employers. They offer cheaper alternatives to traditional university qualifications through fees-free models or 'hybrid' models, such as the MOOC master's programme offered by Georgia Institute of Technology (Georgia Tech), which reduce the cost and time to complete the qualification.

For employers and employees, MOOCs can effectively support lifelong learning, continuing education and professional development. They also allow for more customised provision to be delivered in a timely manner that can reduce the costs associated with off-site training.

As with many changes concerns have been expressed about MOOCs. Generally these focus on the potential impacts of MOOCs on the workforce, pedagogical approaches and delivery models. Teacher-learner interaction, learner networking and social capital, and lack of structure, particularly for inexperienced learners have also been raised.

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[1] According to a McKinsey Global Institute (2013) report, mobile internet use could generate a 10–30 percent productivity gain in tertiary education and training by 2025.

A way forward

So what do the New Zealand Government and institutions need to consider about technology-enabled learning and MOOCs to support more effective institutional operations (including teaching and learning environments)? The overarching questions that government, education agencies and the sector need to consider are:

- What will tertiary education delivery look like in 2030?

- What kinds of opportunities and challenges do technological developments, including MOOCs, present to the current policy, regulatory and operational arrangements for tertiary teaching and learning in New Zealand?

- How can New Zealand make the most of the opportunities and manage any associated risks and challenges?

1 Introduction

1.1 Context

Tertiary education is facing a complex set of financial, technological and political challenges. These challenges are not only influencing the current delivery of tertiary education provision but are also likely to have a major effect on the future delivery and content of the teaching and learning experience (Ehrenberg, 2012). One of the challenges relates to the rate of change in technological development.[2] This can both significantly influence education delivery and address other important challenges, especially the costs and affordability of tertiary provision.

Previous shifts in information technologies, such as the invention of writing and the printing press, and the emergence of textbooks, revolutionised the teaching and learning experience (Darnton, 2008). Modern technological developments could equally affect education delivery because they can provide education ubiquitously and 'just-in-time'. For example, digital technologies supported by fast broadband can lead to new modes of internet-based provision that are more flexible and less place based.

In addition to these wider changes, the New Zealand *Tertiary Education Strategy 2014–2019* (Ministry of Education, 2014) notes that New Zealand tertiary education institutions need to consider the impacts and implications of technology-driven changes to the delivery of their provision and how they engage and interact with learners and wider communities (including employers).

1.2 Purpose

This paper aims to assist the Ministry of Education and the TEC and other decision-makers in the tertiary education sector to gain a better understanding of the newer technology-enabled delivery models. It will also allow them to consider the impacts and the implications of them on learners, employers, tertiary education institutions and government.

The paper uses the example of MOOCs and their associated trends, opportunities and challenges as a case study to illustrate these impacts and implications. It is a discussion paper and does not seek to make recommendations but rather provides a basis for wider debate and consideration about the place of technology-supported delivery models in the tertiary education system and its associated sub-sectors.

The authors' views expressed in this report do not necessarily reflect the views or policy of the Ministry of Education or the TEC.

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[2] The pace is accelerating at an unprecedented rate. It took 38 years for radio to reach 50 million people, 13 years for television, four years for iPod, three years for the internet, one year for Facebook and nine months for Twitter (McKinsey Global Institute, 2012).

1.3   Methodology

The paper is informed by a desk-top literature scan and selected interviews. The literature scan comprised both research literature from sources such as journals and publicly available reports and 'grey' literature including media articles. The 'grey' literature is important because MOOCs are a relatively new phenomenon, so academic literature on them is limited.

Selected interviews focused on tertiary sector e-learning experts including the Tertiary e-Learning Reference Group established by the Ministry of Education and Ako Aotearoa (the National Centre for Tertiary Teaching Excellence). However, the paper is mostly informed by the literature scan and developments in the United States, because that is where most of the MOOC activity is occurring.

2   Distance education delivery models

Distance education has a long history, starting with paper-based delivery in the 19th century in the United States (US), which used postal services for the exchange of study material to learners and for submission of assignments.[3] While this core delivery model is still used, further developments in distance education have emerged with each new communication technology: radio, television, video recorders and, recently, web-based and mobile technologies, which leverage the widespread penetration of personal computers and mobile devices into society. These web-based technologies in particular, which are already used by many tertiary education institutions, have also supported the emergence of MOOCs – a term coined in 2008 to describe an open online course offered by the University of Manitoba in Canada.[4]

The MOOCs phenomenon, despite its apparent originality, needs to be viewed in the wider context of distance education, e-learning and the other changes that are taking place in tertiary education at a time of increasing globalisation of education and constrained budgets. It also needs to be seen in the context of pre-existing concerns in tertiary education about government funding for tertiary education, access to study, student loans, teaching, learning and research quality, assessment practices and institutional restructuring, because MOOCs could affect these areas.

Even if MOOCs are merely the latest manifestation of distance delivery, their rapid development is generating considerable debate in the tertiary education sector. This is because they are being offered by elite universities, have expanded rapidly (with hundreds of courses now being offered in a wide range of subject areas) and have attracted a large number of learners. Media reports suggest that more than 10 million learners have already enrolled in MOOCs and the enrolments are growing rapidly, as illustrated by Figure 1, which is slightly dated but still represents the current growth trend.

Some of the elite tertiary institutions in the US – Harvard, Stanford, Massachusetts Institute of Technology (MIT) and Princeton – are the MOOC pioneers and are heavily involved in the three big MOOC consortia – Coursera, edX and Udacity. These MOOC consortia are the fastest moving start-ups in tertiary education to date. The popularity

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[3]   Distance education started as 'correspondence courses' in 1852. The first course was the Pitman Shorthand training programme, which brought stenographic practices to the US, and distance learning achieved academic recognition in 1892 when the University of Chicago created the first college-level distance learning programme (Casey, 2008).

[4]   Dave Cormier first described Siemens and Downes' 'Connectivism and Connective Knowledge' course as a MOOC. This online course was initially designed for a group of 25 enrolled, fee-paying learners to study for credit. At the same time, it was open to learners worldwide by free registration. As a result, over 2,300 people participated in the course without paying fees or gaining credit.

of the MOOCs phenomenon has led many to ask if this could be a disruptive innovation[5] in tertiary education.

Figure 1: Coursera's enrolments February 2012 – March 2013
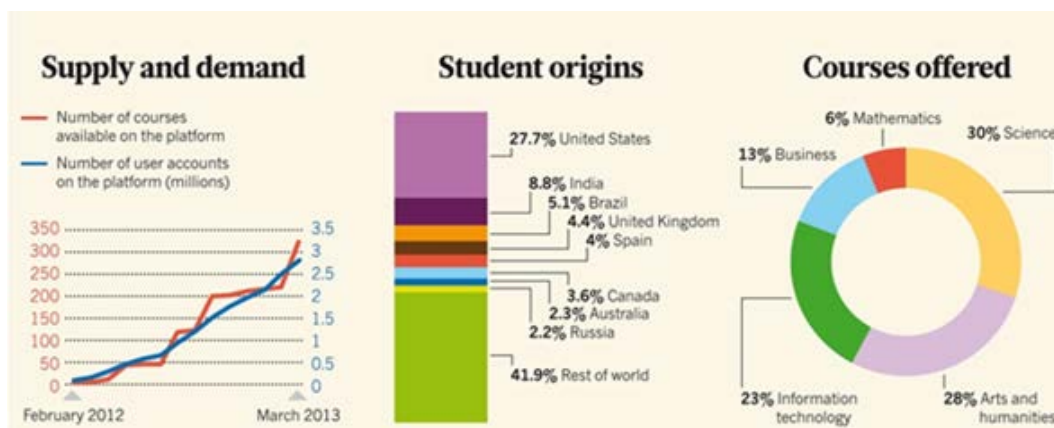
Source: Adapted from Waldrop, 2013.

