

MOOCs, Graduate Skills Gaps, and Employability: A Qualitative Systematic Review of the Literature

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Article abstract

The increasing costs of higher education (HE), growing numbers of flexible anytime, anywhere learners, and the prevalence of technology as a means to up-skill in a competitive job market, have brought to light a rising concern faced by graduate students and potential graduate employers. Specifically, there is a mismatch of useful skills obtained by students through HE institutions which is evident upon graduation. Faced with this dilemma, “graduate students,” or more specifically newly graduated students, with a bachelor’s degree, and a growing number of employers are turning to Massive Open Online Courses, or MOOCs, as a complimentary mechanism through which this skills gap may be bridged.

It is found in the literature that MOOCs are often discussed within the capacity of their development, their retention rates, institutional policies regarding their implementation, and other such related areas. Examinations into their broader uses, benefits, and potential pitfalls have been limited to date. Therefore, this paper aims to analyse the literature highlighting the use of MOOCs as a means to reduce the mismatch in graduate skills. As such, this literature analysis reviews the following relevant areas: higher education and graduate skills gap, today’s graduates and employability, and MOOCs and graduate skills. Through analysing the literature in these areas, this paper identifies gaps in the existing literature.



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MOOCs, Graduate Skills Gaps, and Employability: A Qualitative Systematic Review of the Literature



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Abstract

The increasing costs of higher education (HE), growing numbers of flexible anytime, anywhere learners, and the prevalence of technology as a means to up-skill in a competitive job market, have brought to light a rising concern faced by graduate students and potential graduate employers. Specifically, there is a mismatch of useful skills obtained by students through HE institutions which is evident upon graduation. Faced with this dilemma, “graduate students,” or more specifically newly graduated students, with a with bachelor’s degree, and a growing number of employers are turning to Massive Open Online Courses, or MOOCs, as a complimentary mechanism through which this skills gap may be bridged.

It is found in the literature that MOOCs are often discussed within the capacity of their development, their retention rates, institutional policies regarding their implementation, and other such related areas. Examinations into their broader uses, benefits, and potential pitfalls have been limited to date. Therefore, this paper aims to analyse the literature highlighting the use of MOOCs as a means to reduce the mismatch in graduate skills. As such, this literature analysis reviews the following relevant areas: higher education and graduate skills gap, today’s graduates and employability, and MOOCs and graduate skills. Through analysing the literature in these areas, this paper identifies gaps in the existing literature.

Keywords: MOOCs, graduate skills gap, graduate employers, literature review

Introduction

In many parts of the world, HE has become increasingly unaffordable and many question tertiary institutions' ability to prepare students for their professional careers (Harris, 2013). Reports by Arum and Roksa (2010; 2014), Van Velsor and Wright (2012), Barber, Donnely, and Rizvi (2013), YouGov Survey (2013), Gergen and Rego (2014), Kaka, Madgavkar, Manyika, Bughin and Parameswaran (2014), and Mourshed, Patel and Suder (2014), have highlighted the existing mismatch of skills between university graduates and the needs of potential employers. These reports have claimed that companies found it increasingly difficult to "find people with the right skills for entry-level positions" (Barton, 2012). The European Commissioner for Education and Youth, Androulla Vassiliou, argued that such mismatched circumstances, were reaching "crisis" levels:

In Europe the mismatch between what our education systems are delivering and the needs of employers is resulting in a serious skills shortage and damaging the aspirations of Europe's young people and, ultimately, our future prosperity. (Coughlan, 2014)

MOOCs have been labelled as the 21st century's educational revolution by a number of media reports (Bulfin, Pangrazio and Selwyn, 2014). With the popularity of MOOCs since 2012, there also seems to be a keen interest with companies examining whether MOOCs could help reduce the gap in skills of their newly-recruited university graduate employees. In addition to this, they have attracted the attention of educators and have raised hopes of change in academic circles (Shirky, 2012). Recent reports such as Education at a Glance 2014 (Organisation for Economic Co-operation and Development [OECD], 2014) have highlighted that MOOCs, through their anytime/anywhere foundation, may have the potential to bridge the graduate skills gap as they offer on demand affordable continuing education (Christensen & Alcorn, 2013). Kranz (2014) and Radford et al. (2015) suggest that organisations have either used, have strongly considered using, or in the future could see their companies using MOOCs for employees' professional development.

