Chapter 10
Technological Innovation and Massive Open Online Courses (MOOCs) in Taiwan Higher Education

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Abstract Massive open online courses (MOOCs)—an innovation with great potential to promote lifelong learning and expand participation in higher education—have been applied worldwide. Since 2012, the widespread interest in a variety of MOOCs has contributed to a platform that promotes higher education opportunities. In light of the importance of MOOCs, Taiwan's Department of Information and Technology Education, under the Ministry of Education (MOE), launched a series of MOOC projects to help higher education institutions (HEIs) develop digital teaching models and advance the quality of MOOCs. The spread of MOOCs in Taiwan has led to new pedagogical concepts and offered numerous advantages to HEIs. However, there are four main issues with the emergence of MOOCs, including costs, completion rates, student learning outcomes, and online degrees. Furthermore, how to ensure the quality of online learning, credits, and credentials poses challenges to MOOCs.

Keywords Massive Open Online Courses (MOOCs) · E-pedagogy · Technological innovation · Higher education

10.1 Introduction

As one way of learning, massive open online courses (MOOCs) have been part of the educational arena since 2012, when The New York Times published the article "Year of the MOOCs" (Papanno, 2012). MOOCs are often presented as a new form of opening access to quality higher education and creating global universities for students (Popenici, 2015), which also triggers in-depth expertise in pedagogy in higher education. With the increasing number of participants, MOOCs have obtained public attention as a form of online and open education that has the potential to influence the higher education system.

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Aware of the importance of MOOCs, Taiwan's Department of Information and Technology Education, under the Ministry of Education (MOE), has developed digital teaching models and advanced the quality of MOOCs since 2014. The MOE launched a series of MOOC projects for higher education institutions (HEIs), and, currently, more than 50 HEIs cooperate with various MOOC platforms and thousands of open-access courses from different disciplines.

10.1.1 Backgrounds

The term "massive open online courses (MOOCs)" was coined to describe the distributed peer learning model on which the "Connectivism and Connective Knowledge" course developed by Stephen Downes and George Siemens was based (Zhu et al., 2018). Digital learning involves formal or informal online, distance, and blended forms of learning. According to those features, MOOCs have been classified into two main categories based on their functions: networks of distributed online resources (cMOOCs) and well-structured learning pathway resources centralized on MOOC platforms (xMOOCs) (Downes, 2008; Zhu, Sari, & Lee, 2018).

The MOOC field has subsequently evolved rapidly. In 2014, approximately 1,000 MOOCs were available in several languages from universities in the USA as well as 800 from European institutions. Worldwide, the top five MOOC providers are Coursera, edX, XuetangX, Udacity, and FutureLearn. These MOOCs providers have been monetized financially in the education market. For instance, Coursera generated an estimated $140 million in revenues in 2018 according to Forbes, landing Coursera on Forbes' list of Next Billion-Dollar Startups (Feldman et al., 2018). In 2018, more than 900 universities around the world had announced or launched 11.4k MOOCs, attracting more than 101 million participants (Shah, 2018).

MOOCs were an internet revolution for universities facing financial pressures and limited budgets. Many scholars believe that MOOCs could solve the difficulties of limited access to higher education (Joksimović et al., 2018; Pappano, 2012; Zhu et al., 2018). Universities provide instant, free, online, and open-access courses, and interactive coursework via the internet to anyone interested in learning. They see MOOCs as an inexpensive and innovative way of delivering knowledge to various students while offering the potential for profit. MOOCs have been rapidly adopted by many universities and countries that offer MOOC-based degree courses, including Arizona State University, the University of Pennsylvania (an Ivy League institution), the University of California San Diego, and Imperial College London.

