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Measuring the success of scaleable open online courses

Measuring the success of SOOCs

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Abstract

Purpose – The purpose of this paper is to propose measures of online open course success for non-commercial institutional providers of massive open online courses (MOOCs) and other scaleable open online courses (SOOCs).

Design/methodology/approach – The measures are derived from the characteristics of open online courses, existing knowledge about open online course providers and users and their motivations, and current practice in MOOC evaluation and data analytics.

Findings – Current practices for evaluation of open online courses are dominated by MOOC analytics which provide insights into user demographics and behaviour with some implications for evaluation of reach and course design but leaving many unknowns. Measures for evaluation of success at the institutional level can be derived from institutional goals for open online courses. Success from the point of view of teachers and technical teams involved in design, development and delivery of open online courses can be derived from team members' expectations, resources and satisfaction as well as measures of cost and effort compared to budget and benchmarks. Users are classified as registrants (information seekers, window shoppers, samplers), downloaders and participants (starters, partial participants and full participants who are further divided into auditing, active and certificate takers); different measures are appropriate for each group.

Practical implications – Practitioners and researchers must consider a variety of levels and indicators of success to adequately evaluate open online courses. Tables in the text propose measures, methods, timing and roles.

Originality/value – This is the first published paper to take a holistic view of open online course evaluation and propose detailed measures.

Keywords e-Learning, MOOCs, Evaluation, Open online courses, SOOCs, Success measures

Paper type Technical paper

Introduction

The development and widespread availability of massive open online courses (MOOCs) has been accompanied by controversy about their educational and social merit (Haggard *et al.*, 2013; Nanfito, 2013; Yuan and Powell, 2013). Regardless of the ultimate outcome of experiments with MOOCs, the investment of time, effort and financial capital in MOOCs has produced open source software which permits individual institutions to mount and offer open online courses and identified a demand for such courses. In addition, individual elements of MOOCs, such as videos (e.g. Harvard University, 2009) and, in some cases, entire MOOCs are available to be used as open learning resources. Thus, open online courses now present a real opportunity to increase the reach of knowledge and information resources. Measurement of how well they are able to do this is, on the other hand, not yet well developed.

This paper focuses on measurement of the extent to which open online courses meet the expectations of their providers. It begins with a brief history of MOOCs, establishes some key characteristics of open online courses, and considers online course providers and users and their motivations before focusing on how open online course success can be measured.



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MOOCs

The term MOOC was originally coined to describe an experiment in which a 2008 course in connectivist learning at Canada's online Athabasca University was opened up to unenrolled as well as enrolled students; around 2,000 unenrolled students participated, swelling total student numbers to around 2,200 (Cormier, 2008). Three years later, two Stanford University computer science courses opened to the public attracted more than 100,000 registrants, positive press and the interest of prestigious universities and entrepreneurs. By 2012, consortia of universities including the EdX consortium of prestigious universities led by Harvard and the Massachusetts Institute of Technology (MIT) (www.edx.org/); commercial start-ups (notably Coursera, www.coursera.org/, in which Stanford University took a strong lead, and Udacity, www.udacity.com/) and several universities and other training providers acting on their own behalf had launched MOOCs or announced their intention to do so, leading *The New York Times* to pronounce 2012 to have been the "Year of the MOOC" (Pappano, 2012).

