



Do MOOCs contribute to student equity and social inclusion? A systematic review 2014–18

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ABSTRACT

In recent years, hopes that Massive Open Online Courses (MOOCs) would make access to education fairer faded in the light of research showing MOOCs favoured the already educated and relatively advantaged. This paper presents the results of a systematic review of literature from 2014 to 2018. The aim was to investigate the extent that MOOCs and other free open education programs provide equitable forms of online education to address global widening participation agendas. The literature fell into two main groups: empirical reports on outcomes for students, and those providing policy or practitioner guidance. A globally diverse set of 46 studies and reports were examined, including 24 empirical evaluations of programs reaching over 440,000 disadvantaged learners in both distance and blended learning settings. Most literature claimed an interest in advancing *student equity* (enrolled or tertiary preparation learners) and/or *social inclusion* (community learners) with low-skills, low confidence, and/or low levels of previous education. In contrast to the existing literature, this study found that there was a flourishing of multi-lingual and Languages other than English (LOTE) programs and those addressing regional socio-economic disadvantage. Most cases involved MOOCs and free online resources combined with additional forms of support, including face-to-face study groups. Contrary to the existing debate in the open education literature, the review also found that the legal status of the learning materials (copyright or openly licenced) was of little consequence so long as it was free to the end user. What seemed to matter most was the intentional and collaborative design for disadvantaged cohorts, including the provision of digital or face-to-face personal support. Successful design collaborations often featured learner-centred, non-technical partnerships with community groups which increased the understanding of the needs of particular marginalised learners, while also providing more sustainable and distributed learner support. The review concludes that MOOCs which aim to widen participation in education are an alternative global practice that exists alongside more commercial MOOC offerings. Recommendations are provided for addressing gaps in offerings, and improving design and research.

1. Introduction

Massive Open Online Courses (MOOCs) - like the open and distance learning programs that came before them - rose to prominence on the promise of increasing access to education for learners from all backgrounds (Moore & Tait, 2002). MOOCs are free online courses with tens of thousands of students, which started more collaboratively as “techie learning events” before being discovered and adopted by elite higher educational institutions (Pappano, 2012, p. 1). “The shimmery hope is that free courses can

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bring the best education in the world to the most remote corners of the planet”, noted Pappano in her influential piece “The Year of the MOOC” (Pappano, 2012, p. 2).

MOOC advocates suggested that MOOCs could include people who were traditionally excluded from higher education. While Open Universities operating around the world had been doing this for many years with programs for learners (often mature age and working) without suitable entry skills and qualifications, equity advocates hoped MOOCs could make an additional contribution in the way they charged no entry fees. It was also assumed that increasing the knowledge and skills of excluded learners would lead to improved social inclusion through the attainment of skilled jobs, increased wealth, status and prosperity. Within a few short years however, the MOOC revolution was shown to have only minimal impact on educational access patterns. While commercial MOOCs may have been offered in many developing nations, it was still the already-privileged in those countries who primarily benefitted. “The demographics of massive open online course (MOOC) analytics show that the great majority of learners are highly qualified professionals, and not, as originally envisaged, the global community of disadvantaged learners who have no access to good higher education” (Laurillard, 2016, p. 1). They were also found to be socio-culturally exclusionary for the millions of non-English speaking people, those with English as a second or third language, and those native English speakers in colonised places like India and parts of Africa for whom the American or English content and cultural perspective was not applicable to their local context (Adam, 2019; Bali, 2014).

Just as concerns were being raised about the lack of impact of MOOCs on educational inequality (Emanuel, 2013; Jordan, 2014), the major MOOC providers Coursera, Udacity and edX began introducing fees for components of their courses while pursuing more commercial online business and IT training markets. This was in response to concerns about the quality and sustainability of their courses. Coursera introduced “signature track” courses where a verified certificate of completion could be purchased for \$50. By October 2014 Coursera was earning US\$1M per month from certification fees, and reducing the number of programs with the option for a free ‘Statement of Accomplishment’ (D. Shah, 2014). Udacity charged a fee for certification options and provided a help line, then decided to focus on the IT training and hiring market. edX began to establish partnerships with traditional Universities to teach MOOCs in their for-fee classrooms.

The shift from free to a fee-paying offerings was a significant departure from the original MOOC aim to promote free education for all. Unfortunately, the costs and topics associated with the second wave of MOOCs seemed more likely to further exclude learners without the income and skills that come from already experiencing tertiary education.

Commentators noted that what Udacity CEO and co-founder Sebastian Thrun called MOOCs 2.0 (Hyman, 2013) looked much more like mainstream eLearning provision, and that “MOOC 2.0 courses focus on the typical student, integrate more effectively with established distance and on-ground programs, and lead to trustworthy credentials” (Legon, 2013). In other words, MOOCs 2.0 shifted to support traditional higher education students, rather than those excluded from it. Based on 2014 estimates, the investment into the already-educated and relatively-advantaged would therefore be between \$38,980 to \$325,330 per MOOC (Hollands & Tirthali, 2014b). Indeed, such provision and investment has been noted to contribute to the digital divide, i.e. worsen rather than decrease the gap between the have and have-nots (Laurillard, 2014; Laurillard & Kennedy, 2017; Rohs & Ganz, 2015; Warschauer, 2003).

Meanwhile, in developing countries and those recovering from financial crises, non-commercial philanthropists had also invested in the development of MOOCs due to their potential to increase access to higher education, stimulate digital skills and related jobs; and address a shortage of teachers in many developing areas (Boga & McGreal, 2014; Daniel, 2012; Garito, Paravati, & Bagnol, 2015; Laurillard, 2014; Waard et al., 2014; Willems & Bossu, 2012). The philanthropic funded programs tend to focus on foundation, entry-level topics, mobile-friendly technologies, and the provision of classes or extra support required by learners with no prior experience in online learning. There is also increasing attention given to diversification of provision in languages other than English. Diversification of platform providers in India and China often with government support also radically improved the linguistic options and broadened access to larger populations (Trehan, Sanzgiri, Li, Wang & Joshi, 2017).

Concerns for how MOOCs might be sustained in the non-for-profit sector once philanthropic seed funding has been expended were similar to the issues about sustainability being discussed by commercial platforms (Daniel, 2012; Mishra, 2017). It is not yet clear from existing literature how programs for socio-economically disadvantaged learners can be provided in affordable and sustainable ways.

This study is timely and important as there have been no published systematic literature reviews or meta-analyses relating to open-courses and socio-economic disadvantage since the emergence of MOOCs. Related earlier reviews covered broader topics: Open Education Resources (Wiley, Bliss, & McEwan, 2014), Research interests in early MOOCs 2008–2012 (Liyanagunawardena, Adams, & Williams, 2013) and the Distance Education field (Zawacki-Richter, Baecker, & Vogt, 2009). Notably, the 2009 Zawacki-Richter et al. study developed a “Classification of Research Areas in Distance Education” in which “Access, equity and ethics” is noted as an area of research at the macro level - however, their review found very little research occurred on this topic. Student equity was also not discussed in the Liyanagunawardena et al., 2013 review of early MOOC research which categorised the early MOOC literature (Liyanagunawardena et al., 2013). A recent review into MOOC accessibility developed many recommendations for how platforms, providers and designers could improve technical access for disabled and aged learners (Sanchez-Gordon & Luján-Mora, 2018) and this topic is also coming up at conferences (Iniesto, McAndrew, Minocha, & Coughlan, 2017). The technical access is an important related field of study however it is more narrowly focussed than this study which is more interested in the broader socio-economic barriers to learning.