MOOCs appear to present a number of opportunities. These include extending the reach (and brand and reputation) of institutional provision (particularly in areas where they specialise or have expertise), having the potential to obtain more revenue from different sources, reducing the cost of provision and providing an environment that allows experimentation with innovative teaching and learning approaches.

2.1   MOOCS – a primer

While MOOCs are the latest iteration of distance education, they are different from traditional distance education provision, which charges tuition fees, awards qualifications and restricts enrolment to a limited number of learners. In contrast, MOOCs are usually free, do not currently lead to a formal qualification and have no real restrictions on student numbers. The most important differences between traditional distance education and MOOCs, other than the sheer scale of MOOCs, are the multi-faceted use of emerging technologies to support delivery, interactions, assessment and data analytics,[6] and experiments to substitute teacher–student interactions with peer-to-peer ones.

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[5]   Disruptive innovation describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors (Bower and Christensen, 1995).

[6]   See discussion in section 3.5.

An important self-professed aim of MOOCs is to provide free access to tertiary education for as many learners as possible and to progress the kind of ideals reflected in the Open Educational Resources (OER)[7] movement.

Two broad categories of MOOCs have emerged and they are differentiated on the basis of their pedagogical emphases and organisational models: c-MOOCs and x-MOOCs. c-MOOCs are based on the connectivist model of learning,[8] which places a high value on learner autonomy, diversity, connectedness between learners and peer interactivity. Learners in c-MOOCs determine the extent of their participation and are encouraged to collaborate and share with one another in the learning process through peer-to-peer interactions.

Essentially, c-MOOCs are an experiment in pedagogy and educational organisation. They have moved away from the model of one person holding all the knowledge and disseminating information to knowledge receivers to one where knowledge is co-created by teachers and learners and disseminated through multiple networks, some of which are non-institutional. The original MOOC offered by the University of Manitoba is an example of a c-MOOC.

In contrast, the x-MOOCs (which have emerged as the dominant model), while scaling up knowledge dissemination, are typically based on a traditional delivery approach, in which knowledge is passed from a teacher to a learner in a one-to-one and one-way interaction. They are usually offered through proprietary learning management platforms. However, like c-MOOCs, their assessments are typically automated or carried out by peers.

x-MOOCs have been criticised for adopting these teaching and learning approaches at scale, with some believing that, without the possibility of direct interaction between teachers and learners, they are suited only to certain quantitative disciplines (especially computer science). Some think that x-MOOCs are unable to effectively teach higher-order skills such as critical thinking.[9] However, despite the criticism of pedagogical methods of the x-MOOCs model, a recent Gallup survey of US university and college presidents found that 44 percent of the 889 surveyed respondents considered that they offered potential for pedagogical creativity.[10]

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[7] OERs are digitised materials offered freely and openly for educators, learners and self-learners to use and reuse for teaching, learning and research. They include learning content, software tools to develop, use and distribute content, and implementation resources such as open licences.

[8] Connectivism is a theoretical framework for understanding learning. In connectivism, the starting point for learning occurs when knowledge is actuated through the process of a learner connecting to and feeding information into a learning community (Kop and Hill, 2008).

[9] Some evidence suggests that purely online learning is not suited to foundation learners unless learning materials deliberately teach literacy and numeracy learning needs.

[10] Gallup (2013), *Gallup-Inside Higher Ed College and University Presidents Panel – Inaugural survey findings*. The poll also found that the university and college presidents did not expect online education to solve colleges' financial challenges or improve all learners' learning.

Others also point out that, because of the licensing regimes and restrictions put in place by some of the MOOC consortia, MOOCs are not genuinely 'open' to learners worldwide. However, the MOOCs environment is rapidly evolving and changing in response to major identified problems, and newer models are being developed. These newer models of MOOCs are increasingly blurring the boundaries between x- and c-MOOCs and online and physical classrooms through their experimentation with online tools, OERs and new ways of engaging learners.[11]

For example, the last quarter of 2013 saw the emergence of the Small Private Online Courses (SPOCs)[12] model, in which the number of learners is limited and the courses have entry requirements that allow for a more customised approach. SPOCs use a more conventional 'blended learning' approach that combines traditional delivery with online learning. In common with MOOCs is the fact that the courses are free and delivered through the internet.

Early x-MOOC providers, including Harvard and the University of California, Berkeley, are among the universities beginning to experiment with this more refined model. SPOCs may provide a way to address one of the biggest problems for MOOCs, namely how they can be formally assessed and credentialed. This issue is discussed later in this paper.

2.2   How MOOCS work

MOOCs are generally of short duration (four-to-six weeks) and have no entry requirements. The x-MOOCs delivery format involves learners watching a series of short videos prepared by the lecturer and are typically supported by online quizzes.

An important feature in MOOCs is interaction among learners through posting comments in online forums (unlike traditional distance and on-campus education, where generally student–teacher interactions are built into the course design and associated pedagogical approach). Some MOOC lecturers organise face-to-face study groups in various physical locations or through the provision of separate online forums for learners. These models have been adopted because of the number of students enrolled in MOOCs and their geographical distribution.

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[11]   A course on the Coursera platform drew on c-MOOC principles by dispensing with the more conventional video format and focusing on sets of resources for use each week alongside exercises and student contributions. A variety of web-based interactive tools, such as an electronic circuit builder and molecular manipulator, has also been developed for a better pedagogy. Some MOOCs are also attempting to encourage alumni to participate in courses to help provide additional support and guidance for learners.

[12]   Coughlan (2013).

2.3   MOOCs consortia

MOOC consortia consist of a number of tertiary institutions but they often also include non-educational partners. One of their primary functions is to aggregate content from many different sources by providing platforms that bring together multiple MOOCs.

US MOOCs consortia

The three biggest MOOC consortia – Coursera, edX and Udacity – are US based.

Coursera is a for-profit consortium that started with a US$22 million investment from venture capitalists and elite universities including Stanford and Princeton. This is the biggest consortium, with 625 institutional partners and 615 courses. As of February 2014, Coursera had enrolled more than 6.5 million learners[13] on its platform, in a wide range of courses from computing to humanities.

edX is a non-profit consortium founded by MIT and Harvard University with a US$60 million investment. As of February 2014, it had partnered with 32 universities and 12 other institutional contributors and was offering 157 courses, mostly from its founders. It has nearly 2 million enrolments in its courses, which are focused on science and technology.

Udacity is a for-profit start-up with a US$21 million investment from venture capital firms. It had 35 online courses as of February 2014 and about the same number of enrolments as edX. Udacity, unlike the other consortia, designs and produces its MOOCs in house and focuses mostly on computer science related topics. It uses external companies like Google and Microsoft. Its model of content delivery challenges the traditional role of academics as subject matter experts and deliverers of the content and is an example of MOOCs' ability to 'unbundle' services.[14] Because of the low completion rates, Udacity recently announced it would no longer focus on academic provision for its MOOCs but, instead, would shift its attention to vocational, industry-specific offerings.

Udemy is a different kind of consortium that allows anyone to teach and participate in online video classes. It was founded in 2010 with a US$16 million investment. Another such consortium is **P2Pu**, which was launched in 2009. It has adopted a community-centred approach to provide opportunities for greater social participation. As with Udemy, anyone who is willing to teach and learn online can participate in P2Pu.

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[13]   This represents an increase in the number of students by 1 million within a span of three months and a fourfold increase in the number of partners.

[14]   The concept of unbundling is discussed in section 2.4 below.