There are few published studies to date investigating the potential of MOOCs to impact employability by helping to bridge the graduate skills' gap. Existing literature on MOOCs has primarily been concerned with their development, pedagogy, processes, course formats, user/subpopulations data, enrolments, participation and completion/dropout rates, and also their business models (Clow, 2013; Conole, 2013; Cooper and Sahami, 2013; Daniel, 2012; DeBoer, Ho, Stump and Breslow, L. 2014; Dellarocas and Van Alstyne, 2013; Grünewald, Meinel, Totschnig and Willems 2013; Ho, Reich, Nesterko, Seaton, Mullaney, Waldo and Chuang 2014; Kizilcec, Piech and Schneider 2013; Kolowich, 2013; Milligan, Littlejohn and Margaryan 2013; Petkovska, Delipetrev and Zdravev 2014.; Reich, 2014; Rodriguez, 2012; Yousef, Chatti, Schroeder, Wosnitza and Jakobs 2014).

This paper therefore addresses a gap in the literature as it provides a qualitative review of 16 published reports and documents relevant to this topic. To identify eligible reports, the authors conducted a systematic qualitative review of the available literature. To the best of the authors' knowledge there is no systematic qualitative review on this topic.

This literature analysis reviews the following relevant areas: higher education and graduate skills gap, today's graduates and employability, and MOOC and graduate skills. Through analysing the literature in these areas, this paper identifies gaps which may exist.

Background

Discrepancies in Higher Education Graduate Skills and Employability

“What is the value of a college degree?” (Selingo, 2013)

“What's a college education worth these days?” (Miller, 2013)

Several studies have highlighted the discontinuity between skills university graduates have when they graduate and the specific needs of the employers. According to a YouGov survey for instance, 52% of graduate employers said “none” or “few” recruits with a university degree were “work ready” (YouGov, 2013). Similarly, Harris (2013) argued that only around 25% of fresh graduate interviewees were employable.

Arum and Roksa (2010; 2014), Barber et al., (2013), and Gergen and Rego (2014) confirm these views. They argued that a mismatch of skills exist between university graduates and the needs of the industry (Gergen & Rego, 2014). A study by Van Velsor and Wright (2012) identified specific transferable skills such as problem solving, leadership, teamwork, empathy, and social/emotional intelligence, which were still being left out of the curricula of most HE institutions, thus contributing to the widening of the skills' gap. Another survey found that specific industries, such as in the Information Technology (IT) sector, had a difficult time finding qualified applicants and 94% had to turn down candidates, at least in part, due to a deficiency in specific skills areas (Belkin, 2015).

An international survey conducted on graduates, educators, and employers from 9 countries identified a significant disconnect between the world of education and employment (Mourshed et al., 2014). It also noted that education providers had an inflated confidence regarding the relevance of what they were teaching. Whilst fewer than half of their surveyed students and employers believed that graduates were adequately prepared for entry-level positions, education providers were much more optimistic as 72% of them believed the new graduates were ready to work (Mourshed et al., 2014). These results were further confirmed by a 2014 McKinsey survey which showed education providers confidence in

graduates' skills readiness at 74%, whilst only 38% of youth and 35% of employers agreed (Mourshed et al., 2014). The contradictory perspectives between the various stakeholders may be due to the misalignment between universities' perceptions of graduates' skills knowledge, employers' required graduate skills and students' perceived career readiness (Mourshed et al., 2014). Weise (2014) aptly suggested that "something is clearly wrong when only 11% of business leaders, compared to 96% of chief academic officers, believe that graduates have the requisite skills for the workforce" (p. 1).