Rolfe’s review of MOOCs had an interest in ethical outcomes for students however the method excluded all case study reports, which produced a narrow picture of available practice and therefore perhaps not surprisingly found that most studies in the sample focussed on learner demographics harvested from the in-built analytics systems (Rolfe, 2015). Broader sampling and inclusion of qualitative case studies as proposed by the design of this research might be expected to produce different results.

Therefore, this research addresses a need to explore the impact of the reduction of free MOOC provision from 2014 with a particular focus on socio-economically disadvantaged learners. The systematic review method seeks to take a global snapshot of practice 2014–18 to address issues which remain unclear such as if the diversification of providers and platforms advanced the widening participation educational agenda and mitigated the impact of fee introduction in commercial platforms. The research also addresses the need to know if MOOC providers and stakeholders – commercial or otherwise – have found sustainable ways to continue improving the quality and learner support for socio-economically disadvantaged learners who need additional mobile-friendly and linguistic delivery options but are unlikely to be able to pay for certification.

After the following Literature Review to define key terms and research questions, Section 3 outlines the qualitative systematic review method. Section 4 details the results: descriptive statistics and qualitative themes of the studies including which kinds of learners were enabled and the level of outcomes achieved. Section 5 discusses the limitations including gaps and opportunities for future research and program design.

2. Literature review

2.1. Widening participation, student equity and social inclusion

Widening participation in higher education is a policy focus for many countries around the world seeking to address the historical under-representation of students from particular social and racial groups in higher education (Bennett, Southgate, & Shah, 2016).

In Australia for example, under-represented equity groups are currently defined as low socio-economic status learners, indigenous, regional and remote, migrants and those for whom English is not their first language, and learners with disabilities (Koshy, 2014). In the United States the two-year colleges play a key role to widen participation of Black and Hispanic learners, whereas in the UK and Australia the focus is on enrolling a more diverse student population into mainstream teaching and research universities offering three to four-year undergraduate degrees.

Widening participation policies aim to accelerate progress towards fairer educational participation and are focussed on making education accessible for all learners, not just those from white, wealthy or professional families. By ensuring that a wider range of learners are supported into and through higher education it is expected that the benefits of health, wellbeing and prosperity that flows from good graduate employment are spread more equally throughout society (Burke, 2012).

Widening participation policies are known by many names in different parts of the world including “widening access”, “fair access”, “social inclusion” and “student equity.”

The term “student equity” is used in the Australian context and will be used in this study to describe fairer access and outcomes for enrolled and transitioning higher education students.

The term social inclusion is sometimes used interchangeably with student equity to discuss widening participation policy in higher education as an important priority for governments (Naylor & James, 2015). However, social inclusion is more typically used more broadly to refer to welfare policies targeted at unemployed adults who become disenfranchised from mainstream society.

Social inclusion aims to bring marginalised or excluded communities back into the mainstream by first addressing food, housing and basic health issues as a foundation for stability, training and employment (Silver, 2010). Policies are often directed towards adult migrants, refugees and the unemployed rather than school leavers. In the current environment where government services, access to community information, voting and banking are increasingly going online, then the term ‘digital inclusion’ is seen as an important part of ensuring social inclusion, as well as facilitating access and participation in higher education (Thomas et al., 2017). Social inclusion will be used in this study to mean fairer educational access and outcomes for non-award community-based learners. “Disadvantaged” will be used to refer to the socio-cultural, linguistic, economic and skills barriers facing under-represented MOOC learners which is often related to or compounded by only have basic or foundational levels of existing education. Disabled and indigenous learners would be part of this definition however the study is broad by nature and not focussing on any particular sub-grouping of disadvantage.

While in many cases the raw numbers of disadvantaged learners in higher education are on the rise, so too are the overall numbers of students in higher education. This means that higher educational inequality has remained a persistent issue, and many groups of disadvantaged students remain proportionally under-represented in many global contexts (Bennett et al., 2016; Burke, 2012; Pitman, Roberts, Bennett, & Richardson, 2017). In addition, recent research shows that unequal outcomes post-graduation between disadvantaged learners and their more advantaged peers continues to be a problem. This might be because learners from lower socio-economic communities lack high-level maths taught at their schools effectively excluding them from a range of professional courses and careers (Mestan & Harvey, 2013); need to juggle working and caring roles and select lower status courses associated with lower incomes and lower job security (O’Shea, May, Stone, & Delahunty, 2017); attend newer, lower prestige universities; and have higher rates of dropping out (Koshy, 2014; Mountford-Zimdars et al., 2015; Zacharias & Brett, 2018).

Therefore, research into student equity and social inclusion continues to be an important area that looks not only at the populations who access formal and informal education but also at the equality of their experience, progress and outcomes. While terms are often used interchangeably in the literature, for the sake of clarity and analytic precision, this research will use the term “student equity” to refer to efforts to make education fairer for tertiary learners and those preparing to enrol in higher education. The term “social inclusion” will be used to refer to the education of non-award community or “lifelong” learners.

These distinctions are useful within the context of the study of current open education programs which cover a variety of topics useful for both lifelong and enrolled learners, including those preparing to enrol in higher education. Indeed open education has been noted to promote the movement from “informal” to “formal” learning, that is trying a free online introductory course prior to

enrolling in something similar for credit (Bossu, Bull, & Brown, 2012; Farrow, Arcos, Pitt, & Weller, 2015).

2.2. MOOCs and open education

Open education as practiced by Open Universities has a long history of widening participation for disadvantaged learners. However, the possibility of increasing access to education world-wide has been advanced more recently by the rapid growth of the internet and free online resources including Open Educational Resources (OER) (Weller, 2014). From this point of view, MOOCs can be seen as a recent digital chapter in the longer history of open education. Recent institutional and policy guides have been published that advocate for the potential of MOOCs and open education as both a quality initiative and also as a “potential means of achieving social inclusion and equal opportunities (Inamorato dos Santos, Punie, & Scheller, 2017, p. 6)”.

Some well-known contemporary open education researchers including those from global Open Universities approach their work from a widening participation or social inclusion perspective and explicitly use those terms to discuss lifting the life-chances of disadvantaged learners through education (Lane, 2008, 2012, 2013; Bossu et al., 2012; Bozkurt, Ozdamar Keskin & De Waard; Cannell, 2017; Cannell, Macintyre, & Hewitt, 2015; Lane & Van Dorp, 2011; Tait, 2008).

However, more commonly open education is discussed in terms of “democratising knowledge” or making materials free “for everyone” unshackled by fees and/or copyright restrictions. Ideas on the best way to achieve this have changed over the last decade. Training academics and teachers in open-licencing and OER including how to search, find, edit and create their own OER were first implemented in the belief that re-using digital materials would be cheaper and easier than creating them from scratch. When this proved harder and slower than expected, there was a wave of investment in OER repositories so OER could be found and re-used more easily by teachers (Mulligan, 2019).

Due in some part to the barriers of staff time, skill and interest in OER adoption, high profile initiatives such as Massachusetts Institute of Technology's Open CourseWare initiative, iTunesU, YouTube and more recently MOOCs have tended to promote and make popular the idea that “open” can mean free online learning, direct to the learner. Without a strong organisational culture of OER use and support, teachers are more likely to use free materials from the internet in their lessons and in the last decade software for creating your own materials from scratch has become much cheaper and easier to use (Mulligan, 2019).