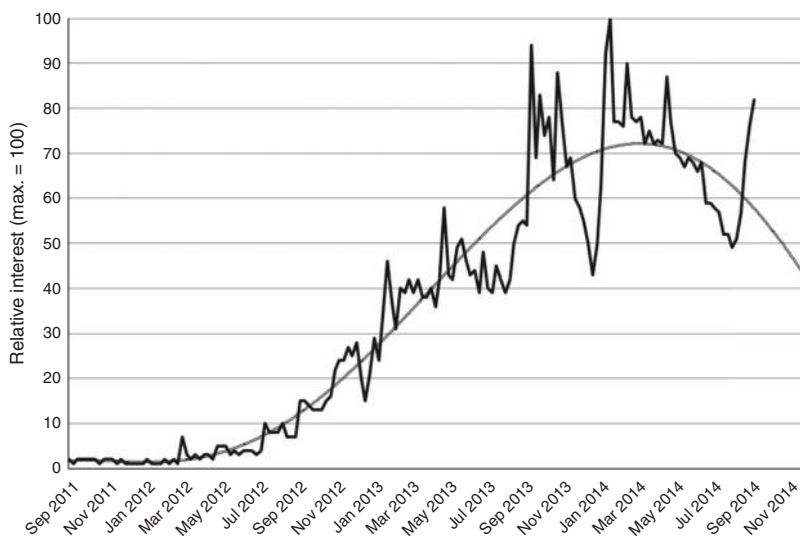
The cost and effort involved in providing courses of satisfactory quality to a large cohort of learners with different abilities, backgrounds, interests and levels of preparation became evident as courses were developed, run and evaluated during 2013. By 2014, the fairy dust was beginning to settle. Udacity began to charge a monthly fee for full-course participation (although courses can be used as open learning resources for free). Coursera remains the most well-known commercial platform for university-level MOOCs, and many universities have contracts to offer courses through the Coursera platform. EdX affirmed that its aims are not commercial, but to improve teaching and learning with technology through research and innovation. Several well-known open universities, including Spain's Universidad Nacional de Educación a Distancia (UNED), the UK's Open University (UKOU), Open Universities Australia and other existing providers of open and online learning have joined with others to offer a range of MOOCs. These groups are also among the prime movers behind the development open source MOOC platforms which are now available for learning providers to download and use to mount their own MOOCs.

The growth of interest in MOOCs appears to be following the "hype cycle" identified by the Gartner Group of consultants (Fenn and Raskino, 2008): a period of increasing hyperbole about the potential of a new technology is followed by disillusion but interest in the technology is regained as valuable uses are identified and, finally, consolidated in a "plateau of productivity". Figure 1 maps interest in MOOCs against the first two stages of the hype cycle. Web site (including Facebook and other social media) hits from a topic search on "Massive open online course" in Google Trends is plotted by date from September 2008, about the time of the first web site use of the term MOOC to describe a course. Interest in MOOCs appears to have reached a peak in January 2014 and to be in decline. The smooth curve fits shows the fit of the hits to a hype cycle (an order 5 polynomial curve) with a three-month forecast from September to December 2014 illustrating how MOOCs, at least in terms of general interest, appear to be heading towards what Gartner describe as the "trough of disillusionment".

Characteristics of open online courses

There is no consensus about the precise characteristics that define open online courses, but there is little disagreement that to be described as open the course needs to offer both:

- (1) open enrolment, i.e. it is open to all, with no restriction on prior learning or individual, physical or intellectual difference; and



Notes: Author representation of data from Google Trends (www.google.com/trends) topic search “Massive open online course”, 13 September 2014. Grey curve is fit of unsmoothed data to the hype cycle, $R^2 = 0.92$

- (2) free, i.e. available in full without charge for all elements of the course itself and acknowledgement of completion (even if only in the form of an automatically generated digital “badge”).

Open online courses are typically offered 100 per cent online, although a broader definition of an online course permits up to about 20 per cent of face-to-face contact (Allen and Seaman, 2014). Open online courses are formal programmes of learning, which are designed, developed, run – and which should be evaluated – like any other formal learning programme.

The open and online nature of open online courses introduces a fourth factor, that of scale. The potential for any person who is interested in a course to locate it and register for it by internet, without cost or the need to buy new software, makes registration highly accessible. Registrants have “nothing to lose” (apart, perhaps, from loss of face if they had told others they were taking the course) if they do not complete, or even begin the course. For a course provider, this makes planning difficult, particularly the first time the course is offered: how many people will register, how many of those will begin the course and how many will actively participate? Teachers, learning activities, servers and learning technology all need to be planned to scale to the anticipated numbers of registrants, and a potentially varying number of commencements and participants while the course is running.