International consortia

The US-based consortia have prompted players in other jurisdictions to establish their own consortia.

- **OpenupEd** is a pan-European consortium established with European Union funding in April 2013.

- In the United Kingdom, **FutureLearn** was launched in December 2012 as a private company wholly owned by The Open University[15].

- **Alison** is an Irish MOOCs platform that focuses on vocational courses.

- **Iversity**, a German MOOCs platform, was developed in 2008 from a university administrative tool designed to manage student records.

- **Université Numérique** is a French MOOC platform working in partnership with edX.

- Open Universities Australia started the **Open2Study** MOOC platform in March 2013.

- The Japanese consortium is a Tokyo-based **Schoo** platform that was established in October 2012.

- In China, the **XuetangX platform** began working in partnership with edX in early 2013.

- India has the **EducateMe360** consortium and is planning to launch at least two more.

- Mexico and Brazil have their own **MOOCs** platforms.

- Jordan is working with edX and has recently announced a MOOC consortium referred to as **Edraak**. This is intended to provide Arabic language provision right across the Middle East and Arab speaking world.

While there is no MOOCs platform in Africa, the World Bank is funding Coursera to offer Africa-specific MOOCs in the second quarter of 2014 (Lee, 2013). These courses are designed to meet the demand for practical solutions-oriented learning on pressing issues in African countries.

MOOCs in New Zealand

A few New Zealand tertiary education institutions are offering MOOCs and/or have joined some of the MOOCs consortia referred to above. Interestingly, none have joined a US-based consortium.

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[15] The Open University is a distance learning and research university founded by Royal Charter in the United Kingdom. The university is funded mainly by student fees and teaching and research grants by the higher education funding bodies throughout the United Kingdom.

Massey University

In November 2013, Massey University offered its first MOOCs ('Agriculture and the world we live in' and 'Emergency management', with a total of 1,252 learners) through its partnership with the Australian Open Universities consortium Open2Study.

The University of Auckland

In October 2013, the University of Auckland announced it would partner with FutureLearn, the United Kingdom MOOC consortium. At the time of writing, the University of Auckland has not started delivering courses through the platform, but is expected to do so during 2014.

The University of Waikato

In September 2013, the University of Waikato became the first New Zealand provider to offer a MOOC ("Data Mining with Weka"). Rather than partnering with a MOOC consortium, Waikato developed the MOOC internally using the open source Google Coursebuilder platform. The course itself runs in the Google App Engine cloud. In Waikato's open source MOOCs course materials are issued under a Creative Commons licence and its video content is freely available on YouTube.

Waikato has taken this route to give its staff experience and knowledge of MOOCs. It has also allowed them more flexibility about how the courses are developed, deployed, and disseminated.

In contrast to these universities, the **University of Otago** has made it clear it will not be joining in with the MOOCs phenomenon because of its belief in the superiority of traditional delivery and the associated on-campus educational and social benefits, as well as concerns about the viability and sustainability of MOOCs.

Open Educational Resources universitas (OERu)

While not a MOOC platform, the OERu aims to enable learners to study for free, from anywhere in the world, using courses based on OER. These courses will be able to be completed through the use of alternative non-institutional pathways, and learners completing them will get recognised credentials. Learners will be able to pay reduced fees if they want to get academic credit and only pay for assessment if and when they are ready. New Zealand institutions involved with OERu include the Otago Polytechnic (one of the founding and most active members), Nelson Marlborough Institute of Technology, University of Canterbury, Waikato Institute of Technology, Open Polytechnic of New Zealand, Northland Polytechnic, Lincoln University and Unitec Institute of Technology.

New Zealand's relative inactivity in MOOCs reflects the fact that, before 2013, MOOCs were largely confined to the US. However, earlier thinking on MOOCs has led to a formal request by the Minister for Tertiary Education, Skills and Employment to the Ministry of Education to organise an event on delivery models including MOOCs in June 2014, in

collaboration with the TEC, New Zealand Qualifications Authority (NZQA) and Education New Zealand.

2.4   MOOCs and unbundling of educational services

MOOCs have the potential to 'unbundle'[16] educational delivery, as shown in Figure 2. In the traditional model of tertiary education, an institution delivers a 'bundle' of experiences, knowledge and skills to a learner in one setting, whether they need all of these services or not.
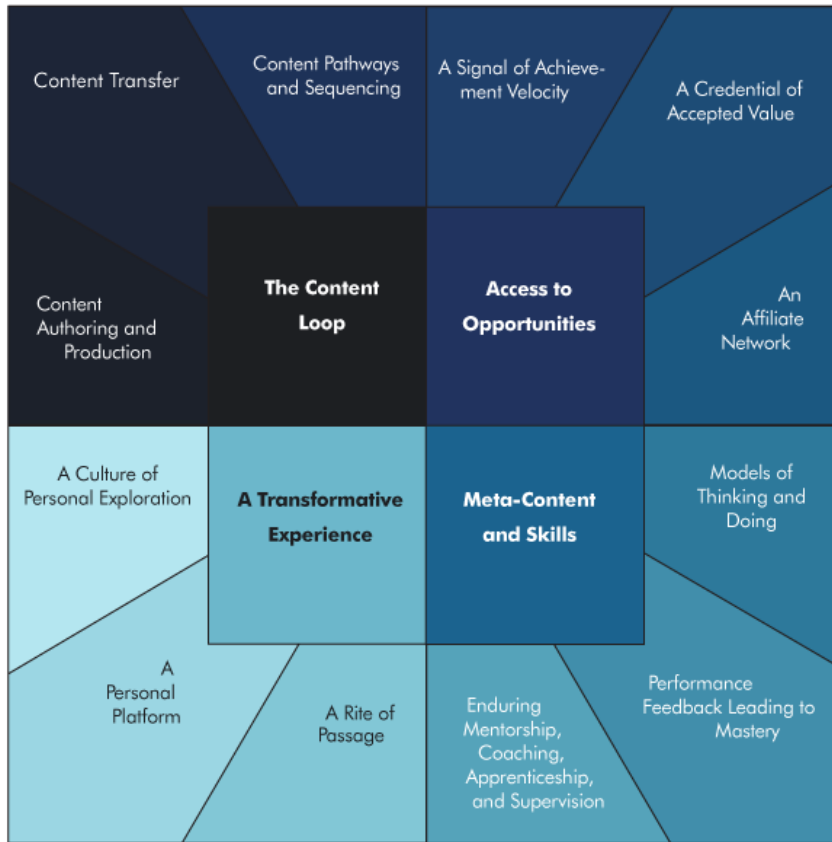
Unbundling educational provision and its associated services along functional lines would substantially increase learner options. Allowing non-educational organisations to offer services in addition to existing institutional offerings would also increase competition and innovation, as has been the case in other sectors of the economy.[17]

One of the important components of 'unbundling' is the ability to disaggregate course development and teaching from assessment and accreditation. MOOCs therefore allow for differential pricing of ancillary or associated products and services, as well as the pursuit of marketing activities. This also offers the potential of making available more individualised instruction and giving learners freedom of choice about the delivery and scheduling of courses, the pace at which they learn and complete their studies, and where they learn.

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[16]   The concept of unbundling has been debated since the 1970s. Wang (1975) proposed unbundling the services provided by American law schools. He argued that learners did not have the opportunity to pay for just the services they wanted and were unable to buy each of the services from different institutions if they wanted to. He further argued that these services could be rendered by many different kinds of organisations, each specialising in only one function or an aspect of one function. He termed these services (1) impartation of knowledge, (2) counselling/placement, (3) credentialing, (4) coercion and (5) club membership.