Another argument from open education ‘purists’ who maintain that OER must be openly licenced (Wiley et al., 2014) is that re-use allows for the adaptation into different languages and cultures. “Localisation” of OER materials for different global contexts is said to be one of the greatest potential strengths of the model - but it also a weakness as it requires much additional time, resources and commitment from academics (Farrow et al., 2015; Lane & Van Dorp, 2011; Weller, 2014; Wiley, 2017). So far, the evidence for OER localisation is scant and the biggest OER re-use projects are modifying OER textbooks for subtly different contexts in courses in North America and Canada. Recent research has shown the positive impact of courses that have adopted OER textbooks— particularly on disadvantaged learners through reduced student debt, lower attrition, and better grades (Colvard, Watson, & Park, 2018).

Regardless of whether OER re-use or creation of free materials is more popular generally, the question of which approach to MOOCs and open education programs is more likely to benefit disadvantaged learners remains unanswered. There are few empirical studies underpinning the literature assessing the “potential” of OER and open education (Knox, 2013; Lambert, 2018). Therefore this study is interested to know whether OER re-use can reduce development costs while providing quality courses in the way that has been achieved with OER-based textbooks (Hilton, 2016).

This research takes a broad approach to open education by including both free and OER learning materials in its conception of open education, aligned to Butcher's guide to OER for the Commonwealth of Learning (Butcher, 2015). For the purposes of this study, *open education program* is defined as any free, online learning sequence that incorporates resources, instruction and assessment (including formative assessment i.e. feedback). The program could be offered fully or partially online using desktop, laptop or mobile devices, or in blended mode so as to provide additional learner supports. MOOCs are defined as a sub-set of open education programs.

3. Research method: qualitative systematic review

The overarching Research Question for this study is: How prevalent and successful are MOOCs and open education programs to enable social inclusion and student equity?

To address this question, a qualitative systematic review of the global literature was undertaken using an established methodology from the fields of education, health policy and practice (Bearman & Dawson, 2013; Finfgeld-Connett, 2014; Pawson, 2006; Pawson, Greenhalgh, Harvey, & Walshe, 2005). Four sub-research questions were developed to guide the data collection:

RQ1. What is the global distribution of MOOCs and open education literature aiming to address student equity or social inclusion and what delivery technologies are reported to be used?

RQ2. What are the aims of MOOCs and open education expressed in the literature, and which types of learners are expected to benefit?

RQ3. To what extent did the evaluated programs (empirical studies) succeed in meeting their aims for student equity and social inclusion?

RQ4. What are the characteristics of the successful programs?

Systematic reviews search, evaluate and synthesise the findings from diverse primary studies. Regardless of whether they are more qualitative or quantitative in focus, they tend to first look at the spread and characteristics of the phenomena to be studied (RQ1

and RQ2). Qualitative systematic reviews then additionally go on to collect more detailed data to answer more qualitative research questions such as RQ3 and RQ4 in this study (Sandelowski, Voils, Leeman, & Crandell, 2012).

3.1. Scope, inclusion criteria and keywords

The scope of the systematic review was English language literature on open education programs which aimed to improve student equity and/or social inclusion of disadvantaged learners. Because so little work has been done in this area, an exploratory approach was taken to firstly create a global snapshot of recent equity and inclusion focussed literature, before going on to investigate the aims and outcomes of programs. Typical of exploratory qualitative reviews, both peer-reviewed journal papers and “grey literature” or reports were included but not longer-format publications, i.e. books or theses (Finfgeld-Connett, 2014; Sandelowski et al., 2012).

Literature published from 2014 was included to capture programs from the time of the second wave of MOOCs (MOOCs 2.0) when the major providers with massive global reach were limiting free programs for learners while focussing on more commercially sustainable markets. Focussing the review on open education programs from this time is important because a more stable and sustainable practice emerged after the experimentation of the earlier MOOCs (Clay, 2015; Hyman, 2013). Therefore, the results of the study are more likely to be suggestive of what is possible for others in the current commercial or philanthropic MOOC provider contexts.

In consultation with two open education/widening participation researchers from different global contexts (see acknowledgements at end of paper), test searches were undertaken in various databases using the key terms “open education”, “social inclusion”, and “student equity” and their synonyms as search terms. Early searching tests produced few results so preliminary reading of papers and keywords began to note the variance in terms to describe similar work. A number of additional synonyms were developed, and further test searches made. For example, the word “remedial” was found to be commonly used for student equity programs addressing foundation skills in higher education transition programs. A combination of Google Scholar and Scopus databases provided the best results as they each had strengths in different areas. Google Scholar returned a more globally diverse set of sources including those from different discipline backgrounds and openly published journals. Scopus returned papers from more traditionally indexed, closed sources.

Inclusion criteria:

- Journal articles, national studies, policy reports and full conference papers in English
- Study must describe one or more open education programs or program designs; pilot programs and early phase innovations were included
- The open education program must involve learners who are post-compulsory schooling age, programs solely offered to primary/secondary students were excluded
- Studies must have an aim in assisting disadvantaged students, or increasing social and educational inclusion.
- The open education programs must be free, with online resources and assessment/feedback options. The programs could be either for credit or not for credit.

The final search string was: “open education” OR MOOC* OR “massive open online course*” OR “open course*” AND “social inclusion” OR equity OR “social justice” OR “widening access” OR “widening participation” OR “community participation” OR “community partnership*” OR “co-create” OR remediation OR “study groups”.

3.2. Search returns, data extraction and analysis

The literature search identified 176 papers and articles. Include/exclude decisions were made at both the abstract and full-paper text stages. To reduce bias in these judgements, a second researcher reviewed include/exclude decisions at the title and abstract stage. It was decided to include national and multi-studies papers for their ability to provide multiple examples and trends. After the removal of 130 out-of-scope and duplicate papers, the final number of studies reviewed was reduced to 46.

Systematic, formal data collection was undertaken using Google forms. To reduce bias in interpretation, a second researcher reviewed a sample of 10 full papers at the full paper review and data collection stage and differences in interpretations were resolved through discussion to consensus.

The first phase of analysis quantified and developed descriptive statistics for features of interest: country of origin; technologies used; numbers of students in the program; numbers of students involved in the research; aims, beneficiaries and outcomes of program. The second phase of analysis involved a method of qualitative synthesis to make judgements on similarities and difference in program themes, aims and outcomes between very different types of primary sources i.e. descriptive, qualitative and quantitative studies (Sandelowski et al., 2012). Any study that was not sufficiently evaluated with learners and/or did not report sufficient learner outcome data was excluded from this second qualitative phase, for example policy papers, staff accounts, and pilots.

To assess the success of the programs, a false dichotomy, i.e. good/bad was avoided, and instead a judgement was made comparing the stated aims to the actual outcomes using a “meaningful and consistently applied standard” (Sandelowski et al., 2012, p. 325). In this case, a 4-scale rating system was used: aims exceeded; aims met; mixed outcomes (some aims met, others not met); and underperformed (aims not met or largely not met.). In both phases of analysis, the use of a direct statement or reasonable inference from the text is used as the level of certainty as criteria for determining the aim and outcomes of the program, the reasons that aims were met or not, and which marginalised learners have benefitted from the program.

Table 1
Globally diverse authors and studies.

Authors' location	Number	Percentage
Nth America, Canada	16	21.0%
England, Scotland	25	32.9%
Europe	13	17.1%
Australia	6	7.9%
South America	6	7.9%
Middle East, Africa	4	5.3%
Asia	6	7.9%

Please consult [Appendix A Supplementary data](#) file for a master Excel data table listing of all studies and related data sets.

4. Results and discussion

A total of 46 reports and articles were examined which met the study criteria covering open education programs from around the world. The following four sections (4.1, 4.2, 4.3, 4.4) address each of the four research questions in turn. A brief discussion of the results including relevant comparative literature is included at the end of each section.

4.1. Global distribution and characteristics of the studies

This section addresses RQ1: What is the global distribution of MOOCs and open education literature aiming to address student equity or social inclusion and what delivery technologies are reported to be used?