The popular view of a massive course is a course of 100,000 or more, although such numbers are rare. An analysis of 91 MOOCs completed by July 2013 found registrations averaged around 43,000 with “typical” completion rates of 5 per cent (around 2,100 in a course of 43,000) (Jordan, 2014). Nonetheless, compared to the numbers that teachers and trainers normally deal with in the classroom or online, these numbers are still very large indeed. Individual course registrations have declined markedly as MOOCs have matured. Numbers were declining by thousands each month

Figure 1.
Change of interest in
MOOCs over time (four-
week moving average)
mapped to the beginning
of a Gartner (Fenn and
Raskino, 2008) hype cycle

in the first 18 months that MOOCs were offered, based on data in Jordan (2014). A scan of the courses on offer from one of the few MOOC platforms to publish up to date course statistics, Open Universities Australia's Open2Study (www.open2study.com) shows that, at the time of writing, most courses were attracting student numbers in the hundreds rather than the hundreds of thousands. Thus, although courses with massive scale have attracted most attention to date, this paper is concerned more generically with scaleable open online courses (SOOCs) which might be fully open or might be deliberately limited to a maximum number of participants.

Open online course provision and use: roles and motivations

While this paper takes the point of view of the institutional provider, it is important to acknowledge the many roles played in SOOC design, development and performance. The institutional provider is one of several layers of course providers on the one hand. The users of SOOCs include learners, but also others whose motivations need to be understood if we are to evaluate SOOC success effectively. More visible than in the past, where the platform on which courses were mounted was usually offered by the same institution which united providers and users, are course aggregators, hubs and platform providers. In economic terms, these three groups (course providers, users and platform providers), operate as a two-sided market (Eisenmann *et al.*, 2006) where the survival of the platform providers relies on the willingness of course providers to provide them with suitable courses and the interest of sufficient users to participate in them under the conditions under which they are offered (Figure 2).

The motivations of course providers

Course providers include teachers and trainers, members of the technical team which produces the SOOC with the teacher and any institutions or organisations for which they work. The motivations of these three groups do not always coincide.

With some exceptions, university-based SOOC providers at the institutional level tend to be more focused on financial than social or societal outcomes. Institutional providers of MOOCs expect them, by positioning the university at the forefront of modern universities and showcasing star teachers, to contribute to institutional visibility and reputation (Allen and Seaman, 2014; Grajek *et al.*, 2013; The Chronicle of Higher Education, 2013), both important factors in attracting students and thus fees. Social motivations might include increasing flexibility for enrolled students, learning more about teaching and learning through research (most notably for members of the EdX consortium; EdX, 2014), and making the institution's courses or knowledge accessible beyond institutional boundaries. Some, albeit only very small numbers (2 per cent in US universities in 2013; Allen and Seaman, 2014), hope for some cost reduction.

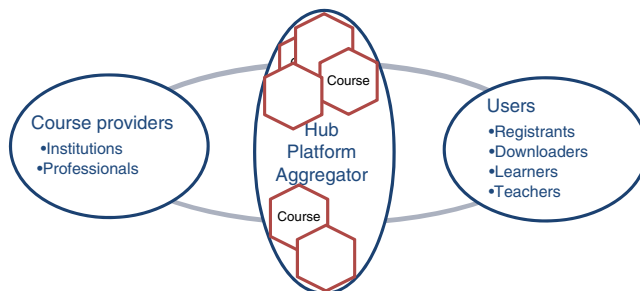


Figure 2.
Two-sided market for open
online courses

Individual teachers and trainers are more likely to be motivated by the potential to reach a wider and more diverse audience of learners than that limited by institutional enrolment; they are also interested in learning from the experience (Haggard *et al.*, 2013). Learning quality and learner engagement did not appear to be of great concern for many early teacher-adopters of MOOCs (Grimmelmann, 2014), and most literature specific to measurement of student outcomes in MOOCs tends to focus on logistical issues related with assessment, such as how to ensure the identity of a test taker.

The professional and technical team required for development of a SOOC which achieves positive outcomes for learners, teachers and institutions includes instructional designers and educational technologists, who also have goals for satisfactory performance (in addition to any goals that the platform provider might have for management of the load of simultaneous student access to one more courses and their components). Surprisingly, technical outcomes are excluded from most reports of MOOC outcomes.