Furthermore, MOOCs have led to discussions about teaching and learning. Compared with Open Course Ware (OCW), developed by Massachusetts Institute of Technology (MIT), MOOCs build two-way interactions between users and advance teaching and learning skills by combining technological innovation with e-pedagogical strategies. Most opinions suggest that MOOCs provide new ways of teaching and learning, challenging traditional models of higher education. HEIs should use MOOCs effectively to "change teaching, learning and the pathway to

employment" (Friedland, 2013). Nevertheless, questions about MOOCs' pedagogy, new business models for higher education, and quality assurance have emerged, and critics argue that MOOCs are another hype around technology in education, simply playing a "marketing exercise" role (Conole, 2013, p. 2) in the knowledge economy society.

In Taiwan, MOOCs also face certain challenges, such as their quality, assessments, e-pedagogical strategies for the effective use of MOOCs, and high drop-out rates. As most MOOCs are typically non-credit, offer no certificates, and have no strict entry requirements, they are not all formally supervised by the MOE. Therefore, this chapter enters the MOOC debate from the perspectives of shifting pedagogy paradigms and adaptive learning. The following section will clarify the characteristics of MOOCs; current issues relative to MOOCs in Taiwan will then be explored.

10.1.2 Purpose of the Chapter

This chapter builds on earlier systematic researches on MOOCs (Joksimović et al., 2018; Zhu et al., 2018), and examines the trends and patterns of MOOCs from the perspectives of policy practices and quality assurance. The ladder of analytical abstraction is adapted as an analytical framework, transforming qualitative data by clustering, sorting, and linking information to illustrate MOOCs (Miles & Hubermans, 1994). As this study is exploratory and thematic in nature (Creswell, 2005), broad information is narrowed into themes to elicit a deeper structure of various dimensions. Verification of systematic themes are based on the researchers' critical reflection and shared understanding, which enhance validity and reliability and matrix analysis of themes by crosschecking. Academic articles and policy reports are reviewed inductively, and categories are formed by analyzing themes of MOOCs relating to policy practices and quality assurance. The concept of quality assurance has played a key role in motivating higher education institutions to introduce a digital dimension to formal tertiary education. Online education has been vital in enhancing digital literacy and internationalization of higher education through pedagogical and policy practices. Thus, the focus of the chapter is on how MOOCs affect higher education policies in Taiwan, and how MOOCs have been shaped by those policies and quality assurance initiatives in turn.

10.2 MOOCs in Taiwan

In Taiwan, MOOCs are known as mokeshi (磨課師), and they provide a platform for digital and online learning and resource sharing. MOOCs generally include a massive amount of various materials for interested learners and form new learning models in the age of e-learning.

10.2.1 Development of MOOCs and Related Policies

Given the importance of MOOCs, universities have started to join MOOC networks. For example, National Chiao Tung University (NCTU) established NCTU OCW in 2006, and National Taiwan University joined Coursera, offering 22 courses since 2013. At the same time, universities have cooperated and created an open education platform known as "ewant education network" (ewant育網), which was the first MOOCs network organized by universities voluntarily. Universities have also joined various MOOC platforms, such as ShareCourse, Open Edu, and Coursera.

The Taiwanese government also noticed the increased popularity of MOOCs. Since 2014, the Department of Information and Technology Education of the MOE has launched a series of projects related to MOOCs to help universities develop digital teaching models and advance the quality of MOOCs (Yang, Huang, & Huang, 2017). The MOE has promoted MOOCs at different educational levels, including compulsory education, post-secondary education, and higher education levels. At compulsory and post-secondary education levels, the MOE implemented the 2-year K-12 MOOCs Innovative Teaching Project in 2015. At the higher education level, the MOE launched the 4-year New Generation of Digital Learning Project, which is a MOOC subproject to assist colleges and universities in developing classical MOOCs from 2014 to 2017 (Fig. 10.1).