This skills gap phenomenon does not appear to be restricted to specific regions or nations. Dobbs et al., (2012) argued that, for instance, workers did not have the skills to transition from lost to new jobs, that the U.S. would have a shortage of approximately 1.5 million college graduates by 2020, and that the form of mismatch was not geographically isolated to the U.S. but rather was a global concern. In a survey of employers in India by Kaka et al. (2014), 53% said that the lack of skills of graduates was the leading reason for entry-level vacancies. As such, by 2022, India is predicted to be short of more than 160 million skilled workers in various industries (Lakshmi, 2013), with inevitable economic consequences.

A City & Guilds (2013) survey conducted in the UK identified "three quarters of employers in the IT, Digital and Information Services Sector" (p.3) expressed these industries were facing a skills gap. Forty seven percent of the employers surveyed believed the "education system wasn't meeting the needs of business" (City & Guilds, 2013, p.7) and there was an urgent need for a redesign of educational curriculums (Gurney-Read, 2014). Other reports from the UK such as the Institution of Engineering and Technology (IET, 2014) Skills and Demand in Industry report have suggested employment sectors were becoming "hollowed-out" shells due to the lack of skilled graduates (Tovey, 2014). As such, business sectors and tertiary education providers in the UK should closely collaborate to "produce a stream of talent equipped with the skills ready to enter industry" (Tovey, 2014, para. 1). This was identified as a serious concern to the UK economy as annual reports on skills suggested 44% of businesses did not view new graduates as meeting "reasonable expectations for levels of skills" (EIT, 2014, p.5).

The Organization for Economic Co-operation and Development suggested that in order to align this divide between national policy objectives and the development of necessary skills which may meet the evolving demands of the labour market, MOOCs may be employed as the means through which the skills gap may be reduced (OECD, 2013). Reports by Kranz (2014) and Radford et al. (2014) have investigated this as they both identified organisations that have either used, have strongly considered using, or in the future could see their companies using MOOCs for employees' professional development (Kranz, 2014; Radford et al., 2014).

Changing the Conventional: Flexibility, Graduates Skills, and Today's Students

Research has indicated that today's typical university students frequently juggle coursework with jobs, either part-time or full-time, along with often maintaining additional responsibilities, such as a family (Johnson, 2013). Jenkins (2012) called this phenomenon the "New Traditional Student," as they may be more inclined to gain employable skills through greater flexible means of learning. For Levine (2001), Rose (2012), and Mintz (2015), the non-traditional student is "becoming the norm" in U.S. colleges.

According to Aud and Filkinson-Flicker (2013), Leathwood and O'Connel (2003), Bates (2013), and Smith (2015), the U.S. is now in a position where less than half of their students could be considered full-time. As such, students who can attend courses full-time on campus five days a week, have now become the minority (Aud & Filkinson-Flicker, 2013, Bates, 2013; Leathwood & O'Connel, 2003). Additionally, complex economic market conditions and the rise in tuition fees have seen increasing interest in more affordable and alternative ways for students to look at learning, along with re-examining the amount of time spent studying to complete a degree and gain relevant skilled credentials (Carlson, 2013; Levine, 2001; Mintz, 2015; Rose, 2012; Weise, 2014). The need for more flexible learning paths along with an increasing desire to learn skills that can immediately be applied in the workplace, has incited the "new traditional" university students to explore MOOCs' potential to provide an alternative or a complement to their degree.

MOOCs Bridging Graduate Skills Gaps

With today's 24/7 connected learners, some higher education institutions have leveraged technology to provide a greater levels of flexibility to their teaching and learning process (Olcott & Schmidt, 2000, p.269). The provision of online courses are "breaking the traditional mould of instructional provision" (Swail, 2002, p.16). MOOCs are such forms of technology used by many universities as a mean to provide flexible learning. Kop (2011) aptly suggested when examining MOOCs, the "boundaries between settings in which people learn and in which they use technology for other activities have blurred" (p.20).