Users and their motivations

Because users can register without subsequent participation or completion of a SOOC, it is important to distinguish between SOOC users and learners. The burgeoning field of MOOC analytics is providing detailed information about behaviour within open online learning environments, including use of learning resources, participation in discussion forums, exercises and assignments, and navigation within the course and from the course to external links. A broad first distinction can be made between users (including members of the course team), registrants, starters, active users and persisters or completers (Perna *et al.*, 2013). Kizilcec *et al.* (2013) identified behaviours of sampling course materials, disengaging after a period of active participation, auditing without participating in assignments and completing most assignments.

A little is known about why MOOCs are not completed. More than 70 per cent of the students who disengaged from a Stanford MOOC reported that they either found the course too difficult or they did not allocate enough time to it (Halawa, 2014). Indeed, a high number of registrants who do not start a course might be an indication of poor representation of the course rather than an indication of widespread interest in the course. Some registrants are looking for information that is not available without registration, and this was particularly the case with early MOOCs (Edinburgh University MOOC Teams, 2013; Grimmelmann, 2014). The available information suggests that registrants can be divided into:

- course information seekers, who are simply seeking basic information about the course that is not available without registration;
- window shoppers, who already have basic course information, but want more detail such as the full syllabus and assignment schedule, and decide not to proceed; and
- samplers, who access some course materials, typically introductory videos, and decide not to proceed (Kizilcec *et al.*, 2013; Perna *et al.*, 2013).

In addition, some users download course materials to use as information resources or follow the course offline, so these users are not true participants either.

MOOC participants include both teachers and learners (Klobas *et al.*, in press). While learners want to learn from and/or gain recognition of their learning through participation in a course, teachers are interested in the developing pedagogy of open

online learning and the nature and content of learning activities and resources that are provided within a course. It appears that while most MOOC participants want to learn something, relatively few participants are interested in obtaining a certificate and even smaller numbers in improving their career prospects (Christensen *et al.*, 2013; Edinburgh University MOOC Teams, 2013; Klobas *et al.*, in press).

Measuring the success of open online courses

This section draws on the preceding sections to propose an articulated set of success measures for SOOCs. The proposed measures are presented in a series of tables, each of which examines issues of particular concern to a different actors involved in provision and use of SOOCs: institutional levels measures are summarised in Table I, measures that addresses issues of concern for teachers in Table II, for technical team members in Table III, for project managers in Table IV and for learners and other users in Table V.

Institutional level

At the time of writing, little institutional level evaluation of MOOCs or other SOOCs has been done. The annual Babson Research Group surveys of Online Learning have been monitoring institutional response to MOOCs since 2012, but around two-thirds of institutions reported in 2013 that it was “too early to tell” if MOOCs are meeting the institution’s objectives (Allen and Seaman, 2014).

Table I places reputational criteria with potential financial implications with financial criteria and separates them from social motivations for offering SOOCs. The criteria reflect the range of reported motivations for providing MOOCs and, like the criteria in the subsequent tables, are not necessarily relevant to all institutions or to all SOOC programmes.

One criterion added to the financial category is financial sustainability (McGill *et al.*, 2014). Full costing includes ongoing license fees for all software that is affected by an increase in student numbers, not just any purchased SOOC platform and production software. Contract arrangements with external platform providers vary, but a figure commonly used in budgeting is a one-off cost of US\$250,000 to mount the course on the platform with a payment of \$50,000 each time the course is run; the course and platform providers then agree on how any revenue or profit will be split, although the power has initially been with the platform providers (more detail is provided by Nanfito, 2013).

Teachers and open online course design, development and delivery teams

Tables II-IV drill down to the level of the SOOC design, development and delivery team, including the teacher (Table II) and project manager (Table IV). The criteria listed here are in many ways similar to those which would be used to measure the success of e-learning initiatives in general, and several such as availability of time, resources knowledge and support to undertake their various roles are drawn from studies of the sustainability of online learning initiatives (McGill *et al.*, 2014).