In 2018, the MOE initiated the Digital Learning Sprout Project in higher education and provided NT$37 million to universities to reduce the digital divide by promoting self-directed learning and digital learning, creating certificate systems, and ensuring the quality of MOOCs. These MOOC-related policies have contributed to the rapid development of MOOCs in Taiwan. The MOE integrated numerous platforms, such

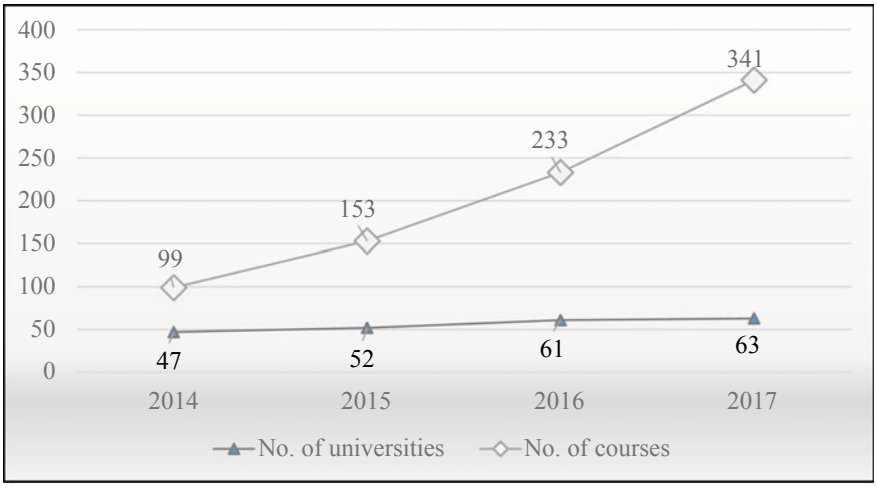

Fig. 10.1 Number of universities offering MOOCs and number of MOOCs (2014–2017) (*Source* Author)

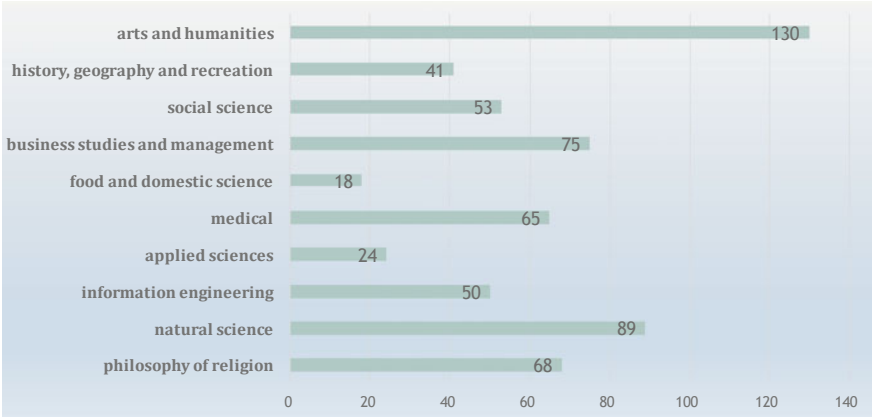

Fig. 10.2 Subjects of MOOCs in 2019 (*Source* Taiwan mooc website)

as Taiwan MOOC OERs, OpenEdu, and ewant, and created an official platform, Taiwanmooc (http://taiwanmooc.org/). Ten subjects are classified on Taiwanmooc, including art and humanities, social sciences, and natural sciences (Fig. 10.2). As of 2019, 70 universities had joined the MOE's MOOC projects, offering more than 700 courses online.

In addition to the MOE's official Taiwanmooc platform, universities have engaged in various types of cooperation to promote MOOCs. For instance, National Yilan University proposed a shared model of MOOCs to other universities in eastern Taiwan. This model includes five universities, which share their MOOCs and credits, providing students with a greater diversity of courses. Furthermore, 12 private universities established the Excellent Long-Established University Consortium of Taiwan (ELECT) to share multiple online courses. In 2019, the 12 participating private universities provided a total of 791 courses, focusing in particular on artificial intelligence and technology disciplines and interdisciplinary learning.