[17]   In the late 1970s, the computer industry was dominated by huge, vertically integrated companies like IBM and Digital Equipment. With their vast scale advantages and huge installed bases, they seemed unassailable. However, innovation shifted the power in the industry in the next decade. They were struggling to survive while smaller, highly specialised companies like Apple Computer, were expanding their influence. The Apple II's open architecture unlocked the computer business, allowing the entry of many new companies that specialised in producing specific hardware and software components. The advantages of these companies (size, reputation and integration) began to decline. The new advantages (creativity, speed and flexibility) belonged to the specialist (Hagel III and Singer, 1999).

Technological developments and tertiary education delivery models –
The arrival of MOOCs: Massive Open Online Courses

Figure 2: Bundling of educational services

Source: Staton, 2012.

2.5   MOOCs business model

MOOCs are experimenting with various standalone business models to find a financially viable 'bundle'. As at February 2014, none had succeeded, despite the trialling of many models. This situation – very rapid growth of a large number of experimental business models, followed by a 'weeding-out process' that eliminates most of them – is typical for high-tech venture capital financed companies like Silicon Valley start-ups.[18] Government decision making about the funding and regulation of MOOCs will have a substantial influence on which of these (or yet to be developed) models might emerge as being sustainable. The situation could also change if MOOCs become part of the publicly funded tertiary education system.

The most common business model used is the one adopted by Coursera, where learners who wish to obtain recognition of completion are charged. Coursera is experimenting with a career service that makes money by connecting employers to its learners. It also recently started a student identity verification service to generate revenue (see Box 1). As a result of these initiatives, Coursera has accrued US$1 million in revenue within one

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[18]   The three pioneer MOOCs providers – Coursera, edX and Udacity – originated in Silicon Valley.

year of its establishment. It is also generating revenue by partnering with the World Bank (World Bank, 2013).

Coursera has established partnerships with five academic publishers and Chegg (an online platform for textbook rental and sales). This model enables publishers to provide content to a large number of learners, at reduced cost, on a revenue-sharing basis with MOOCs providers.

Coursera is also partnering with the US Department of State to expand learning opportunities worldwide as part of the department's MOOC Camps initiative, which is intended to promote interest more generally in US higher education.[19]

In a similar way, FutureLearn is allowing the British Council[20] to access its platform, with the aim of bringing "high quality English materials to every learner or teacher who wants them around the world".

Box 1

Coursera's Signature Track
Price: US$30–$100 per course

- To join *Signature Track*, learners build a *signature profile* that links their coursework to their identity. The *signature profile* includes photo ID, as well as the learner's *signature phrase*, a biometric profile of their unique typing pattern. Every time coursework is submitted, learners easily authenticate their identity by typing their signature phrase.

- When a *signature track* is successfully completed, learners receive a *verified certificate* issued by the participating university and Coursera. Learners are also able to share their course performance electronically in a verified format via the *certifiable course records page* – similar to an academic transcript.

- The *verified certificate* does not include credit towards a degree nor does it make them a learner at the issuing university. Instead, the *verified certificate* proves a learner met the passing criteria of their online course.

Source: Adapted from Gallagher and Garrett, 2013.

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[19] The MOOC Camps initiative has been designed to offer broad learning opportunities to help meet the aspirations of young people around the world and offer skills and knowledge they can use to succeed in life. They also offer learners a chance to experience a US higher education experience. It is expected that programme learners will also be able to learn more about opportunities to study in the US (United States Department of State, 2013).

[20] The British Council is the United Kingdom's international organisation for educational opportunities and cultural relations. It is a public corporation but operates at arm's length from the government.

Udacity is adopting a different approach. It is working directly with companies to provide more customised courses to train their existing and future employees. AT&T[21]is part of a partnership with Udacity and Georgia Tech that offers a master's degree in computer science. The course is run on a semi-traditional basis, where the course materials are free but learners pay around US$7,000 for tuition, assessment and certification of their learning. This is significantly cheaper than Georgia Tech's on-campus version (see Box 2 for further details).

MOOCs are starting to license technology to universities. For example, edX is selling its technology to universities that are interested in offering MOOCs. It is also partnering with foreign governments (including France, China and Jordan) to offer MOOCs. Alison, the Irish MOOCs provider, is generating revenue by selling advertisements on its site. Given the nature of MOOCs, crowd-funding is yet another possible source of revenue. For example, an institution could indicate that it would offer a MOOC when 100,000 people had committed to paying $1 for it.

Box 2

Georgia Tech: Online Master of Science in Computer Science on Udacity's MOOC platform

Georgia Tech is collaborating with Udacity and AT&T* to offer a Master of Science in Computer Science completely online. Learners will have to meet the entry requirements and pay tuition fees. This is a different model from MOOCs, and it is different from a traditional online course in terms of scale, cost, assessment, use of data analytics and business model.

This MOOC programme will be available to students all over the world. The current campus intake is 300 students, but the MOOC programme is expected to have thousands of learners.

The total cost of gaining the qualification through this MOOC programme will be less than US$7,000, whereas the on-campus version of the same course costs US$25,000 for Georgia residents and US$60,000 for non-Georgia residents.

Learners sit examinations at proctored centres. Assessments are graded by Georgia Tech instructors and an automated process developed by Udacity. The learners determine their own weekly workloads.

This initiative has had a mixed reception. While some applaud the innovation and potential equity gain of providing high-quality education to those who may not otherwise be able to afford it, others have raised concerns about the:

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[21] AT&T is an American multinational telecommunications corporation.

- return to taxpayers: what are the benefits for the people of Georgia?

- loss of academics: Georgia Tech plans to have up to 10,000 students enrolled in the future but intends to hire only an additional eight instructors

- value of the qualification: the MOOC programme may dilute the value of the traditionally taught master's degree in computer science offered by Georgia Tech.

This is an example of unbundling and collaboration. Georgia Tech provides the learners and teaching staff; Udacity provides the technology to put these classes online and the labour to interact with and effectively support the expected large numbers of learners. AT&T has injected the cash to make the innovation possible, and Georgia Tech and Udacity will split the profits. AT&T gains access to skilled learners and gets a reputational boost from being involved.

* AT&T will use the graduates as a recruitment source.

Source: Rich Vuduc, Director Computational Science and Engineering, Georgia Tech (pers comm, 2013), and www.omscs.gatech.edu

2.6   Drivers of MOOCs

Several recent developments have helped MOOCs grow quickly, including the increasing cost of tertiary education, technological progress, the changing global economy, the emergence of lifelong learners and the lack of alignment between tertiary provision and the job skills needed. This section discusses these developments in relation to MOOCs.

Cost

Tertiary education at degree level is expensive in both monetary and time terms. Baumol et al (2012) note[22] that a major problem afflicting tertiary education is that over time the cost of tertiary provision has been rising relative to the cost of other types of services and manufacturing. This is happening at a time when tertiary education is, for the first time in history, a near-compulsory prerequisite for entry to the skilled labour market in much of the developed world.

Christensen et al (2011) argue that one of the reasons for the escalating cost problems in tertiary education is the inefficient business model of tertiary provision. Universities produce and provide a range of services including teaching, assessment, accreditation

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[22] Baumol et al (2012) found that the costs of health care, education and the live performing arts have risen at a rate significantly greater than the economy's rate of inflation, because the quantity of labour required to produce these services is difficult to reduce compared with manufacturing. Labour-saving productivity improvements have been occurring in most manufacturing activities with technological developments since the Industrial Revolution. For example, the average consumer's educational costs in the US have risen by over 7 percent per year during the past 30 years, whereas the consumers price index increased by nearly 4 percent per year.

and student facilities as a bundle to all their learners, whether they all need all of the services or not (described in section 2.4 above).