Possible teacher and trainer expectations of increased student diversity, learning about teaching and crossover of teaching skills and materials to classroom courses are included among outcomes. Narrative reports of learning can identify unexpected outcomes. For example, Head (2013) describes how difficult it was, even with a production team of 19, to develop a MOOC on composition for Georgia Institute of Technology’s School of Literature, Media, and Communication, until she located and employed an instructional designer.

Category	Criterion	What, how	When	Who
Financial/ reputational	Visibility: showcases star professors, courses, institution	Google Trends, Twitter and other social media trend searches on professor's name, course, institution (+ and - reports)	Contrast before and aftercourse info release and course completion	Marketing/competitive intelligence unit
	Increases and maintains institutional reputation	Positive media (including social media reports) linking the institution to its SOOCs (vs negative reports)	Regular monitoring	Marketing/competitive intelligence unit
	Attracts new students/users	Ask if enrolment was influenced by an institutional SOOC as part of the existing incoming student survey/registration surveys		Enrolment unit
	Reduce costs	Full costing of SOOC effort vs any realised savings	Prior to investment, monitoring during development, post-development review	Accounting unit/teachers and others involved in SOOC development and delivery
Social	Financially sustainable	Full analysis of costs of updating the course, and continuing to provide it and to support teachers and users	Prior to investment, post-development and delivery review	Accounting unit/teachers and others involved in SOOC development and delivery
	Provide more options for enrolled students	No. of SOOC students who indicate they have taken it to meet their needs for flexibility (rather than the institutions)	At course completion; make early contact with students at risk of non-completion	Statistics office
	Increase the reach of the institution's courses and knowledge	Demographics of downloaders and course participants (excluding other registrants)	Ongoing monitoring (see Nesterko <i>et al.</i> , 2014b for examples)	Statistics office/specialist analysts
	Advance teaching and learning through research	Impact of research describing and evaluating learning from the institution's investment in SOOCs	According to the institution's schedule	Statistics office/teaching and learning office/research office

Table I.
Institutional level success
measures for open online
courses

Table II.
Success measures
for teachers of open
online courses

Category	Criterion	What, how	When	Who
Outcomes	Increase in diversity of learner cohort	Demographic profile of participants obtained from IP addresses or survey	Once participant (as distinct from registrant) status is confirmed	Statistics office/specialist analysts
	Lessons learned from SOOC experience – including lessons learned for classroom teaching	Narrative reports and/or survey; teacher reflection	After first SOOC experience, and after gaining more experience; teacher reflection during and after all courses	Teaching and learning office and teachers
Capacity	Learning materials and resources developed that can be used in classroom and other online courses	Narrative reports and/or survey; teacher reflection	After first SOOC experience, and after gaining more experience; teacher reflection after SOOC and classroom courses	Teaching and learning office and teachers
	Availability of time, resources, knowledge	Formative evaluation by observation and interview; summative interview/survey	During development and delivery of each new and revised SOOC; during delivery of subsequent SOOCs; after delivery of all SOOCs	Teaching and learning office/Educational Technology office/HR/consultant
Engagement	Use of specific learning resources, participation in discussions and other learning activities	Count of number of unique users and completions, by demographic characteristic	Within 1-2 days, 1 week of moment in course that the resource is recommended to be used; Summary at end of course	Analysts

(continued)

Category	Criterion	What, how	When	Who
Satisfaction with SOOC platform and learning environment	<p>Capability of platform vs skills of teacher and development team to develop a pedagogically satisfactory course</p> <p>Satisfaction with the SOOC platform's ability to provide formative as well as summative feedback to learners</p> <p>Where course credit or certification is offered, satisfaction that the approach taken by the institution and/or platform provider verifies the identity of the examinee</p> <p>Ease of access/connection from the platform to additional learning resources</p> <p>Ease of adaptation/change to accommodate course revision, new learning resources, connections, etc.</p> <p>Advocacy score</p>	<p>Formative evaluation by observation and interview; summative interview/survey</p>	<p>During development and delivery of each new and revised SOOC; during delivery of subsequent SOOCs; after delivery of all SOOCs</p>	<p>Teaching and learning office/educational technology office/HR/consultant</p>
		<p>Percentage difference between those who would recommend others to participate in SOOC development and/or delivery and those who would not recommend participation</p>	<p>Post development/delivery</p>	<p>Teaching and learning office</p>