As [Table 1](#) below shows, authors from North America, Canada and the UK who often dominate review studies in open and distance learning ([Zawacki-Richter et al., 2009](#)), only made up just over half of the authors. Authors from both northern and southern Europe, South America, Asia, Australia, Africa and the Middle East were also represented in the studies.

The studies were roughly split into two types – just over half ($N = 24$) were empirical studies such as evaluated cases of student equity MOOCs or demographic studies of one or more MOOCs (see [Table 6](#) for citations.) Just under half ($N = 22$) were staff accounts, practice or policy guides, and as such tended to be more aspirational (see [Table 5](#) for citations). They often advocated for staff and institutions to take up the various strategies or pilot approaches they described.

As [Table 2](#) shows, there was a spike of interest in publishing on the topic of open education for social inclusion or student equity in 2016, and after this the number of publications slowed significantly. In addition, 2017 results had only 3 published empirical studies evaluating actual programs and the rest were largely policy guides/discussions on MOOC's equity potential. This suggests that interest in equity and inclusion focussed MOOCs has slowed in the last few years after the initial burst of interest and funding of MOOC projects. However, the 2017–18 published empirical pieces in this review describe major and high-quality projects, so perhaps the field has simply matured and stabilised with fewer studies thoughtfully building on earlier experimentation.

Therefore, the first key finding is that during 2014–2018 open education programs with an interest in student equity and/or social inclusion continued as an active, globally diverse phenomena. While cases of program development reduced from 2017, policy guides for open education increased prior to a further general slow-down in 2018.

In terms of the technological characteristics, data was collected on which technologies the studies reported were used ($N = 45$ as one study did not say). A diverse set of open and proprietary technologies were found to deliver the programs, including for-profit and not-for-profit technology platforms, social-media based “cMOOCs”, as well as non-English and community-based MOOC platforms. The frequency of different course delivery technologies is shown in [Fig. 1](#) below. Multiple MOOCs was the most popular delivery choice, and 3 of the top 4 more frequent delivery choices involved more than one platform or tool.

Unlike many fully online MOOC studies, the programs in this study were often integrated with other classroom-based technologies as well as study-groups and other face-to-face supports. This delivery model could be termed ‘online content with blended support’. While this study is not scoped to investigate the technologies in detail (and most studies did not provide such details), [Table 5](#) in Results Section [4.2.2](#) discusses staff accounts and pilots of technical methods of providing additional learner support and personalisation.

Table 2
The frequency of the 46 studies between 2104 and 2018.

Distribution of studies						
	2014	2015	2016	2017	2018	Total
Policy/aspirational	3	2	9	6	2	22
Empirical	1	9	9	3	2	24
Total	4	10	19	9	4	46

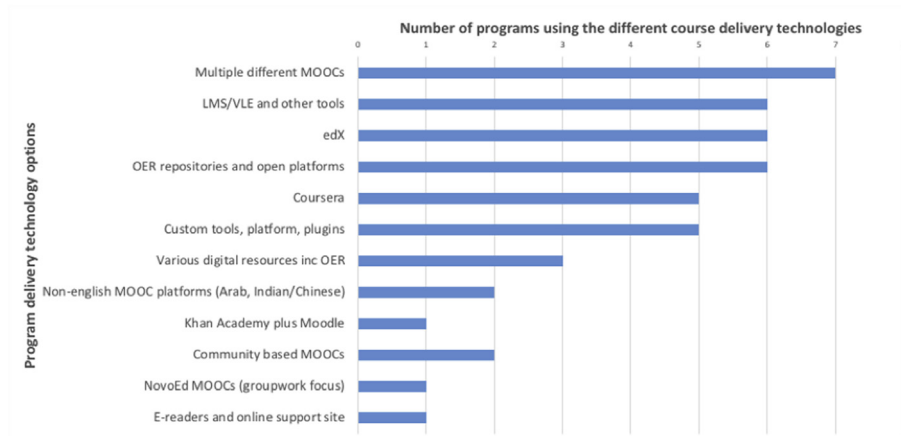


Fig. 1. Frequency of the different course delivery technologies (N = 45).

4.2. Aims and aspirations of the studies

This section addresses RQ2: What are the aims of MOOCs and open education expressed in the literature, and which types of learners are expected to benefit?

As Table 3 below shows, regardless of whether the studies were empirical or aspirational, the greatest number (47.8%) aimed to improve student equity of enrolled or transitioning students. 36.9% of the studies aimed to improve both student equity and social inclusion of community members and 15.2% aimed to improve social inclusion.

4.2.1. What types of learners stands to benefit?

Looking across all of the studies (N = 46), there were four common cohorts that the empirical studies and policy/staff guides aspired to reach:

- learners with low-skills, low confidence, and/or low levels of previous education;
- bi-lingual or non-English learners;
- learners with disabilities; and
- vulnerable people and communities.

The topic and learners' needs were subtly different between student equity or social inclusion programs. As Table 4 below shows, for example, the low-skilled learner in the student equity program was more likely to be a learner in a foundation STEM or university preparation program. Programs designed for the social inclusion of community members took up a broader range of topics, often addressing regional socio-economic disadvantage.

4.2.2. Policy and practice guides for staff: benefit for future students

Just under half of the studies (N = 22) were policy and practice guides for staff and institutions. The guides were designed to encourage the development of student equity and social inclusion MOOCs and open education programs for the benefit of future students. The national and multi-national policy guides were to encourage MOOCs and open education programs generally with student equity and social inclusion noted as potential benefits. Other reports were to enhance skills, employment and regional economies and noted online and open education options as making a contribution. Others were more micro guides to particular pedagogies or technical specifications for platform innovations to increase learner support and personalisation known to be important for disadvantaged learners (Engstrom & Tinto, 2008). Table 5 below provides a summary and citation of the themes and purposes of the reports and guides.

The technical specifications generally aimed to make learning more effective and reduce attrition for all MOOC learners including potentially disadvantaged learners, however the research account did not discuss the pilot cohort demographics, and the context

Table 3

The distribution of the different types and aims of the studies.

Aims of the studies	Number of empirical studies	Number of staff guides	Total	%
To improve student equity	12	10	22	47.8
To improve social inclusion and student equity	8	9	17	36.9
To improve social inclusion	4	3	7	15.2
Total:	24	22	46	100

Table 4

Common cohorts reached and enabled across the program types.

Learner cohort	student equity	social inclusion and/or student equity
Low-skills, low confidence, and/or low levels of previous education	Low-skilled or low-confidence learners in foundation or first year STEM (Science, Technology, Engineering and Maths) subjects, including those from disadvantaged rural communities. Low-skilled students at risk of failure, enrolled in University Preparation/Transition programs.	Low-skilled learners with low levels of previous education, low-waged workers and the unemployed; regional and remote low-socio-economic communities; and working women in caring roles under-represented in skills and career development courses. Learners in languages other than English.
Bi-lingual and/or non-English learners	Students learning in non-native languages (including trainee teachers learning to support these cohorts).	Learners with a Disability, or those with Special Education Needs (SEN).
Learners with Disabilities	Learners with a Disability, or those with Special Education Needs (SEN).	Vulnerable people and communities: Refugees; Human Trafficking; Ethnic Relations; and Sustainable Development.
Vulnerable people and communities		

Table 5

Themes and purposes of the 22 reports and guides.