10.2.2 Features and Emerging E-Pedagogy of MOOCs

Online education is a significant emerging research field due to the dramatic development of technology such as computers, smartphones, and the internet. Digital learning and e-learning have been explored to overcome the difficulties of limited access to physical campuses. One major difference between MOOCs and online education is that MOOCs are a specific platform designed to offer open access for prospective students, whereas online education works as a pedagogical solution for enrolled students within universities (Popenici, 2015).

In 1999, the MIT initiative for open educational resources (OER) and OCW marked a revolution in online education and paved the way to MOOCs, which provide

free, open access to digital documents and video resources for learning and research. Then, in 2002, MIT expanded OCW to OpenCourseWare Consortium (OCWC). Currently, there are over 250 HEIs from 46 countries joining OCWC. In Taiwan, National Chiao Tung University established NCTU OCW in 2006 and joined OCWC in 2007. There are 215 online open courses with similar structures as traditional formal courses, including syllabi and videos.

Early OER and OCW demonstrated the potential to bring dispersed networks of participants together through various open sources and free web resources. Then, in 2008, Stephen Downes and George Siemens developed a model of open online courses based on peer learning in their course "Connectivism and Connective Knowledge" at the University of Manitoba, Canada. It was a free, online course that enrolled more than 2200 students (Chauhan, 2015). This course first used the term MOOC, which is characterized by being free, providing open access, and incorporating online features.

Compared to OER and OCW, MOOCs have much larger enrolments and learning resources; they also provide learners the freedom to form groups and communities to participate in courses without having to register at specific universities. Moreover, teachers and instructors design a series of short videos within courses ranging from a few weeks to a few months, and giving instant online feedback to learners from content management systems. Therefore, learners can control their own learning space and have the freedom to choose and select any online courses that meet their learning goals. Students do not have to pay tuition fees, and there are no criteria or pre-requisites for taking MOOCs. Compared to traditional classroom settings, MOOCs offer greater control and flexibility to learners. Learning is self-directed and self-regulated by learners' motivation and goal setting.

MOOCs can be classified into two categories: xMOOCs and cMOOCs. This categorization is based on the instructional model (Chauhan, 2015; Downes, 2008; Zhu et al., 2018). xMOOCs initially referred to the computing MOOCs launched by Stanford University in 2011, and then numerous universities joined and operated xMOOCs. The courses attracted more than 100,000 enrolees. Generally, xMOOCs adopt the instructor-led traditional classroom lecture model and include weekly short, three to 30 min of videos, and automatic assessments and quizzes for each topic. Teaching assistants (TAs) are necessary because of the large class sizes, and both TAs and instructors respond to students' queries in the forum. On the other hand, cMOOCs depend more on peer support, learner networks, and learning communities. They are based on the theory of connectivism, which asserts that knowledge can be generated, distributed, and expanded by networks to foster learner autonomy. Thus, cMOOCs use various tools for courses, such as wikis, blogs for hosting content, regular updates, live sessions, and posted announcements.

According to Ebben and Murphy (2014), when MOOCs were first being built, MOOC studies focused on the development of connectivism theory and technological experimentation and innovation. Researchers' focus then turned to the development of MOOC pedagogy and platforms, learning analytics, and assessments. With the rapid development of technology, some MOOCs have adopted the concept of the flipped classroom approach to engage and motivate learners. Several new

Table 10.1 Comparisons between traditional online learning and MOOCs

	Traditional online learning	MOOCs
Environment	Closure	Open
Access	Charged fees	Free/small fees
Participants	Limited	Massive/unlimited
Backgrounds of participants	Homogeneous Group	Multiple/unlimited
Teaching models	Simultaneous	Semi- or non-simultaneous
Curriculum	Fixed/from teachers	Flexible/based on participants' experiences and learning objectives
Feedback	Mainly from teachers	Open/from learning communities
Platforms	Management systems operated by individual provider	Internet/companies/HEIs (e.g., Coursera, edX, Udacity)

Revised from Hou, 2017

web resources for hosting learning materials and support have been used to deliver MOOCs, such as discussion forums, wikis, blogs, groups, online communities, and videos. These resources can be accessed anytime, anywhere, via the internet on PCs, mobile devices, and tablets (Hayes, 2015).