Table III.
Success measures for
technical teams involved
in provision of open online
courses

Category	Criterion	What, how	When	Who
Platform and infrastructure evaluation	Availability of infrastructure Suitability of platform for teacher and course needs Suitability of development tools for teacher and course needs Availability of skills Availability of support Ease of adaptation/change to accommodate course revision, new learning resources, connections, etc.	Formative evaluation by observation and interview; summative interview/survey	During development and delivery of each new and revised SOOC; during delivery of subsequent SOOCs; after delivery of all SOOCs	Educational technology office/teaching and learning office/HR/consultant
Satisfaction	Satisfaction with role in design/development/deliver of SOOC Perceived quality of interaction with others involved in the project	Formative evaluation by observation and interview; summative interview/survey	During development and delivery of each new and revised SOOC; during delivery of subsequent SOOCs; after delivery of all SOOCs	Educational technology office/teaching and learning office/HR/consultant

Category	Criterion	What, how	When	Who
Cost	Cost of mounting each SOOC	Total cost of course design, development and delivery, including cost of platform, media development, teacher and technical team salaries, contractors and consultants	Prior: budget; post: actual vs budget	Project manager/ accounting office
Benchmarks	Cost Time and effort for development Size and nature of development team Platform, environment and development tools Support for teachers, developers, users Satisfaction of teachers, developers, users Presentation of the course to users (home page, marketing)	Select benchmark courses and benchmark institutions; benchmark courses might include similar courses already offered online but not in an open format	Pre- and post-development and delivery	Project manager/ key members of SOOC development and delivery team

Table IV.
Success measures for open online course project leaders

Table V.
Success measures for
users of online courses

Category	Criterion	What, how	When	Who
Information	Adequacy of the information provided about the course	Market survey	Regular, e.g. annual	Marketing office/firm
Outcomes	Before registration After registration and before the course begins Goal attainment	What were the user's goals and have those goals been met? Perceived reasons for achievement of goals or not Suggested improvements	Request at time of ceasing to participate in course; for users who complete the course, post-course reflection ^a	Analyst/teacher/researchers
Platform and infrastructure performance	The criteria normally used to measure platform and infrastructure performance in online courses, e.g. availability, accessibility, response time	Following normal institutional practice		Follow normal practice; include technical team and researchers
Satisfaction	The criteria normally used to measure student satisfaction with learning and teaching Any additional criteria normally used to measure student satisfaction with online learning and teaching Satisfaction with specific elements or characteristics of the SOOC, e.g. short lectures, specific videos, topic or discussion formats, use of connections to grow knowledge network, workload relative to time available Advocacy score	Following normal institutional practice		Follow normal practice; include teachers and researchers
		Percentage difference between those who would recommend others take the course and those who would not	Post-course completion (finishers only)	Follow normal practice; include teachers and researchers

Notes: ^aPre- and post-course designs are common in MOOCs. They have the advantage that, if analysed early in the course they can inform teachers of users' goals as the course is proceeding. They only capture changing goals if the user is specifically asked of goals have changed during the course. Post-course reflection has the disadvantage that the user might not remember or report their initial goal, only the goal ultimately pursued or attained

Some guiding criteria for measurement of a SOOC project's success from the point of view of the technical team are provided in Table III. With large production teams, project management becomes essential. Benchmarking criteria are suggested for project management because of the range of time, effort and cost required to develop SOOCs for different subjects and with different pedagogy. Edinburgh University's detailed evaluation of the first five MOOCs that it mounted provides a good starting point (Edinburgh University MOOC Teams, 2013). Harvard is reported to spend between US\$75,000 and US\$150,000 (excluding the cost of teacher time) to develop each of its MOOCs (Bombardieri, 2014).