Theme	Summary and citations
Guides for University transition, foundation or remedial studies	Staff accounts of the challenges and opportunities of developing University transition or foundation programs as open education programs - MOOC assessment for English writing skills (Hills & Hughes, 2016) - remedial STEM courses (Muñoz-Merino, Rodríguez, & Kloos, 2014) - development of language skills and foundation computing concepts at the same time (Rimbaud, McEwan, Lawson, & Cairncross, 2015) - supporting online students at risk of failing technical subjects (Meier, Xu, Atan, & Van Der Schaar, 2016).
Inclusive design guides and MOOC pedagogy accounts	Adaptation of pre-existing and well known inclusive design standards to make MOOCs and online learning: - more ethical for all learners (Rahanu, Georgiadou, & Siakas, 2017) - more accessible to non-native speakers (Sanchez-Gordon & Luján-Mora, 2016). Based on survey of students with cognitive, physical or sensory difficulties: - guide to notetaking for disabled learners including suggestions for video and MOOC lectures, transcripts preferred to captioning (James, Draffan, & Wald, 2016). Staff account of: - a compulsory Ethnic Relations MOOC, aiming for stable national ethnic relations in Malaysia and guide to the use of videos and humour to engage learners with difficult topics such as Ethnic relations (Nordin, Norman, Embi, Mansor, & Idris, 2016). - an openly licenced digital literacies and story-telling MOOC “Phonar Nation” successfully modified and re-used in different contexts (McGuire, 2016). - the need for changing outdated MOOC pedagogy (Jewitt, 2017). - four design principles that informed the equity-oriented creation and iteration of the Marginal Syllabus, an open course (Kalir, 2018).
Technical designs of personal, adaptive or self-directed learning pilots	Staff accounts sought to increase the feedback and support to learners: - technical specification for active, personalised MOOC (Cirulli, Elia, Lorenzo, Margherita, & Solazzo, 2016). - pilot of an adaptive learning tool which personalises quizzes and learning objects in a sequence and a process of academic quality checking (Miranda, Mangione, Orciuoli, Gaeta, & Loia, 2013). (NB. This paper was included in the review due to being incorrectly indexed as 2014, now corrected.)
National and multi-national policy guides	UNESCO and Commonwealth of Learning report grounded in the Sustainable Development Goals (SDGs) aims to lift education and skills of whole communities (Patru & Balaji, 2016). Three European guides to OER and MOOCs acknowledged education as development and/or the SDGs (Campbell, Deepwell, Weller, & Wilson, 2017; Cannell, 2017; Inamorato dos Santos et al., 2017). A North American policy paper addressed the need to upskill the 36 million low-skilled low-paid workers who live below the poverty line even though employed (Strawn, 2015). It also identifies particular vulnerable populations eg. young men of colour, migrants, and people with learning disabilities - stating that these groups “deserve deliberate, targeted outreach and service strategies” to improve their skills and education (Strawn, 2015). One multi-national report focussed on five identified groups of vulnerable people (Waard et al., 2014) and a second examined interventions to reduce barriers to access into higher education for refugees in North America and Europe (Streitwieser, Loo, Ohorodnik, & Jeong, 2018). One paper investigated MOOC emergence in India and China (Trehan et al., 2017). An Australian study highlighted the use of open online courses for regional and disadvantaged learners (Bossu et al., 2016).

tended to suggest mostly relatively advantaged learners. These learner experiences seem to hold a promise to improve the learning and outcomes of disadvantaged cohorts, if they were implemented or taken up in less privileged contexts or if the progress of equity group learners were tracked within a combined cohort, to ensure they succeed at similar rates to their more advantaged peers. Therefore, these areas are recommended for future empirical studies.

Two of the inclusive education guides (Rahanu et al., 2017; Sanchez-Gordon & Luján-Mora, 2016), along with the University of Tasmania's Understanding Dementia study (King et al., 2014), were the only studies in the review to explicitly draw on the substantial body of knowledge in the field of inclusive design and pedagogy (Florian & Black-Hawkins, 2011). Perhaps this is because Inclusive Education has been developed from disability studies and the review did not focus on disabled learners (or any narrowly defined) group of disadvantaged learners. However, this is a suggested area for future research collaboration particularly when it seems that the field of Inclusive Education may be broadening out to include an interest in addressing socio-cultural and linguistic exclusion as well as the technical exclusion or accessibility of learners with disabilities.

The “Phonar Nation” study was one of only three accounts of openly licenced materials and open delivery platforms making it easier to develop a new course. “Phonar Nation” was re-purposed for two American disadvantaged youth programs and one for asylum seekers in Ireland (McGuire, 2016). The two other OER related studies were about badging (Law, 2015) and assessment challenges (Hills & Hughes, 2016) related to the Open University UK's OpenLearn platform.

4.3. The extent of program success

This section addresses RQ3: To what extent did the evaluated programs (empirical studies) succeed in meeting their aims for student equity and social inclusion?

As discussed in the methodology section, a simple 4-scale measurement system was applied to determine the extent to which the 24 evaluated programs met their stated aims. The evidence provided by the study for claims about learner outcomes was consulted when making the assessment. The staff guides, technical specifications and pilot studies were excluded for this phase of analysis due to lack of learner outcome evidence (they mostly were not scoped or did not intend to evaluate with students.) Table 6 below provides a summary of the empirical studies as well as the learner outcomes, and citations.

The frequency of the four types of outcomes is shown in Table 7 below. This shows that 62.5% the studies (N = 15) either met or exceeded their aims. Similar to many studies regarding new technology in complex teaching and learning contexts (Nworie & Haughton, 2008), 25% of the studies (N = 6) had mixed outcomes – they mostly met their objectives but had some kind of unintended consequence or shortfall for some groups or part of the program. Three programs reported outcomes that did not meet most aims. This indicates that the about 87.5% of MOOCs programs in the study met their aims to enable both student equity and/or social inclusion. This is a good result considering these programs reached over 440,000 learners. It was not uncommon for some of the programs to have completion rates of 30–50% ie much higher than current MOOC literature (Bozkurt, Akgün-Özbek, & Zawacki-Richter, 2017).

4.4. Characteristics of successful programs

This section addresses RQ4: What are the characteristics of the successful programs? The success factors discussed are: program size and partnerships, inter-disciplinary design and multiple forms of support; design for bi-lingual, multi-lingual, non-native and non-english learners; and free, useful programs as social justice.

4.4.1. Program size and partnerships

For those studies providing student evaluation data (excluding 2 multiple MOOC studies, N = 22) analysis was conducted on any of the program features which might provide any explanation for the differences in outcomes.

Cluster maps were developed to visually explore multiple project features including program type and study size mapped across the spectrum of outcomes. Many studies had more than one data set ie interviews and analytics, but for this analysis study size was taken as the N of the largest student data-set used by the study to assess its outcomes. In total the 22 programs reached 449, 403 learners, and collected over 320, 723 pieces of learner data, including 28, 198 survey results. See the Appendix A Supplementary data file for the distributions (Study Size tab). The cluster map (see Fig. 2 below) produced a clearer picture of what a typical project looked like and the spread, study size and frequency of projects. All three program types were spread fairly evenly throughout the various types of outcomes.

There were some interesting aspects common to the ‘met’ and ‘exceeded’ outcomes categories. Firstly, there was a cluster of more successful programs with smaller study sizes, which all had smaller MOOC cohort sizes. However, there were 3 very successful programs with much larger cohorts of students and larger research sample sizes that all featured community partnerships (health, education, aid) in both the design, delivery and support of the program. Otherwise, with four exceptions (schools, libraries and an edX technical partnership) programs were most likely to be offered by a single higher education institution with no partners.