For instance, OpenEdu, founded and run by the Chinese Open Education Consortium, provides functions such as OERs, OCWC, and cMOOCs. OpenEdu encourages academics and institutions to make educational resources available for free for educators and learners to reuse, remix, and repurpose. Those released resources range from single documents and lectures provided by over 50 Taiwanese HEIs and the MOE. Currently, there are 454 open courses online, and the topics include philosophy of religion, natural science, computer science, food and home economics, social science, history and geography, humanities.

Recently, students' drop-out rates, retention, and cultural translations have become issues for MOOCs. Most studies agree that MOOCs embed information technology and provide interactive pedagogy to higher education. Information and communication technologies (ICT) help overcome the limitations of traditional teaching and learning methods, such as time, budget, and distance limits, and are effective tools for pedagogical innovation. As part of ICT, MOOCs represent useful and easy ways for learners to access interesting teaching materials tailored to fit their needs (Hou, 2017; Huang, 2017; Means, Bakia, & Murphy, 2014).

Through ICT and technology, the learning culture has been influenced by open online learning resources. Students can obtain various interesting learning materials via websites and platforms, such as Coursera, Ted, OCW, and the Junyi Academy Foundation. Following this trend, MOOCs have become a major technological innovation in education because of their characteristics.

There are some important differences between traditional online learning and MOOCs (Table 10.1). Generally, MOOCs are more flexible and have scalability, which allows them to include massive and unlimited participants.

MOOCs' two-way interactive and learner-centered learning has been utilized to promote the practice of the flipped classroom (Yang et al., 2017). The main features of the flipped classroom are that students gain the necessary knowledge before a formal class from the online courses provided by teachers, who guide students to actively and interactively clarify and apply that knowledge during class. This learning approach supports teachers in playing their most important role in guiding their students to deeper thinking and higher levels of application. A flipped class keeps students' learning at the center of teaching while allowing students to learn at their own pace.

MOOCs are a series of short online courses and tests produced by lecturers. Learners watch lecture videos and complete the tests. Once learners pass the tests, they can move on to the next unit of courses. This learning approach also applies the idea of mastery learning. In addition, learners can interact in MOOCs' discussion and feedback forums and visual labs, in line with the concept of cooperative learning. For example, the Junyi Academy Foundation, which originates from the Khan Academy, has created a platform for interactive learning based on the flipped classroom and the theory of master learning in Taiwan.

However, in addition to the implementation of MOOCs, some researchers have expressed concerns about current MOOCs representing and delivering Western pedagogy, teaching philosophy, methodological orientations, and academic traditions (Altbach, 2014). MOOCs have indeed highly attracted international enrolments, and original MOOC creators, such as Coursera and edX, are mostly from top universities (e.g., Stanford University, Harvard University, and the Massachusetts Institution of Technology) in the USA, the UK, and Australia (Zhu et al., 2018).

10.3 Four Main Issues Concerning MOOCs

MOOCs offer numerous advantages, such as providing platforms for online and free courses, which are open-access and low-cost learning resources for learners. MOOCs also lead to new pedagogical concepts, such as the flipped classroom, that challenge traditional classroom teaching. Furthermore, learners of MOOCs can utilize big data analytics to examine participants' learning processes and provide insights and feedback to participants. The spread of MOOCs in Taiwan has changed the roles of higher education, teachers, and students. The boundaries of university campuses have also been breached due to the unlimited reach of the internet. However, there are four main issues concerning MOOCs.