Palin (2014) suggested that this model may be attractive at scale, as it may provide a means of skilling up for large numbers of non-traditional students. MOOCs have also been identified as an innovative educational method for teaching and learning (Docebo, 2014). They hold the potential to withstand times of economic downturns for students and provide businesses with cost-effective solutions to update their employees on specific "relevant knowledge and skills" (Palin, 2014).

Examples of MOOCs being utilised to bridge the skills gap, and particularly the digital skills gap, have been identified in many regions across the globe. India is one such example which has developed "Mobile MOOCs" as an "innovative approach to addressing India's skills shortage, and will have instant appeal to young people entering the workforce" (Association of Accounting Technicians (AAT), 2015). Other initiatives in locations such as Tanzania are also developing the use of MOOCs to provide skills

in specific industries (Daniel, Vázquez Cano & Gisbert Cervera, 2015, p.6). These examples of initiatives have additional corporate and non-governmental support from sponsors such as The World Bank and Coursera, which are seeking to use MOOCs as a “broader initiative to help equip students with market-relevant IT skills.” (Daniel et al, 2015).

Alsop (2014) cited a Bainbridge report in which 60% of the respondents said MOOCs were a “valid certification of one’s skills or knowledge” (Alsop, 2014, para. 14). Rubens (2016) argued that MOOCs were playing a “key role in addressing the software development skills gap” (Rubens, 2016, para. 1). According to specialists providing online courses to technology professionals, MOOCs are also essential in upgrading technology skills, “because technology changes so quickly, software professionals lose half of what they know in a two-year period of time” (Singer, 2015, para. 18). Additionally, Singer highlighted that professionals can use such online courses “as their go-to resource to stay current” (Singer, 2015, para. 18). A view echoed by Education Analyst, Jan-Martin Lowendahl, when he argued that degrees or certificates might rapidly become obsolete (Rubens, 2016). In cybersecurity for instance, “many people simply don't have the time to go to [college] to learn new skills, and there is a question mark over the value of a formal diploma in a fast-changing world” (Rubens, 2016, para. 19). Julia Stiglitz from Coursera argued that MOOCs were a great opportunity for learners, as they provided alternative and more affordable options for those looking to improve their skills (Riddell, 2015).

A recent (Association for Talent Development (ATD) and Institute for Corporate Productivity (i4cp) (2014) research report on MOOCs indicated that among 525 learning and business professionals surveyed, 22% were using MOOCs in learning and development (Association for Talent Development [ADT], 2014; ATD Research Report, 2014). Radford, Coningham and Horn (2015) explored MOOCs for professional development in North Carolina, examining the types of employees that would take those courses. They found that in 2013-2014 only 7% were using MOOCs (Radford et al., 2015). Ferriman (2015) identified the following 7 ways companies currently use MOOCs to engage their employees: building talent pipelines (e.g., AT&T); on boarding employees (e.g., McAfee); self-directed career development (e.g., Deloitte, Yahoo!); workforce training (e.g., Google); channel/customer education (e.g., SAP); brand marketing (e.g., AMC); and collaboration and innovation (e.g., Coursolve). Google, for instance, enrolled 80,000 employees in Udacity’s HTML5 course (Bersin, 2013). Microsoft also offers IT development courses, taught by Microsoft full-time professionals, in partnership with the edX MOOC platform. Vergne (2015) provided a promising example of a feasibility report on how MOOCs could be used for on-the-go staff development of professionals, in the construction industry in France through the use of mobile devices.

Method

Data Collection and Analysis

The authors conducted a systematic qualitative literature review (Tranfield, Denyer and Smart, 2003; Alasuutari, Bickman, and Brannen, 2008) of relevant reports and documents that aimed to minimise bias and provide a reliable and reproducible assessment of the research topic.