4.4.2. Interdisciplinary design and multiple forms of learner support

The successful large-scale programs developed with community partners included the University of Tasmania's Understanding Dementia MOOC, the TESSIndia teacher training MOOC, and the AuthorAid MOOC which reported impressive outcomes in terms of both attracting and completing higher than average numbers of disadvantaged regional and remote learners. The Dementia MOOC and the AuthorAID MOOC particularly enabled mature women with low prior educational achievement (Goldberg et al., 2015; King

Table 6

Learner outcome summary and citations of the 24 programs.

Study summary and reference	Outcome
1 and 2. The Dementia MOOC enabled older women with low prior levels of education (Goldberg et al., 2015; King et al., 2014)	Exceeded aims
3. e-readers, weekly study groups and online support raised the confidence and academic outcomes of Chilean first-in-family pre-service teachers learning and needing to teach in English, and at risk of failing (Charbonneau-Gowdy, Capredoni, Gonzalez, Jayo, Raby, 2015)	Exceeded aims
4. A first year foundation STEM program formed study groups to learn from a MOOC aligned with formal course materials. (N. Li, Kidzi, & Dillenbourg, 2015).	Exceeded aims
5. The Sustainable Development MOOC platform (Celina, Kharrufa, Preston, Comber, & Olivier, 2016) was customised to facilitate complex group projects undertaken both face-to-face and online, on a development topic of learner interest.	Exceeded aims
6. Large scale Indian multi-regional multi-lingual mobile-friendly teacher training MOOC with weekly study groups, classes with laptops/ connectivity were rare (Wolfenden, Cross, & Henry, 2017).	Exceeded aims
7. AuthorAID research writing MOOC enabled the inclusion and development of large numbers of female, regional, Global South participants with family responsibilities who had been noticeably underrepresented in previous face to face programs (Murugesan, Nobes, & Wild, 2017).	Exceeded aims
8. Digital Families program provided workshops and free handheld devices for parents and children with learning disabilities to explore and become confident using apps useful for their particular learning needs (McDougall, Readman, & Wilkinson, 2016).	Met aims
9. OpenLearn free online modules for university preparation, employability and community volunteering (Law, 2015)	Met aims
10. The NovoEd MOOC platform was customised to enable virtual teamwork, team members negotiated roles and tasks (Wen, Yang, & Rose, 2015)	Met aims
11. The Recommender tool facilitated student-suggested and student-voted resources on the edX MOOC platform (S. W. D. Li & Mitros, 2015)	Met aims
12. A niche medical MOOC for workers to upskill into more professional roles (Milligan & Littlejohn, 2016)	Met aims
13. Use of Peer-2-Peer University Learning Circles with under-served learners in entry level courses. Around half the learners had never done online learning, had no internet at home (Damasceno, 2018).	Met aims
14. Suite of 12 edX MOOCs designed for learners without a degree. Those without a degree (around half of the 247,000 learners) were more likely to pursue the college credit pathway, and persisted and submitted assignments at a similar rate to those with a degree (Wang, Fikes, & Pettyjohn, 2018).	Met aims
15. Demographic study of learners in the University of Edinburgh's first 6 MOOCs on Coursera compared to learners on an Arabic platform from Saudi Arabia (Macleod, Haywood, Woodgate, & Alkhatnai, 2015).	Met aims
16. Coursera Pre-College English Writing MOOC was specific to US context rather than a global cohort of learners, couldn't be modified after course start (Whitmer, Schierring, James, & Miley, 2015).	Mixed outcomes
17. The Human Trafficking MOOC enabled attitudinal change about a vulnerable community who were represented in the forums and videos, online forums were at times very heated (Watson et al., 2016).	Mixed outcomes
18. The EU funded Hands-On ICT (HANDSON) MOOC for teachers included forums and webinars facilitated in seven different mother tongues: English, French, Greek, Slovenian, Bulgarian, Catalan and Spanish (Colas, Sloep, & Garreta-Domingo, 2016). Culturally cohesive groups were more engaged, participated more.	Mixed outcomes
19. College preparation or gateway programs (Stich & Reeves, 2017) were contingent on pitching the content to the correct entry level so that a safe space and modest pace could be provided for beginners	Mixed outcomes
20. eTutor algorithms for revising technical topic increased the speed to revise, but not the depth of learning (Tekin & van der Schaar, 2015).	Mixed outcomes
21. Nanotechnology MOOC in Arabic reached fewer learners than anticipated, learners mostly used the English version despite careful translation (Barak, Watted, & Haick, 2016).	Mixed outcomes
22. The Entrepreneurship and Innovation in IT MOOC was setup to enable groups to develop a new IT-related business plan, but the group-work aspect did not succeed. Instead those who completed did the work individually (MacKinnon & Bacon, 2016).	Under-performed
23. Four optional remedial STEM MOOCs for first year learners with low take-up and little impact on learning (Pérez-Sanagustín, Hernández-Correa, Gelmi, Hilliger, & Rodríguez, 2016).	Under-performed
24. Low take up and negligible impact of optional steps into foundation STEM MOOCs to try and improve study skills (Davis et al., 2016).	Under-performed

Table 7

Frequency of program outcomes (N = 24).

Student outcomes – different levels of program outcomes	Number of studies	% of studies
Program outcomes exceeded aims	7	29.2
Program outcomes met aims	8	33.3
Program had mixed outcomes	6	25.0
Program underperformed, largely did not meet aims	3	12.5
Total studies:	24	100

et al., 2014; Murugesan et al., 2017). The MOOC designs included many elements different to traditional MOOCs that could work in other contexts. For example, the Dementia MOOC considered the existing strengths and education gaps of the intended learners, used experienced dementia carers (ie intended audience) on camera as experts in the same way as the medical and academic experts, provided sufficient scaffolded training in online learning, and both phone and email support from tutors. The 6 week long edX TESSIndia teacher trainer MOOC was delivered in Hindi, English and Oriya. The program was designed for mobile and offline options with facilitated weekly study groups across multiple regional and remote locations in 7 Indian states, which provided for a high degree of localisation and contextualisation. The program design featured authentic tasks flexible to individual's situation, the numerous regional facilitators were also able to overcome lack of computer, internet and electricity in a variety of creative ways

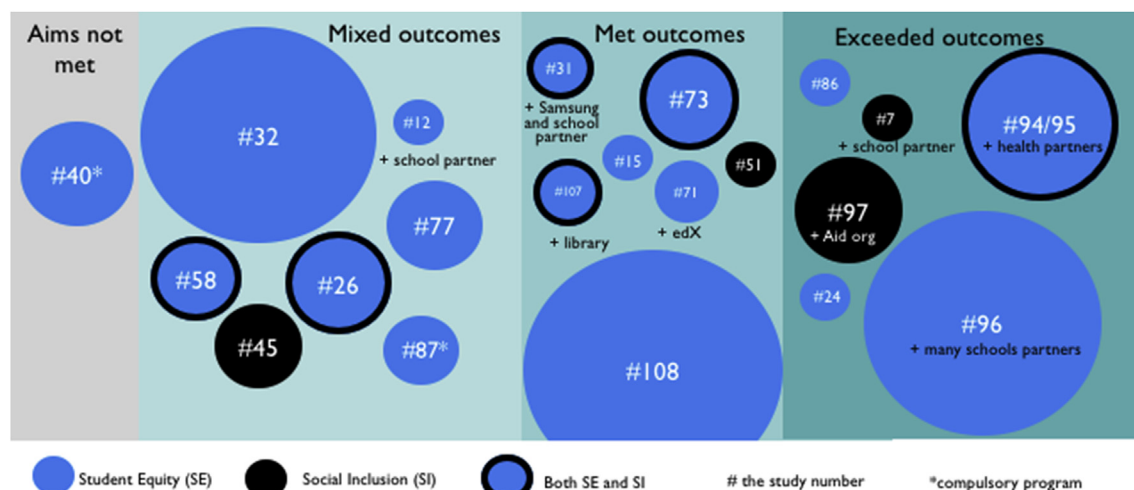


Fig. 2. The distribution of the program types across 4 possible outcomes, showing study size (bubble size), study identifier (#) and project partners (if applicable.).