10.3.1 Costs

MOOCs are seen by universities as an effective way to solve their budget problems by cutting the costs associated with teaching (Gaebel, 2014). One of MOOCs' purposes is indeed to use ICT to help reduce the costs of traditional classes. Once a MOOC is recorded and produced, it can be repeatedly viewed and turned into personalized online courses for enrolled students. However, few studies have examined whether MOOCs truly provide cost-effective mechanisms for universities (Christensen et al., 2013; Zhu et al., 2018). Training academic staff on the use of new technologies and the preparation of facilities for recording videos are often more costly than universities expect. A comprehensive analysis of the sustainability and results of MOOCs is lacking.

According to the Center for Benefit-Cost Studies of Education at Columbia University, the cost of a MOOC ranges between USD$5,000–12,000, which does not include the costs for development, delivery, and maintenance. The high costs of MOOCs also affect their spread in Taiwanese universities. For instance, the Director of Higher Educational Resources for Openness, Wei-I Lee, indicated that the Taiwanese government provides funds for individual MOOC curricula, but not platforms such as ewant. He further pointed out that MOOCs in Taiwan need the long-term support of government policies because the MOOC is relatively small compared to that of global platforms such as Coursera and edX (Feng, 2019).

A gap exists between the investments on MOOCs and their implementation on the one hand, and the predictability of their results on the other hand. Scholars and professionals have thus called for research into both the investments and educational outcomes of MOOCs to evaluate costs, benefits, risks, quality, and long-term feasibility for lifelong learning. The need is felt to explore whether universities can afford to offer one or several MOOCs, considering the costs of development, delivery, and maintenance.

10.3.2 Completion Rates

Participants' completion rate of MOOCs shows a degree of self-directed learning. The drop-out rate is one indicator for evaluating the success of MOOCs. In Taiwan, for example, the completion rate of the four-year New Generation of Digital Learning Project—a MOOC subproject to assist colleges and universities in developing classical MOOCs—is about 12%. Furthermore, many studies indicate that the enrolments driven by the massive open online platforms are significantly smaller than formal enrolments of universities (Hill, 2013). The challenge for online learning is to create an environment to maintain students' interest and commitment to continuous learning. Some studies indicate that active participants, approximately 40% of all students, have higher MOOCs completion rates, and this suggests that students'

engagement and satisfaction with learning experiences are important factors for student retention in MOOCs and learning success (Chauhan, 2015; Hill, 2013).

Some Taiwanese scholars suggest that open education, especially MOOCs, is part of online learning and, thus, has to find ways to survive in the higher education quasi-market (Feng, 2019; Hou, 2017). One effective way is to include MOOCs in universities' official curricula. For example, the MOE could launch special projects and provide funds for general education that include MOOCs. Furthermore, the MOE could request that universities set key performance indicators, such as the number of MOOCs implemented or the percentage of students joining MOOCs.

10.3.3 Student Learning Outcomes

With the rapid spread of MOOCs, the number of MOOCs and associated MOOC studies has continued to expand dramatically. Some researchers have conducted systematic reviews of studies on MOOCs, from the first MOOC offered since 2008 as well as the synthesis of existing MOOC empirical studies (Joksimović et al., 2018; Zhu et al., 2018). Most evidence of learner behavior in MOOCs has been collected from computer science courses. Couse-level learning outcomes are the most commonly assessed in current MOOC research.

The widely used definition of MOOC-related learning outcomes is course completion. The notion of course completion is also interchangeable with course persistence as well as failure and success within the courses. Studies predicting learning persistence are a mainstream approach to the analysis of learning in MOOCs. In such studies, course persistence is defined as engagement with content, assessment, and activities (Joksimović et al., 2018).

Although many studies have collected data on student activities within MOOCs, it is hard to find any causal linkages between the observed metrics and student learning. One reason is that theoretically informed approaches to analyze MOOCs are lacking (Joksimović et al., 2018; Reich, 2015). Systematic reviews have revealed that learning in MOOCs is typically researched by analyzing discussion data or survey data within a single course, and only few studies have focused on more than two data resources at one time.