The net result is that many more people worldwide are facing the challenge of acquiring tertiary education at a higher price, and governments are looking for ways to fund essential provision equitably without undue pressure on the public purse. With their potential to deliver mass low-cost education and their ability to unbundle services, MOOCs are seen by many as presenting a promising way to reduce these costs.

Technology

Wider use of information technology (and, in particular, personal mobile technologies and social media) is transforming the way services are delivered and interactions are conducted across a range of industries, including entertainment, communication, retail and banking. However, so far, they have had limited effect on tertiary education.

The second generation internet (generally referred to as Web 2.0) has dramatically lowered the costs of delivery and increased the feasibility of a quality and sustainable online education platform; but access to the internet could be an issue. For example, only 80 percent of New Zealand households have internet access and households with an annual income under $30,000 have significantly lower access (Statistics New Zealand, 2012).[23]

Technology can also provide unprecedented insight into how students learn and can inform targeted and timely interventions to improve their performance and outcomes. Learning analytics can help providers assess progress and focus on an individual student. Some analytical tools have been developed to track students' academic performance by integrating their data collected from a variety of information management systems. These allow staff to identify at-risk students, initiate early interventions and support collaborative learning.

For example, the Signals project at Purdue University uses the data collected from student information systems, learning management systems and the grade book for a specific course to track students' performance and identify at-risk students in real time. By using various analytics tools, students can review their learning progress and teachers can personalise learning for students and provide additional support in specific areas.

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[23] Only 55 percent of households in the $10,001–$20,000 income bracket have access to the internet and 64 percent of households in the $20,001–$30,000 income bracket. However, individuals, particularly the working-age population and including low-income individuals, have better access to the internet. More than 85 percent of individuals in the 15–64 age group have access to the internet, with the highest being the 35–44 age group (89 percent), followed by the 25–34 age group (88 percent).

At the same time, access to students' data and how it is stored, managed and disseminated raise ethical questions about its privacy and confidentiality.[24] Technology has provided many ways by which individuals can be observed, monitored and their behaviours analysed. In a learning context, these have been traditionally regarded as relatively private spaces, where students can safely explore many areas without exposing their experience to public scrutiny. Aside from breaching their ethical and privacy obligations, students if watched by third parties can affect the reputation of the provider (as has occurred with Facebook and other social media companies).

Labour market needs

The gap is increasing between the supply and demand for skilled labour. The gap has been exacerbated by a skills mismatch. A recent McKinsey Centre for Government report[25] highlights the paradoxical issue that there are high levels of youth unemployment at a time when there is a chronic shortage of skilled workers.

One of the report's main findings is that employers, education providers and learners have fundamentally different understandings of the skills required for the job market. Less than half of learners and employers believe that new graduates have adequate skills for entry-level positions. In contrast, 72 percent of institutions believe that graduates are well prepared for their working lives. This situation has prompted MOOCs providers (like Udacity) to partner with employers and offer courses that better meet their needs.

270,000: Number of students enrolled in Udacity's Introduction to Computer Science MOOC

200,000: Number of US university first-years intending to major in computer science
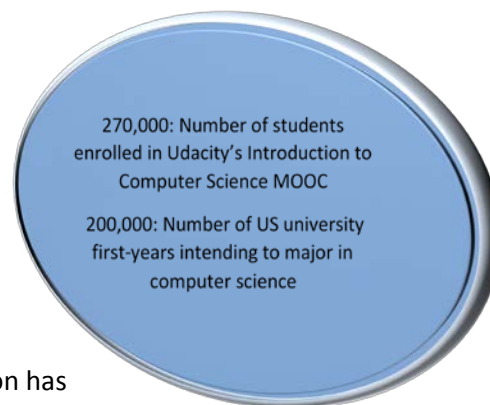
Learner demand

Demand for access to tertiary education is growing worldwide, with the projection that there will be 120 million learners by 2020 (Yuan and Powell, 2013). The combination of globalisation and technology (through the pace of its associated innovations) is transforming the global economy, leading to unprecedented demand for new skills, both for new entrants to the labour market and for existing workers who need to up-skill or change careers. Recent research suggests that the greatest skills shortage may be for vocational 'sub-degree' skills rather than for degree-level training (Carnevale et al, 2013).

Learner demand is growing for lifelong learning supported by new technological media and models – where learners are choosing what they learn and where and how they

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[24] This is not in any way new or unique to MOOCs. It has always been the case that tertiary education organisations have access to a lot of student data and could potentially misuse it.

[25] The report, *Education to Employment: Designing a system that works* (Mourshed et al, 2012), was based on a survey of more than 8,000 young people, employers and education institutions in nine countries.

learn it. Learners are looking for provision that is flexible and accessible but that has institutionally (and, indirectly, government) backed quality assurance.

It is unlikely that traditional tertiary provision, even with massive investment, could meet this projected global demand, but MOOCs may be able to. Currently, the extent of student participation in MOOCs is a fraction of the overall global student population. However, it is difficult to forecast learner demand, because there is limited information about why learners are doing MOOCs and because MOOC offerings are changing so quickly. It is also unclear whether learner-driven models (like Coursera) or employer-driven models (like Udacity) will prove more successful (or whether there is room for both).

Whatever the case, there appears to be latent demand for wholly online learning, as demonstrated by the large and rapid increase in Coursera enrolments.[26] It is also likely there will be demand for 'just-in-time, just-enough and just-for-me' work-based learning and training as the need to up skill and/or change careers gathers pace, driven by changes to the global economy and labour market. MOOCs are well suited to provide this type of training. These factors make it likely that learner demand will continue to be one of the main 'market forces' driving the growth and development of MOOCs.

Conformity

Some commentators note that the main rationale for institutional participation in MOOCs is the 'fear of missing out'. If a large number of institutions are offering MOOCs, including most of the global elite, then other institutions feel a need to participate, fearing the consequences if they do not. These consequences could include a loss of learners, revenue and reputation.

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[26] From 2011 to 2014, Coursera enrolments increased from about 3.5 million to 22.2 million (Coursera, 2014).

3 Implications of MOOCS

While the development of MOOCs has been rapid, their long-term effect on education and learning is not yet clear. The initial wave of interest may be driven by marketing hype, the excitement associated with innovation or the involvement of the elite US universities.

On the other hand, MOOCs could prove to be a substantive and enduring addition to education provision. If so, this could have significant implications for learners, employers, educators and governments, internationally and in New Zealand. The following discussion canvasses these issues and then summarises the main challenges MOOCs will need to overcome before they can realise their potential benefits.

3.1 Economies of scale

MOOCs enable delivery of tertiary education to a mass audience worldwide, with low or no marginal cost to the provider for each additional enrolment. The obvious and important benefit for learners is access to tertiary education, especially as MOOCs are in the process of being recognised for credit. For example, the American Council on Education, one of the main accrediting organisations in the US, is now recognising some MOOCs for credit,[27] and the European Union is also working on how MOOCs might be recognised for credit.

> When one professor can teach 50,000 people it alters the economics of education.
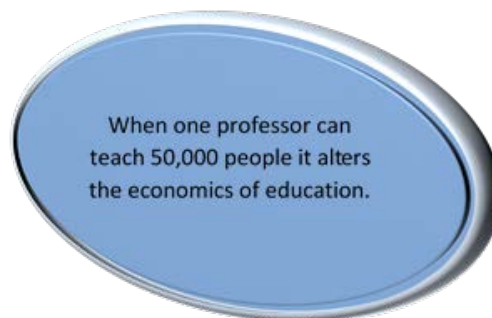
Subject to the development of sustainable business models, MOOCs may allow institutions to:

- offer, at scale, highly specialised 'niche' courses that would not normally attract sufficient domestic enrolments to be viable; this would increase the overall choice of provision available to learners

- deliver entry-level courses to very large groups of learners (potentially including school learners) and use learner analytics to identify those who need additional support or who are ready to move on to higher-level courses

- direct investment away from large 'bricks and mortar' lecture theatres and into improving provision and student support for on-campus learners.