The authors reviewed news media stories published in HE websites such as, The Chronicle of Higher Education, The Conversation, Times Higher or the Education Pages of Wired, The Australian, The Wall Street Journal, The Guardian, and Forbes. Additionally, six scholarly electronic databases between October 2015 and January 2016 were searched to identify original research papers, using search terms such as “MOOCs and skills,” “MOOCs and the graduate skills gaps,” “MOOCs and the skills’ gap,” Massive Open Online Courses and skills,” “Massive Open Online Courses and graduate employment,” and “Massive Open Online Courses and employers.” These databases included: Scopus, Science Direct, JSTOR, MERLOT, Sage, and Google Scholar.

Each report, article, and research paper was initially screened (title, abstract, introduction, and conclusion) to ensure that the review only included documents most relevant to the topic. The purpose of this step was to eliminate efficiently all ineligible publications. The second stage involved a careful review of the full-text publications reports, articles, and papers that did not explicitly focus on the search terms were discarded. The authors obtained the full text of the documents that passed the first level of screening and classified them based on journal, location, impact, and qualitative approaches used (e.g., interviews, surveys, case study). A dual review process was used to reduce the potential for random errors and bias; the authors independently assessed documents for inclusion at each stage, compared and contrasted decisions, and resolved differences through discussion.

Limitations

As indicated earlier, there are currently few journal studies in the published literature that investigate MOOCs’ potential to help reduce the graduate skills gap. Most of the reports in this paper were media stories, surveys, and interviews with academics/MOOC providers published in the education pages of international newspapers and websites. These online sources were considered by the authors as credible and valid data as interviews, surveys, reports, and so forth, which are published in reputable newspapers and corresponding news websites, are screened under ethical journalistic procedures, and examined for journalistic integrity. The authors of this study did not have access to company internal reports which might have provided a more detailed picture of the topic. Since the majority of studies were found in the U.S., the authors feel that a greater number of studies from a wider pool of developing countries may have shown a different or wider perspective.

Results

A total of 16 reports and documents that identified the potential of MOOCs to help bridge the skills' gap were examined. A very limited number of studies on MOOC and the skills gap exists in journal form. It was discovered that 3 papers were published between 2013 and 2016 in education and technology-enhanced journals. Due to the limited number of studies found through journal publications, most documents were found in the education sections of newspaper websites which provided essential data through surveys conducted on the topic of the graduate skills gap. Additional data was discovered through education and employment reports, such as McKinsey Global Institute, resulting in 13 interviews being identified as the main source of data for these reports and news articles. A global perspective on MOOCs and the skills gap was compiled: nine articles were from the United States, one from Australia, three from India, two from the United Kingdom, and one from France. This above mentioned summary is illustrated chronologically in Table 1.

Table 1

MOOCs and Skills

Year	Location	Author	Source/Article Title	Qualitative Approaches Used	Themes
2013	India	Lakshmi	The Washington Post <i>India Students' Aspirations, Job Market Don't Match</i>	Interviews Surveys	Relevant Skills Courses Gap in Job Opportunities Employer Project Implementation Delays
2014	USA	Alsop	BBC <i>Forget the MBA</i>	Interviews	Credentials Update Skills Career Progression Generation Gap

2014	USA	Docebo	Docebo Report <i>E-Learning Market Trends & Forecast 2014 - 2016 Report</i>	Case Studies Report Interviews Analysis Blogs/Websites Human Resources Software	Cost-effectiveness Update Employees
2014	UK	Gurney-Read	The Telegraph Education <i>Britain Faces "Growing Shortage" of Digital Skills</i>	Survey Interviews	Curriculum Transformation Gap in Job Opportunities
2014	USA	Institute for Corporate Productivity	Association for Talent Development <i>MOOCs</i> <i>Expanding the Scope of Organizational Learning</i>	Survey	Learning Opportunities Expansion eLearning Access Expand Leadership Curriculum
2014	India	Kaka et al.	McKinsey Global Institute <i>India's Tech Opportunity: Transforming Work, Empowering People</i>	Report Survey	Remote Learning Digitisation of the Education Sector