Zhu et al. (2018) claim that most MOOC-related studies use quantitative research methods and mixed methods to analyze various aspects of MOOCs. Surveys, platform databases, interviews, and discussion forums on MOOCs are the most frequently adopted data collection methods. Most studies on MOOCs focus on students to understand their learning outcomes, learning strategies, learner retention, and motivation. Other than studies focusing specifically on MOOCs, the second most frequent research topics are instructional design, instructor role, and the context and impact of MOOCs. Future MOOC research should build on the existing research frameworks, evaluated across different educational contexts, and provide a basis for comparing learning in MOOCs with other teaching methods.

10.3.4 Online Degrees

MOOC-based degrees have certain advantages. Compared to other online and on-campus degrees, have a lower cost, greater flexibility, and pay-as-you-go pricing. MOOC providers are aware of the need for MOOC-based degree programs whose content is free to anyone who wants to access it. Subsequently, in 2013, Georgia Tech offered the first online degree on Udacity—the Online Master of Science in Computer Science (OMSCS)—and, in 2015, the University of Illinois Urbana-Champaign offered the second online degree on Coursera—International Master of Business Administration iMBA (Pickard, 2019).

Before the implementation of online degrees, around 630 micro-credentials were launched in 2017. By the end of 2017, only approximately 15 online degrees via MOOCs existed (McIntyre, 2018). In 2019, MOOC providers such as Coursera, edX, FutureLearn, and XuetangX launched a number of new online degrees, and currently, more than 36 online degrees are available, with the UK-based MOOC platform FutureLearn offering the majority of them (i.e., 15 degree programs). Most institutions providing online degrees are from the USA, UK, and Australia, and the most common subjects for MOOC-based degrees are in the field of computer science.

In Taiwan, the MOE announced that universities have autonomy in deciding whether to admit MOOC credentials. Currently, universities can award a master's degree in online learning, but there are no regulations or laws relating to how to calculate MOOC credentials. Nevertheless, getting degrees and credentials are the main motivations for MOOC participants. Some universities in Taiwan have found ways to attract students to enroll in MOOCs. For instance, Taipei Medical University (TMU) has cooperated with Microsoft to establish its online learning platform. Microsoft provides the Microsoft Professional Program (MPP) in data science to TMU students. Once students finish 15 online courses and pass all exams, they are awarded credentials that are also automatically registered on the LinkedIn system.

Another example is from National Tsing Hua University (NTHU), which invited Beijing Tsing Hua University and other universities in Taiwan to cooperate and operate MOOCs on University System of Taiwan (UST) MOOCs. UST MOOCs has a cross-campus course selection mechanism. Once students finish a course and pass the exam, they are awarded a certificate.

As previously discussed, most open education platforms relating to MOOCs face the difficulties of low completion rates. Examples of collaboration could offer a possible positive benchmark for other universities still struggling to attract students and encourage them to finish MOOCs.

10.4 Further Challenges and Opportunities

With the growing trend of MOOCs and online education, universities' physical campuses are without obvious boundaries. Students can connect to the world and be sociable via clicks on technological devices. The shift from traditional learning to digital models has resulted in a significant internationalization of higher education (UUK, 2013). For instance, Coursera—a major California-based provider of online courses—has created an international system of learning hubs. An underlying assumption of MOOCs is that they can serve as an innovation for youth from developing countries who have no access to higher education (Patru & Balaji, 2016). However, numerous studies (Christensen et al., 2013; Perna et al., 2013; Porter, 2014) have revealed that most students in MOOCs are employed, highly educated, and mostly male from developed countries. Such results highlight another unexpected reality of MOOCs. In Taiwan, although MOOCs are seen as providing open access to anyone interested in higher education, most MOOC participants are university students. This phenomenon is similar in MOOCs worldwide: MOOCs attract different target groups that what is predicted, thereby challenging the assumptions about and the expectations of MOOCs.