(Wolfenden et al., 2017).

The more successful programs of all sizes were notable for the diversity of both digital and face-to-face ways found to support learners. Some programs embedded MOOCs as free resources in existing face-to-face classes and/or utilised classroom teachers or study-group peers as a component of the program. This included a 12 month Chilean program with outstanding student outcomes using weekly face-to-face workshops to discuss the freely provided English-language literature resources read by students on provided mobile devices (Charbonneau-Gowdy et al., 2015).

More successful programs delivered entirely online used a range of online supports, for example a European bi-lingual learning program providing mother-tongue online facilitation in 7 languages to supplement the English language MOOC resources and authentic tasks. This successful strategy provided a developmental safe space to engage with the materials and build skills (Colas et al., 2016). The AuthorAID MOOC writing program for Global South authors used a team of voluntary guest facilitators from an existing community network (Murugesan et al., 2017). Another program crowd-sourced student conceptual help resources from within the MOOC cohort (S. W. D. Li & Mitros, 2015) which filled a support need different to the specifics handled in the online forums.

Another element distinguishing successful MOOCs at scale was the involvement of an interdisciplinary development team. They were designed not as a technical exercise, but collaboratively with teaching expertise, community partners or even with widening participation expertise. This approach is very common to successful 'outreach' programs that are core to widening participation activities and literature (Gidley, Hampson, & Wheeler, 2010). Partnering may also share the costs of learner supports such as telephone help line, webinars and regular online forum feedback, and assist with developing a sustainable model for equity and inclusion MOOCs. Therefore, it is suggested that Universities investigate partnering with community groups in not only the promotion but also the development of the MOOC to ensure community needs are met.

However, even if it is not possible to partner externally, it is usually possible to collaborate internally within a Higher Education institution to ensure educational and equity perspectives can inform learner-centred design. It is possible that what is most important in the collaboration is the inter-disciplinarity of the program design. Certainly, the Higher Education plus community partnership approach by its nature brings an inter-disciplinary approach.

Subsequently studies were re-read to collect data on the discipline background of the program authors and design collaborators. This was mostly found in the author roles listed, project background or design description, however in some cases an estimate was made from the design components and description. Two multiple-MOOC demographic studies were excluded from the analysis as developer data was not available. While there is therefore a possibility of some margin of error in assumptions, the results are presented in Table 8, and are quite consistent.

41% of inter-disciplinary collaborations exceeded expectations and 74% produced positive outcomes (met and exceeded outcomes) as compared to only 20% of the more technically produced programs. However, 80% of programs developed from an IT/education technology perspective produced poorer outcomes (mixed and underperformed).

Table 8

Outcomes by level of inter-disciplinarity of authors and/or design process N = 22.

Inter-disciplinarity of program design	Outcomes Exceeded	Outcomes Met	Mixed outcomes	Under-performed	Total
Interdisciplinary: Technical skills plus education and/or widening participation	41% (N = 5)	33% (N = 4)	33% (N = 3)	0	N = 12
Technical backgrounds: IT or Education technology	10% (N = 1)	20% (N = 2)	60% (N = 6)	20% (N = 2)	N = 10

In summary, the most successful programs at scale featured partnerships with community-based health, education or aid organisations which provided a platform for additional support options to be delivered sustainably. The multiple perspectives and expertise of the project partners also seemed to enable greater insight into customising the program for the needs of the learners. This included not only suitable design approaches, but also using existing networks of volunteers or tutors to facilitate online forums and/or community-based classes in culturally appropriate and effective ways.

Regardless of program/cohort size, multi-disciplinary design collaborations between technical, educational and equity experts also produced better outcomes.

Indeed, unlike earlier MOOCs, programs did not recycle higher education content, but tended to be designed from scratch with particular cohorts in mind – a process known as learning design. Learning design is the replacement of a “fragmented approach of pre-digital distance education where student support and curriculum design were separated” to a collaboration between educational technology, curriculum design, subject matter experts as well as learning support staff “where the boundaries of a range of professional disciplines are lowered and their working methods coordinated in particular by the affordances of digital technologies” (Tait, 2018).

For this reason, further learning design collaborations between educational technology/technical developers, educators, support staff and widening participation units and/or student representatives and/or community groups are recommended in the planning phases of new equity or inclusion focussed open education programs.

4.4.3. Design for bi-lingual, multi-lingual, non-native and non-English learners

While previous literature has criticised the exclusionary nature of early MOOCs for their dominant English-language provision (Hollands & Tirthali, 2014a), the studies in this review (both the pilots, staff guides and empirical studies) indicate an increase in the number of bi-lingual, multi-lingual, and non-English provision, including a focus on academic support for students formally studying in non-native languages. This finding is linked to the descriptive statistics of the global diversity of the studies' authors and programs. Many of the innovative pedagogies and provision of extra support were directed at the need to address language learning challenges, including three programs that took a “Content and Language Integrated Learning” (CLIL) approach (Castano Munoz, Colucci, & Smidt, 2018; de Waard, Anckaert, Vandewaetere, & Demeulenaere, 2016; Rimbaud et al., 2015). CLIL is worthy of practitioner attention as a promising way to avoid learners having to take separate, potentially time consuming and costly remedial classes which can also be problematic if they further single out and stigmatise students who have not had privileged educational backgrounds.

4.4.4. Free, useful programs as social justice

The findings of this review departed from much of the open education and OER literature regarding the potential of OER for student equity. This review found that OER use ($N = 3$) and re-use ($N = 1$) of openly licenced (non-copyright) materials were in the minority of the 24 empirical studies.

Instead, the studies found that equity and inclusion objectives were being progressed mostly by designing from scratch with the use of free online and digital materials, often combined with multiple forms of support. Interestingly, this kind of “open” provision – with additional support but requiring no pre-requisites – is close to the model used by the pioneers of the form, the Open University of the UK. While the Open University does charge fees for its distance/online university courses, it has always provided “human interaction delivered through tutors and study advisors” which remains core “to assure the delivery of personalised support at a distance” (Tait, 2018, p. 109).

This is an important finding because free (as in no cost to the user) digital materials such as YouTube clips continue to be criticised in the literature as not transformative to education in comparison to OER (*Cape Town Open education Declaration 10th Anniversary: Ten directions to move Open education forward*, 2017).

However, despite years of lobbying and training for OER, empirical studies suggest that take-up by educators remains very low. This is due to low awareness, conceptual and technical skills barriers (Wiley et al., 2014) as well as “cultural ones such as educator reluctance to reuse other's materials” (Weller, 2014, p. 91) which has recently been linked to attachment to one's own ideas (Pirkkalainen, Pawlowski, & Pappa, 2017). This research then, adds empirically to the small body of recent critical literature questioning the large-scale cost-saving potential of re-purposing OER if the reciprocal sharing and editing capabilities that the model depends on are not realised (Jhangiani, 2017; Knox, 2013; Selwyn, 2011; Tait, 2018; Watters, 2014). Instead, it suggests that providing learners who are not well off with free, useful learning opportunities can be a powerful act of social justice – that is, using our latest technologies to give a little more to those whom by circumstance have less (Keddie, 2012; Lambert, 2018).