Some institutions may choose to run MOOCs as loss leaders. They would use them as 'shop windows' to attract additional learners to their on-campus provision from a much

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[27] However, the American Council on Education can only make recommendations, which institutions can and do ignore, as appears to be the case with MOOCs. Conversations with the Ministry–Ako Aotearoa-administered Tertiary e-Learning Reference Group also suggest that professional associations may be reluctant to recognise MOOCs for their accreditation purposes.

wider geographic area than has previously been possible, in the hope that the subsequent tuition revenue would cover the cost of the MOOC. This view is supported by some instances of MOOC learners returning as fee-paying learners in on-campus credit-bearing courses (Parr, 2013c).

A fully developed MOOCs environment could change the tertiary education funding model in New Zealand, because there may be no need to fund learning for MOOCs delivered from offshore as they are free. However, assessment and other provision will still require funding, as would the development of any New Zealand-originated MOOC content. MOOCs could reduce spending on loans and allowances if large numbers of learners did fees-free courses of short duration. By incorporating MOOCs in their provision, institutions could also achieve efficiencies, particularly through the generation of economies of scale and the reduction of physical infrastructure costs.

3.2   Increasing globalisation of tertiary education

MOOCs support the 'virtual mobility'[28] of staff and learners, and may allow institutions to reach much larger numbers of international learners far more easily than is possible through traditional approaches. MOOCs also allow New Zealanders living offshore (including Māori) to connect more easily with New Zealand institutions; this is currently a student market that is difficult to access.

The increasing globalisation of tertiary education presents opportunities for institutions and learners in New Zealand and internationally because:

- New Zealand institutions can use MOOCs to showcase their areas of particular academic expertise to an international audience at scale. This might include, for example, biological sciences such as agriculture and viticulture, as well as indigenous studies, or subject areas with high rankings in the internationally recognised rankings systems, such as law

- learners in New Zealand and worldwide could use MOOCs to study under 'world-leading experts' in their chosen field, without having to leave their home countries

- depending on what kind of accreditation arrangements become possible over time, New Zealand institutions may be able to offer international learners the chance to study in New Zealand toward qualifications from elite US institutions. This would allow New Zealand institutions to compete more effectively for international student talent on the basis of student experience and immigration pathways, especially in subject areas where elite institutions have an advantage in academic terms.

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28   Virtual mobility refers to learners and teachers in higher education using another institution outside their own country to study or teach for a limited time, without physically leaving their home.

However, MOOCs could affect New Zealand institutions' plans to build their international student market share, because learners would be able to access high-quality, well-recognised, fully accredited tertiary education in their home countries.

MOOCs may also present a potential challenge to some domestic provision, because if domestic learners can study fees-free MOOCs from elite, internationally recognised institutions some of the learners may not be willing to pay for a similar course from their local institution. This may have implications for the tertiary workforce and for institutions.

Another risk for institutions worldwide, particularly in the early explorative years of MOOC development, is that they may experience some 'brand damage' if they venture into the market with MOOC products that are not judged to be of high quality. This could negatively affect an institution's reputation among its own staff, prospective learners, employers and its public funders and regulators.

3.3 Collaborative arrangements among providers

The infrastructure of MOOCs makes it easier for institutions to create and manage collaborative delivery arrangements. They are administratively fairly simple, and they remove the variation inherent in ad hoc teaching approaches based on individual academics' personal preferences.

For this reason, MOOCs could allow groups of institutions (within or between nations) to deliver standardised courses and materials, such as first-year undergraduate courses or technical modules, that are currently duplicated. They could also allow 'divisions of labour' whereby institutions could contribute their teaching expertise, others their technical expertise and so on. This is more efficient for institutions and could also ease learner pathways between them.

However, institutions engaging in collaborative MOOCs delivery may (to varying degrees) need to outsource and relinquish control over their core business, such as academic integrity and quality assurance. This has implications for the institution's reputation with its own staff, with prospective learners, with employers and with its public funders and regulators. It also represents a shift in culture and institutional identity for a sector that has a strong historically founded and enduring conception of itself.

MOOC-related consortia or less formal institutional collaborations can save money through the division of labour, as noted above, and the ability to pool resources for mutual benefit. But institutions and government will need to ensure that a division of labour and participation in collaborative ventures do not adversely affect the quality and integrity of provision.

3.4 Adaptability to the needs of individual learners and employers

Learners

MOOCs may help both teachers and learners to become more proactive and entrepreneurial rather than following predetermined pathways by (among other things) 'uncoupling' knowledge from degrees. Learners can use MOOCs to determine which delivery mechanisms, pedagogies and institutional support structures best suit their learning approaches, lifestyle and desired outcomes. Tertiary education could be more focused on critical thinking and creativity, which also supports lifelong learning.

Lifelong learning, or continuing education, is important because people are increasingly likely to have multiple careers and changing roles over the course of their working lifetime. MOOCs could allow this to occur at minimal cost and with maximum convenience and flexibility, which would be of considerable benefit to learners, particularly those with family commitments. MOOCs would allow learners to obtain only the knowledge they need 'just in time' for a low cost, rather than the traditional approach, where learners are required to do an entire course at a high cost, whether or not they need or require all of its content and knowledge. In short, MOOCs allow learners to obtain knowledge not only more cheaply but also more conveniently.

However, learners need to be aware of the trade-offs involved in undertaking off-campus study. The most important of these is forgoing the networking, social building and career opportunities that on-campus study provides.

Alternative accreditation schemes

Alternative accreditation schemes, such as badges,[29] are gaining popularity and credibility among younger learners, and they could prove to be a popular mechanism for recognising achievement in tertiary education. Badges and other alternative accreditation schemes can also more accurately reflect someone's current competencies and skill sets and tend to be more specialised. Badges may have more relevance for the labour market than formal qualifications, which tend to have generic skill sets and competencies that might not be as current or relevant.[30]

MOOCs could leverage the increasing popularity and relevance of badges and the like for their credit recognition and accreditation rather than trying to enter into the formal

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[29] Badges represent an emerging path to credentialisation. They originated from the gaming sector as a way to show that participants had achieved mastery of particular tasks. However, badges are now being increasingly used in more formal contexts to demonstrate competence and achievement.

[30] In some subject areas, such as IT, degrees are already becoming less important, as standardised tests could be used to assess whether learners have the necessary skills. A new, free, private school in Paris for software development provides a good example. Established by French businesses in response to IT skills shortages, the school does not require any prior formal qualifications and will not award any 'state-recognised diploma'. It is offered by the industry for the learners.

credit and accreditation environment. This model could solve the problem of lack of formal recognition of MOOCs discussed above. It is also possible that alternative accreditation schemes could be incorporated into formal frameworks if they meet their criteria.

Employers

Workplace training

MOOCs have increased the options available for employers to train their staff. They can provide flexible (and cheaper) pathways to support the ongoing development of those already in the labour market and can play an important role in meeting the challenges of equipping the labour force with the skills that industries and businesses need.

MOOCs provide an opportunity for institutions to work with individual employers, larger groupings or even entire industries to custom-design courses to meet the specific needs of employers and employees.[31] The growing emphasis on the role of MOOCs in supporting professional development has driven improved validation, the development of badges and associated recruitment services.