Therefore, some scholars have suggested that the MOE implement policies that support the expansion of access to current MOOCs not only providing funds for individual curricula but also revising educational regulations or laws to implement online degrees for MOOCs (Huang, 2017; Yang et al., 2017). These scholars believe that such strategies could attract a greater diversity of participants, not only those from universities.

One main challenge to MOOCs is ensuring the quality of online learning. Most people choose the major MOOC platforms, such as Coursera, edX, and Udacity, not only because of their high reputation but also because of the quality of courses and micro-credentials they provide. Thus, accreditations are essential to online degree programs, including a variety of MOOCs. Accreditation is a process conducted by an outside authority, normally a third party, to ensure that universities and their degree programs meet specific standards of quality. Online, blended, and on-campus degree programs should all be accredited. Accreditations are also necessary to ensure the quality of MOOCs, especially for online degrees. In the USA, although it offers many benefits and, in many ways, validates programs for employers and other colleges or universities, accreditation is voluntary. Once an institution is accredited, accreditation extends to its online programs (McIntyre, 2018; Pickard, 2019). Programmatic accreditations can be delivered for both online and on-campus programs. For example, the American Council for Education (ACE) CREDIT scheme assesses courses for HEIs and makes full evaluation of the quality, assessment, and learning outcomes of courses. The scheme has a network of 2,000 HEIs that consider ACE CREDIT decisions for transfer to degree programs (UUK, 2013). However, not all MOOCs are accredited.

In Taiwan, a similar situation exists for MOOCs. Although all universities and curricula are supervised and accept accreditations to ensure the quality of higher

education, MOOCs have not been totally examined in the accreditation. Many online students, therefore, plan to advance or change their careers. Most companies and employers still verify that a job candidate's online degree comes from an accredited program and university. Moreover, transferring credits to and from degree programs is essential for online learners, and credits earned in accredited programs and universities are more likely to be accepted by other universities and institutions. Therefore, the MOE and universities must include MOOCs in official accreditations to ensure the quality and credits of MOOCs (Ho, 2014; Hou, 2017).

To this end, quality assurance and excellence in online education for students are crucial to universities. With quality assurance and accreditations, the quality of MOOCs and their credits would be recognized by other universities and institutions, further securing participants' learning rights.

Compared to smaller or local universities, the most prestigious and renowned universities have the potential to attract more enrolled students. In Taiwan, universities are struggling to recruit students because of low birth rates. MOOCs provide universities with another opportunity to attract and keep more participants in their online courses. Universities could make MOOCs a possible solution for reducing financial difficulties and recruiting a massive number of students by providing open access to online courses. This way, MOOCs might gradually become a business with the potential to generate many benefits for universities.

10.5 Conclusion

Digital education and online education have been practiced for years; however, MOOCs, which emerged in 2008, are relatively new to traditional online learning. In Taiwan, MOOCs have generated an educational technology revolution. Not only have numerous universities joined the effort to provide MOOCs, but the MOE has also launched related policies to encourage the implementation of MOOCs.

MOOCs are considered a possible solution for providing quality education to people who cannot enter higher education for a variety of reasons, such as poverty and disadvantaged groups. However, research data reveal that students who enroll in MOOCs are already highly educated and enrolled in universities in Taiwan. Although in Taiwan, the situation is not quite similar to Western countries, the main characteristics of MOOCs—namely, their massiveness and openness—are evident in Taiwan's MOOCs.

MOOCs have their advantages, such as providing new forms of education and e-pedagogy. Nevertheless, some issues and challenges have been raised by the implementation of MOOCs. The most well-known issue is participants' low completion rates in MOOCs. From a different perspective, these issues and challenges also provide universities and higher education with an opportunity to rethink their teaching and learning strategies. Universities should find ways to use new technologies to enhance pedagogical solutions to the needs and challenges of the twenty-first century.

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