2014	USA	Palin	Financial Times <i>MOOCs: Young Students from Developing Countries are Still in the Minority</i>	Interviews	MOOCs Participants in Developing Countries Update skills
2014	UK	Tovey	The Telegraph <i>Universities Need to Talk to Industry to Tackle Skills Shortage</i>	Survey Interviews	Update Skills Gap in Education Sector and Impairment of Graduate Skills
2015	India	Association of Accounting Technicians (AAT)	AAT <i>India's First Skills MOOC will Help Close the Skills Gap for Entry Level Finance and Accounts</i>	Interviews	Up-Skilling Workforce Training
2015	USA	Ferriman	LearnDash.com <i>How Companies Are Using MOOCs</i>	Case Studies	Career Development, Building Talent Pipelines Onboarding Employees Self-directed Career Development Workforce Training Channel/Custom er Education

2015	Australia	Lambert & Alony	Research Online University of Wollongong <i>Embedding MOOCs in Academic Programs as a Part of Curriculum Transformation: A Pilot Case Study</i>	Interviews	MOOCs and Skills Shortage Curriculum Transformation
2015	USA	Pandya	Knowledge@Wharton <i>How Companies are Managing the Millennial Generation</i>	Interviews	Scalability Accessibility Variability (learning expectations) Just-in-time Learning
2015	USA	Radford et al.	Wiley Journal <i>The Employer Potential of MOOCs: A Mixed-Methods Study of Human Resource Professionals' Thinking on MOOCs</i>	Survey Interviews	Professional Development
2015	USA	Riddell	Education Drive <i>Coursera's Stiglitz: MOOC</i>	Interview	Credentials Partnership with Companies

			<i>Revolution is Just Beginning</i>		Update Skills Professional Development
2015	USA	Singer	New York Times <i>Silicon Valley Turns Its Eye to Education</i>	Interviews	Update Skills
2015	France	Vergne	LeMoniteur.fr Magazine <i>Les MOOCs Bâtiment Durable dans les Starting Blocks</i>	Interviews	Flexibility Scalability Self-directed Learning Onsite Learning Collaborative Learning

Discussion

The aim of this paper was to examine a broader reaching area for which MOOCs are used, through a qualitative literature analysis of MOOCs as a means to bridge the mismatch in graduates' skills. The analysis of studies in the US, Australia, UK, France, and India has shown that a mismatch does exist between the skills needed by employers and the skills students have upon graduation. Nevertheless, the literature has also implicated that there is conclusive evidence to suggest that MOOCs have a positive impact on graduates' and employees skills development. MOOCs have had a significant role in helping the traditional and the "new traditional" graduates to quickly up-skill before employment or to quickly "come on board" in their new job. MOOCs have provided flexible, on-demand, collaborative, and just-in-time learning opportunities through which to obtain relevant and applicable skills.

In 2013, research had already indicated that MOOCs offered unprecedented choice, customisation and gave thousands of participants the possibility to have greater ownership and control over their learning experiences, "rather than being constrained by centralised, instructor-controlled learning based on delivery of pre-fabricated curriculum" (McLoughlin, 2013). Others had similarly expressed the benefits

(and the necessary critical factors) of MOOCs as a means to bridge the skills gap (Albert & Sekhon, 2015). According to these two authors, contextual content, dynamic and active peer-to-peer learning, and participant engagement through constant feedback, were fundamental in the success of this customised corporate skills course. They argued that the needs of the “new traditional” students had to be carefully considered: “One-way, inflexible, broadcast-style training fails to work, to the extent that it doesn’t respect the modern learner’s time, intelligence, workload, and competing life and work demands” (Albert & Sekhon, 2015). With this in mind, Albert and Sekhon (2015) identified what they call the “7Cs” or 7 critical or positive factors which influenced the success rate corporations using MOOCs to bridge skills gaps (Albert & Sekhon, 2015). The 7 critical factors are as follows:

“7 Cs”	Positive factors that influenced success in a corporate MOOC
Content	Up-to-date: Added value to the expertise of the participants. Was relevant to the audience. Taught by INSEAD faculty: brought credibility and trustworthiness.
Context	Readily applicable content to situations faced by the employees.
Curation and Co-creation	Participants as co-creators of content: social construction of knowledge relevant to discussion threads or specific issues posted on the discussion forums, often used as group discussion topics and tackled in teams.
Communication	Regular instructor presence. Messages were kept short and concise to respect employees’ busy workload. Timely reminders were sent. Expectations explicitly stated to participants to keep them engaged and on target.
Collaboration	Reality-based learning and teaching activities designed to mirror Microsoft employees’ daily tasks: Teams working together on tight deadlines to solve real-world issues. Employees were encouraged to work offline with colleagues and share insights and difficulties with other participants.

Competition	All employees had access to a leaderboard: individual and overall scores along with progress throughout the course.
Certification	An executive education certificate from INSEAD Business School.

(Albert & Sekhon, 2015)

Indicative evidence has also suggested that employees in some industries were accessing, or as in the case of Vergne (2015), were currently investigating, specialised and interactive MOOC content and activities onsite/on-the-go through mobile devices, including in remote areas. The use of MOOCs for skilled trades demonstrated that their anytime/anywhere learning opportunities and functionality were helping employees access content and receive instant feedback, instantly upgrade their skills, and increase their job performance. Partnerships between MOOC platforms and companies provide employers with the ability to engage and propose varied and cost-effective (cost of travel and lost productivity) staff development opportunities to their new employees at scale.

Evidence provided by Ong and Grigoryan (2015) demonstrated that partnerships were increasing because they were essentially win-win situations. MOOC providers would have access to a large database of students (i.e., potential purchasers of lucrative certificates or services), while universities benefitted from the expertise, logistics, and hardware/software capabilities of platforms that helped them to teach and engage with students at scale, at a similar or cheaper cost (Ong & Grigoryan, 2015).

Radford et al. (2015) noted that employees at lower salary grades, with less education, and shorter employment contracts were among those most inclined in sacrificing personal time to participate in a short MOOC to improve skills. This potentially indicates that MOOCs were perceived as valuable in terms of affordability (i.e., subscription model), convenience, skills development, as well as a means to get ongoing contracts. Leadership, management, and communication courses were among the most popular courses (Radford et al, 2015). This possibly indicates that these skills are the most sought-after by employers and considered most important by employees to fulfil their job duties, progress in their careers, and demonstrate their eagerness to improve their skillset while employed (i.e., potentially for performance reviews) (Radford et al, 2015). Jason Wingard, from Goldman Sachs, described how MOOCs offered unprecedented opportunities for *scalability*; “it’s not feasible to take all of these people, put them in a room and have a group education session,” *accessibility* to; “reach wider audiences,” as well as *variability* and *just-in-time learning* as employees “can cherry-pick the topics they want to address specific challenges they’re facing” (Pandya, 2015).

There is indicative evidence that there is a MOOC-adoption generation gap. Millennials (18-25 years old) and Generation X (26-35 years old) were more likely to register and use MOOCs to upgrade skills than Baby Boomers (over 45 years old) (Rubens, 2016), which might create an internal digital gap and possibly gaps disparities between employees inside an organisation. Millennials would have access to

very specialised and updated content online, anytime taught by industry experts external to the organisation, while Baby Boomers would have to wait for in-house staff development opportunities offered by their company's trainers. These gaps between graduate skills and employability seem to have impacted numerous companies' ability to develop, implement, and complete projects on time. As indicated by Lakshmi (2013), skills' disparity between employees working in teams were too significant and hindered teamwork.