Direct link to employment

MOOC platforms allow learners to connect directly with employers. For example, Udacity and Coursera charge a fee to recruiters and businesses for access to their learners' CVs. These platforms could become LinkedIn-like recruiting hubs, where learners showcase their strengths and connect with employers and peers. Such a development may start to address the global skills and location mismatches between employers and graduates, highlighted by the McKinsey report (Mourshed et al, 2012).

Perhaps the biggest challenge for employers in a MOOCs context is whether or not (and how) they recognise MOOCs and/or their associated accreditation. If employers are unable or unwilling to recognise MOOCs, it would reduce their value not only for them but, more importantly, for learners, and could even threaten the viability and sustainability of the MOOCs model. On the other hand, businesses and industries could use a series of MOOCs, selecting the most appropriate courses from a number of MOOC aggregators, in addition to or instead of an accredited qualification.

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[31] Examples of courses are available that are explicitly targeted at vocational learners. For example, the University of Edinburgh's Equine Nutrition course on the Coursera platform potentially connects with a vast cohort of learners working with horses around the world, often in locations that do not have access to higher education providers. Similarly, the Information Security and Risk Management in Context course on Coursera is pitched explicitly at professionals working in this area who want to up skill. As noted above, Udacity is now shifting the focus of its provision away from academic courses to these types of courses.

3.5   Teaching innovation and improvement

MOOCs present an opportunity for institutions to research and experiment with new ways of teaching in a digital environment. edX, Coursera and the University of Waikato are all conducting specific research on their MOOCs provision to obtain a greater understanding of effective teaching practices and institutional support in an online learning environment. This knowledge and experience can in turn be used to improve on-campus provision.

MOOCs allow institutions to access unprecedented levels of detailed data about learners' progress and behaviour. Technology can log every click and keyboard stroke a learner makes online, and data analytics can reveal patterns of learning behaviour. This can show at what point learners disengage from lectures or 'rewind' a video to re-check content; how different groups of learners learn differently; to what extent learners helping their peers benefits them; and how online learning can be used to stimulate better performance.

Institutions can use this information to adapt their teaching materials and deliver better targeted and timelier interventions and support. They can also use their learning management systems to show both learners and teachers data on learner progress at a glance. This sort of information-rich teaching environment could be used by staff to improve their teaching practice and provide more timely and personalised support. Learners could also use this information to better manage their learning which would have the added benefit of helping them become more independent, lifelong learners.[32]

x-MOOCs essentially scale up existing knowledge-transfer systems and processes, and c-MOOCs provide alternative mechanisms for achieving this. However, c-MOOCs have not been able to achieve the scalability of the x-MOOCs. The emergence of a new MOOC model that combined the knowledge creation and transfer systems and processes of the c-MOOC (or other as yet to be determined alternatives) with the scalability of the x-MOOC could provide an opportunity to change the way knowledge is created and disseminated. The impacts of this could be far-reaching for institutions that have historically controlled this process in a formal learning context.

3.6   Tertiary education workforce

The potential implications of MOOCs for the tertiary education workforce would depend on the kinds of business models that emerge as enduring. Some unions and individual academic staff are already expressing concern about the potential for MOOCs to reduce or change the composition of the tertiary education workforce. Of particular concern is a possible acceleration in the rate of 'casualisation', as institutions shift away from hiring

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[32]   The experience of the Khan Academy, a MOOC-like online maths teaching programme aimed primarily at school-aged learners, has shown that schoolteachers' maths teaching practice can be transformed by having excellent technology-tracked information about which learners are having trouble with particular kinds of problems – instead of having to rely on learners asking for help.

tenured lecturing staff with research expertise to hiring more student-focused teaching staff in potentially short-term roles.

MOOC platforms are likely to need qualified teaching staff to guide some learners through courses, especially if there is an option to pay extra for mentoring; but these staff may not need the same kind of skills as typical existing faculty. For example, Georgia Tech is planning to create two new categories of educators: course assistants, outsourced to Udacity, to handle student 'issues'; and teaching assistants hired by Georgia Tech directly.

While the long-term effects are unclear, institutions need to consider staff concerns about MOOCs carefully because overseas examples show that staff resistance[33] can seriously undermine an institution's ability to offer MOOCs, and in some cases it can even stop them being offered altogether. They also need to make sure their staff are appropriately trained to teach effectively in these new environments.

3.7 Issues to be overcome

To be able to deliver the kinds of potential benefits identified above, MOOCs need to overcome important issues. These are summarised below.

Accreditation, regulation and quality assurance

MOOCs raise multiple regulatory challenges for governments because they reflect a trend toward a student-centred approach to the assessment of course quality. This means that the need for official accreditation could be limited. Examples of poor courses quickly receive a lot of attention and, as a result, courses are modified or withdrawn.

Platforms like Coursera may award their own certificates and quality could become a matter for the learner and employers, who could recognise MOOCs credits.[34] In this situation, the role of government could be minimal and market-type arrangements could replace regulation.

However, another scenario may require more government oversight. This is because fraudulent institutions are already offering fake qualifications and this 'market' is growing rapidly. The proliferation of MOOC platforms and other online courses could accelerate this trend. Even if they do not directly contribute to the trend, public and student perceptions could see MOOCs positioned alongside the fraudulent provision. Therefore, accreditation and quality assurance of MOOCs will become critical for their success.

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[33] Professors in the philosophy department at San Jose State University refused to teach a philosophy course developed by edX. They argued that they did not want to enable a push to "replace professors, dismantle departments, and provide a diminished education for learners in public universities" (Kolowich, 2013c).

[34] Companies like Yahoo have started recognising MOOCs credits.

This will make government quality assurance both more difficult and more necessary. The question for government could then be how does it ensure quality or recognise credits or qualifications from a MOOC; doing this is very different from government's traditional regulatory and quality-assurance role.

There is an international dimension to quality assurance in relation to MOOCs and there are varying jurisdictional approaches to how quality is defined (Bennett et al, 2010). Although there have been initiatives to create a larger international framework through the Lisbon Recognition Convention[35] and the UNESCO/OECD (2005) *Guidelines for Quality Provision in Cross-border Higher Education*, a truly global standard in quality assurance is unlikely to be developed soon (Lawton et al, 2013).

As new players enter international markets and provide MOOCs, Universities New Zealand and NZQA may have to extend their existing international cooperation efforts to inform New Zealanders about the quality of such provision.

MOOCs raise questions about the jurisdiction of NZQA and Universities New Zealand over institutions operating in New Zealand. For example, when an educational institution has a physical campus in New Zealand, it must be registered and approved by NZQA and comply with the Education Act 1989. However, when an institution is only operating virtually, the situation is much less clear, even if it is deliberately marketing services to New Zealanders. NZQA's 'Quality assurance in a borderless world' project is examining these issues.

Ethics – information sharing, pastoral care and obligations to learners

Supplying student data to employers or third parties, particularly for non-educational purposes such as advertising, carries ethical risks for New Zealand providers. Coursera, for example, has an 'opt-in' clause for its employer services, so that institutions delivering courses via its platform can choose whether or not their learners' data can be sold by Coursera. While this may meet appropriate ethical standards, it could also mean insufficient learners participating to ensure the service's financial viability and sustainability. However, if these types of measures are not in place, New Zealand institutions risk breaching not only their own ethical guidelines but also legislative requirements related to privacy.

A separate ethical question is that of the level of pastoral care a provider is expected to offer its MOOC learners, especially younger ones. This question is further complicated in New Zealand by various legal and regulatory requirements relating to the pastoral care

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[35] The United Nations Educational, Scientific and Cultural Organization and Organisation for Economic Co-Operation and Development agreement is designed to improve the recognition of qualifications, so that learners and skilled workers can move between European countries. The convention provides the legal framework for, and defines the functions of, a national education information centre. New Zealand is a signatory to the convention.

of enrolled learners in publicly funded programmes (which differ between domestic and international learners and between programme types).