5. Limitations, gaps and areas for future research

The findings of this study need to be considered in the light of the limitations of the method. Firstly, the review can only examine published literature. There may be other programs in existence with an aim to improve student equity or social inclusion, but unless they have published a report or study they cannot be considered in the review. This skews the data towards programs developed by Higher Education institutions, whose staff authored most of the literature reviewed. Other philanthropic organisations without research and publishing as core to their activities may be active but under-represented in this study. Choice of databases is another limitation of the method. While Google Scholar and Scopus have merit for researchers for the breadth of what can be searched (Gehanno, Rollin, & Darmoni, 2013), other databases may have returned additional results. The test searches made in the preliminary phases were undertaken to reduce this limitation as much as possible.

While systematic reviews are considered more impervious to researcher bias than narrative literature reviews, some researcher

interpretation is always required because the review seeks to answer questions not envisaged by the authors of the primary studies. Partial or implied data is therefore always challenging, as interpretations need to be made for some categorisations. The national and multiple-program studies were most challenging to categorise. Different ideas or definitions of what was meant by some of the key issues such as “student equity”, “social inclusion” or “disadvantaged learner” were also apparent across the studies leading judgements to be made based on reasonable inference. The development of definitions grounded in literature and the use of a secondary reviewer were very helpful in standardising these judgements. While some studies addressing learners with disabilities were identified in the search due to the broad set of interpretations of the search term “inclusion”, they were not the focus of the study. If researchers wanted to focus on or increase the number of these studies they would need to also use the search term “accessibility”.

Lastly, success measures were important to address as some research questions looked for trends within more successful programs. However, success measures can only be broadly indicative as there is no benchmark for success; in this review success was reported relative to the programs' stated aims and some aims were more modest than others. It is therefore suggested that future research could test the findings into the factors influencing successful programs using different methodologies that can more precisely pinpoint the level of outcome for students.

5.1. Gaps in programs for employability, refugees and indigenous learners

While the national policy studies maintained a focus on employment and employability skills, there were surprisingly few empirical studies addressing unemployed learners. This was unusual considering the wealth of literature indicating employment and employability as dominant higher education concerns (Ball, 2012; Selwyn, 2013; Southgate & Bennett, 2014).

The American national study of adult skills (Strawn, 2015) highlighted that it is not only unemployment that is linked to poverty, poor health and life outcomes, but also the spread of low-skilled and low-waged jobs. Considering recent reports of increased wage and wealth polarisation in the US and elsewhere, it is possible that in the future there will be more focus on what could become a significant new equity group – that of the low-skilled and low-waged worker.

Indigenous groups or indigenous knowledges were also not represented in the studies, either as populations to offer free education, or as curricula to be shared for cultural understanding. Both approaches are recommended for additional focus, resources and research. This does not seem to be a shortcoming of the search strategy, but a legitimate lack of published works on the topic at the time the study was undertaken. A mid-2019 search in Scopus and Google Scholar for “Indigenous MOOC” located very little. There was one theory paper via Scopus which was excellent but too recent to be included in the study (Adam, 2019). Google-scholar found a few sources with mentions but not sufficient a focus to be included in the study (Carr-wiggin, Ball, & Lar-son, 2017; McKinley & Tuhiwai Smith, 2019).

There were few programs for refugee and asylum seekers, however this is likely to be a matter of publication timing as open education programs focussing on refugee crisis within Europe are only recently publishing their outcomes (see <https://moonliteproject.eu/> for more information). Similarly, there was less representation from South African authors considering the prevalence of work in the area. However, the Research on OER for Development project (see <http://roer4d.org/>) has recently released an edited book volume as a project outcome which will no doubt assist others in learning from their work. Therefore, as these African and European studies make their mark, it seems likely that the global diversity of open education studies is set to continue in the future.

5.2. Gender inequality and gaps in research methods

Research questions and methodologies which did not track the success of different demographics in their cohorts were unfortunate missed opportunities, particularly when the area of study is well known to be exclusionary. For example, gender inequality in technical disciplines is a well-known world-wide phenomena and yet of the many STEM MOOCs, there were none targeted to women. In addition, useful research questions to track women's progress in mixed cohorts were not asked in the studies and therefore remained unexplored, such as: Did the women in the MOOC study group do better in terms of final grades than the average marks for women without the study group intervention (N. Li et al., 2014)? Did women also find help resources and submit that as part of the crowdsourcing help project (S. W. D. Li & Mitros, 2015)? Did the algorithm to predict grades of learners by the 4th week do so as reliably for men as for women (Meier et al., 2016)?

Similarly, projects which seek to develop resources “for all learners” would do well to at least track the demographics of those who take up the offer to determine if they are reaching only the privileged or could do more to attract and support a more diverse set of learners. Such actions are not only good for society, but also good development for teaching staff to better serve the increasingly diverse learners as higher education expansion and widening participation policies continue to have impact.

6. Conclusion

The present study has identified, classified, and reviewed the equity and inclusion purposes and outcomes of MOOCs and open education programs from 2014 to 2018. This study has shown that MOOCs and contemporary open education programs that aim to enable improved student equity and social inclusion are an active global and multi-lingual phenomenon. The potential for serving socio-economically disadvantaged learners promoted in the popular and higher education press 2012–13 appears to have energised and motivated a range of institutions around the world to design and implement programs with more equitable educational opportunities in 2014–16. Efforts continued in 2017–18, although not to the same degree and with more of a policy focus. Through

analysis of program outcomes, the study also concludes that 87.5% of programs in the studies entirely or largely met their aims to enable either student equity and/or social inclusion. A range of additional support strategies have been identified, including via community partnerships, parallel delivery by university teachers to both community and enrolled students, embedding as free materials in university courses, and both pedagogical and technical innovations.

The most well-known for-profit MOOC providers are used for widening participation, but they are certainly not the whole picture. Widening participation programs are just as likely to use not-for-profit partnerships and platforms, combinations of technologies, and additional support, including face-to-face study groups.

Whereas the first phase of MOOCs (and indeed OpenCourseWare that preceded it) put existing university content online and enjoyed a wider, but well-educated audience, these more equitable open education programs are typically designing using new materials tailor-made for a particular audience.

Learner support options were common and important to the success of all types of programs and the online content with blended support model was popular (face to face and online support options.) For student equity programs, support was often provided within a face to face classroom or study group setting. For the student equity and social inclusion programs, it was more likely to be phone, email or digital facilitation within distance delivery mode. Where fully online programs succeeded, they had strong teacher presence in the online forums plus other support options such as email, phone or synchronous webinar style tutorials. The use of algorithms to develop personalised digital learning materials or sequences was more common to pilot programs but not yet tested with non-privileged learners. More work and research is required to link and test these innovations with more diverse learner groups, including through improved community-university partnerships.

This study adds to the understanding of the type of learners and outcomes that can be enabled by both open education programs and commercial MOOCs. MOOCs may not, as previously noted in the literature, simply become more profitable, and business-like to the detriment of free offerings to disadvantaged learners. While commercial platforms may have changed their “free to all” strategy, this study has shown that organisations and educators with a remit or passion to widen participation have instead designed programs with particular disadvantaged communities and cohorts in mind, adopting the MOOC platforms and similar technologies in more developmental, supportive and equitable ways.

Nevertheless, additional attention and research is recommended on: inclusive design and pedagogy; contemporary approaches to remedial and transition pedagogy including Content and Language Integrated Learning (CLIL); partnerships with equity group communities in the development, delivery and promotion of courses; cross-disciplinary design collaborations to develop courses; programs to address gender and indigenous inequality; and the tracking of equity group cohorts within ‘open to all’ untargeted programs to ensure not only the access, but progression and success of diverse learners. By embracing such approaches, MOOCs and open education programs can continue to be part of the solution to educational and societal inequality.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.compedu.2019.103693>.

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