MOOCs Disruptive Potential

Despite such benefits of the use of MOOCs to bridge skills gaps, there are, nevertheless, scepticisms and mixed feelings about this approach which consists of offering affordable, short term, modular, time flexible, readily applicable, and taught by industry experts, face to face courses. However, Christensen and Weise (2014) argue that "when an education technology company like UNow can collaborate with an employer, it will have an enormous competitive advantage". For instance, the recent partnerships between MOOC platforms, universities, and high-tech firms such as Instagram, Google, and Qualcomm, to jointly design and offer specialisation courses on Interaction Design, Mobile Cloud Computing, or data Science, are considered potentially very disruptive for tertiary institutions. These partnerships also allow for customisation and quick iterations to meet constantly changing industry's standards for skills and knowledge, which is not often the case in more administratively-rigid university programmes and courses. According to Alexander Halavais from Arizona State University, the issue with most universities is that they lack "interoperability" (Waters, 2015). He argued that universities often proposed outdated curriculum, were like "old-fashioned Macs losing out to the openness of Windows and other platforms that made it easier to 'plug-and-play'" (Water, 2015, para. 18) and that the integration of "nano-," "micro-," and "meso-" certificate programmes would give an edge to their degree programmes (Waters, 2015). In other words, MOOCs' main competitive advantage is their agility and their just-in-time training capacity to cater to employees' immediate needs, in fast changing industries such as computer forensics or data visualisation.

Gaps in the Literature

To date, there are no longitudinal studies investigating MOOCs' impact on graduates' skills and their potential to help reduce it. As mentioned earlier, there is also a lack of studies examining the negative economic impact the graduate skills gap has on companies in specific industries. Moreover, there are limited studies investigating a company's return on investment related to MOOCs vs "traditional" in-person skills development training opportunities offered to employees.

In addition, there are few published studies in the literature investigating whether there are digital gaps between different employees' age groups within a single organisation. This may have an impact on, be counterproductive to, or affect employees' engagement with MOOCs or other online courses, which may potentially impact retention, completion, motivation, etc.

Conclusion

MOOCs' potential to help graduates attain relevant skills before employment, as well as with continual up skilling once employed, has been largely ignored in the published literature as exemplified by the scarcity of journal articles on this topic to date. The purpose of this paper therefore, was to shed light on graduates' skills, employability and the use of MOOCs to provide flexible and affordable learning opportunities to both employers and "new traditional" graduates. The examination of skills and employability has revealed that the mismatch between potential employers and their ability to hire new bachelor degree graduates with relevant skills is not only a growing problem but also a global phenomenon. Scepticism inevitably exists when online flexible and affordable means to minimise the mismatch is explored. However, to bridge this gap, it has been discovered that the disruptive capabilities of MOOCs are indeed being utilised through collaborations by corporations, MOOC platforms providers, and some HE institutions.

The findings of this paper have indicated there is evidence that corporations have and are exploring bridging the skills gap, in partnership with MOOC platforms and universities. In many instances, corporations are specifically exploring how MOOCs could be offered at scale as interactive continuing professional development (CPD) opportunities to their employees or as refresher courses to their often technology-savvy and geographically-dispersed workforce, using a quick and cost-effective "learn-certify-deploy" pattern.

There is also evidence that these partnerships are mutually beneficial, as MOOC platforms provide the complex technical know-how while universities disclose student databases which aid MOOC platforms statistical, research, and marketing objects. There is also promising evidence that Ed Tech companies are directly collaborating with employers to improve fluidity, alignment, and design of MOOCs that are better tailored to the specific needs of their businesses. This, in turn, improves their credibility and acceptability in the competitive field of online skills courses. Such industry-driven courses are valuable as they can be quickly accessed, completed, updated, and offered as frequently as required, while maintaining a high iteration design rate. Finally, as indicated by Albert and Sekhon (2015), there is strong evidence that the 7Cs, which influence successful corporate MOOCs, are potential game changers to ensure employees' motivation and MOOC completion. MOOCs, therefore, are becoming clear global stakeholders in enhancing opportunities for both new seekers of employment, as well as corporations providing staff development options to their employees.

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