A third potential ethical concern is that of providers' obligations to MOOCs learners in cases where, for example, a provider wishes to discontinue a course or to alter the nature of the offering, or to start charging a fee, midway through a learner's enrolment. It is plausible to expect tension to develop in time between MOOC platform founders, often driven by the ideal of educating the world for free, and venture capitalist backers, some of whom are profit driven. Learners (and indeed institutions using the platforms) may risk being 'caught in the middle' of these tensions.

Learner motivations and completions

Evidence is emerging e about the types of learners who are most likely to enrol in MOOCs. The available data suggests they are older professionals who already hold a degree-level qualification. However, this emerging learner profile could change when MOOCs are offered for credit. No data is available about why learners are choosing to do MOOCs and this is an important issue because it significantly limits the ability of institutions and government to forecast demand for MOOCs with any certainty.

The low completion rates are leading to an interesting debate among MOOC providers. One viewpoint, expressed by Udacity, is that they represent a 'lousy product'. Udacity's response to this 'lousy product' is to discard academic MOOCs altogether and focus on work-based, vocational provision. The other viewpoint, expressed by edX, is that, while the percentages are low, the raw numbers are sufficient to justify the continued offering of MOOCs. In other words, 10 percent of 1 million learners represent a substantial number of successful outcomes. Figure 3 shows that almost half of the active learners complete the course, despite a significant number of no-shows and observers.[36]

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[36] No-shows are students who never log in to the course while it is active.

Observers are learners who log in and may read content or browse discussions, but do not take any form of assessment beyond pop-up quizzes embedded in videos.

Drop-ins are learners who perform some activity (watch videos, browse or participate in a discussion forum) for a topic within the course but do not attempt to complete the entire course. Some of these students are focused participants who use MOOCs informally to find content that helps them meet course goals elsewhere.

Passive participants are learners who view a course as content to consume. They may watch videos, take quizzes and read discussion forums but generally do not engage with the assignments.

Active participants are learners who fully intend to participate in the MOOC and take part in discussion forums, the majority of assignments and all quizzes and assessments.

Figure 3: Emerging student patterns in MOOCs
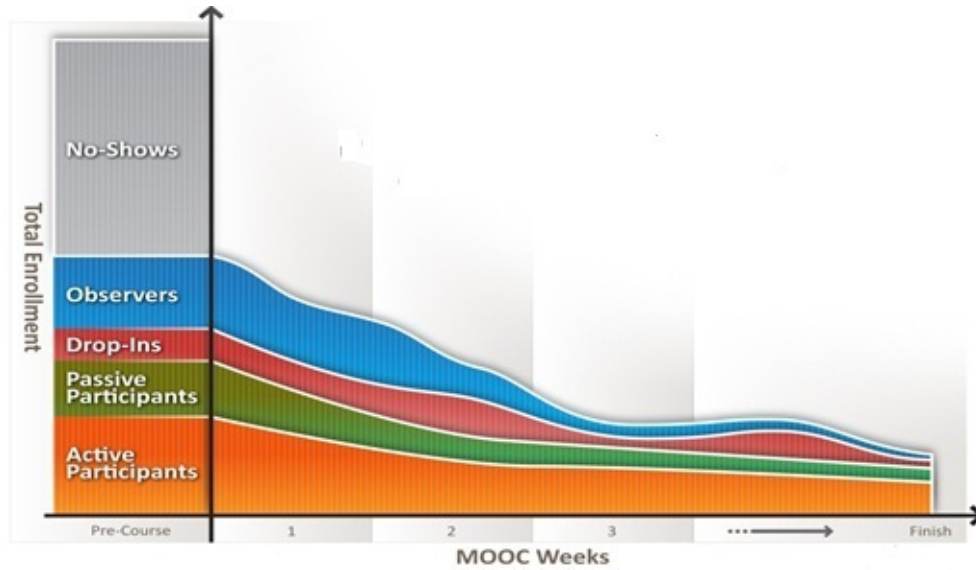
Source: Hill, 2013.

Financial viability and sustainability

Arguably, the biggest hurdle facing MOOCs is establishing their financial viability and sustainability. This concern is likely to grow the longer it takes to establish their financial viability and sustainability, and it could ultimately threaten the existence of MOOCs. However, the MOOC business models and revenue sources are still in their infancy and initial efforts by Coursera in particular are yielding promising results, for example, by successfully generating revenue through its Signature Track programme as described in section 2.5.

It is important to note that the business models being experimented with by MOOC platforms have not considered mainstream public funding,[37] which currently has an important role in tertiary education. Public funding steers the tertiary education system in a way that facilitates its contribution to public goals.

Copyright, privacy and data sharing

New Zealand institutions could breach existing copyright restrictions by offering MOOCs, because course materials commonly include third-party material not owned by the host institution. In these cases, it is likely that New Zealand institutions would need to comply with US (and/or other jurisdictional) regimes. Because of the large number of learners who are studying off-campus, and who can and do access content from non-institutional sources, a licensing option is unrealistic.

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[37] Both edX and Coursera are partnering with some US state governments to offer degree-level provision through MOOCs. Coursera is also partnering with the US Department of State and the World Bank to offer MOOCs to support their international efforts and African development respectively.

Agreements to sign up to MOOC and other collaborative platforms can involve agreements to share individual data across countries and jurisdictions. These agreements can be subject to US and/or European Commission laws. However, their provision may not be compatible with New Zealand domestic law and/or institutional policies. For instance, the agreements may allow foreign government agencies direct access to learners' personal records without any control from New Zealand authorities.[38]

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[38] For example, the New Zealand Government negotiated specific terms and conditions for the licensing of Google Documents for government department use to ensure conditions were compatible with New Zealand law.

4 Next steps: Key questions for New Zealand to explore

Like many countries, New Zealand is in the early stages of understanding what MOOCs might mean for its particular needs and requirements, and what opportunities they might present. Government agencies in New Zealand will need to work together with tertiary providers, learners and employers to explore and understand the critical questions associated with the introduction of MOOCs in an environment of rapid change.

The overarching questions are as follows.

* What will tertiary education delivery look like in 2030?

* What kinds of opportunities and challenges do technological developments, including MOOCs, present to the current policy, regulatory and operational arrangements for tertiary teaching and learning in New Zealand?

* How can New Zealand make the most of the opportunities and manage any associated risks and challenges?

To answer the overarching questions, more specific questions need to be considered.

* Do MOOCs undermine the central value of higher education, or are they just a helpful 'updating' that reflects its new mass nature?

* Where do MOOCs fit within the New Zealand education and qualifications systems?

* Who values the knowledge and skills gained from a MOOC programme and why?

* Can economies of scale be achieved through MOOCs without loss of quality?

* Can MOOCs lead to better learning outcomes at the same or less cost than traditional classroom-based teaching? If so, how might the Government go about funding institutions that want to deliver MOOCs to a mix of domestic and international learners?

* What kinds of MOOC accreditation models might make sense in the context of New Zealand's quality-assurance system?

* What role might MOOCs play in the kinds of 'future state' scenarios mapped out by DEANZ[39]/Ako Aotearoa in its '2016 scenario guide to effective tertiary education in New Zealand'?[40]

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[39] The Distance Education Association of New Zealand (DEANZ) is an association of tertiary and compulsory sector practitioners (largely educators) who are expert or interested in distance education.

[40] Further detail about the 2016 scenarios for tertiary education is available at:
http://akoaotearoa.ac.nz/projects/2016-scenario-guide-effective-tertiary-education-new-zealand

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