Users of open online courses

The criteria in Table V combine generic course evaluation criteria with criteria that are specific to SOOCs. The information category is designed to determine if marketing is effective enough to attract only potential participants to register for the course, i.e. to reduce the number of non-participating users to near zero. The outcomes of interest are not limited to learning outcomes because users might have a range of goals for registering for a SOOC, including locating course-related information, curiosity about the course and searching for a particular type of learning resource, as well as learning about the course content. In addition, measurement of both engagement and satisfaction occur at the level of the individual learning resource or activity rather than just at the level of a major course component or the course as a whole.

Post-course MOOC surveys have typically attracted low response rates, not much higher than course completion rates. Any contact with SOOC registrants or disengaged users who do not follow through with the course therefore needs to be made within a very short time of their failure to complete a course activity (a week or two) in order to capture their response to the course and its quality. Indirect assessment of course quality through retention rates is less satisfactory for SOOCs than for courses with formal institutional registration and evaluation. Nonetheless, much of the debate about the success of MOOCs concerns retention rates, with detractors claiming that the low proportion of registrants who complete MOOCs is an indicator of low quality and poor pedagogy. MOOC providers, on the other hand, argue that because MOOCs are used in several different ways, they are better evaluated in terms of the use and reach of individual elements (such as the number of downloads of each learning resource and the number of participants in each discussion) and retention of participants rather than registrants (Ho *et al.*, 2014; Jordan, 2014; Koller *et al.*, 2013; Reich and Ho, 2014). Reich and Ho (2014) cite the case of a 45-minute video of Professor Michael Sandel speaking on moral reasoning (Harvard University, 2009) that was viewed five million times by registrants on one of the first Harvard MOOCs.

Most reports of MOOC retention rates nonetheless provide the simplest statistic to calculate, the percentage of registrants who take out a certificate, e.g. HarvardX reported 7.5 per cent certificate attainment from enrolments in Harvard MOOCs to 28 August 2014 (Nesterko *et al.*, 2014a). Retention, completion and certification rates as percentages of registrations are not only difficult to interpret but also appear to be unreliable: Halawa (2014) found substantial differences in the completion rates of the same Stanford course offering "identical content to learner populations with almost identical demographic distributions".

MOOC analytics provide an example of how registration data, including IP addresses can be mined to provide demographic overviews of SOOC participants. Descriptive information about the geographical location, gender, level of location and

age of registrants and the percentage of registrants who take out certificates in Harvard and MIT courses is provided graphically on interactive maps and charts (Nesterko *et al.*, 2014b, c). This information can be overlaid on user behaviour data to identify patterns of use by learning resource by demographic group by location and over time: Seaton *et al.* (2014) identified two distinct patterns of video use among learners who completed MOOCs from MIT; Halawa (2014) observed that participants with a stronger existing background in the subject were more likely to complete Stanford computer science MOOCs; and Baker *et al.* (2014) have developed an approach to mapping not just geographical reach but also socioeconomic status relative to MOOC persistence using the ArcGIS software, IP addresses and census data.

Table VI proposes a basis for analysis of reach and user participation in SOOCs taking account of the different uses to which courses can be put. Whilst general analytics about the marketing reach of a course might meaningfully count registrants and demographic information about the informational reach of the course might count downloaders, it makes sense to calculate completion rates only for participants, defining the exact nature of a completion (audited, full participation, certification or a combination of these) for the specific institution or course.

The question of what is an appropriate benchmark for open online course completion remains. Laurillard (2013) suggested that MOOC providers look to the completion rates attained by the UKOU – 70-80 per cent when the Open University was first launched in the mid-1990s – but some differences should be expected given the difference between free open online courses and paid UKOU online courses. Publicly available information about MOOC completion rates might be adapted to provide benchmarks for SOOC completion as a percentage of participation. For example, published rates of MOOC participation vary between 15 and 34 per cent (Jordan, 2014; Klobas *et al.*, in press), say around 25 per cent. If, overall, around 5 per cent of registrants complete MOOCs, MOOC completion rates among participants are around 20 per cent, still a very low number. (More specific estimates can be made for specific courses, particularly where recent registration and completion rates are available and course content and length can be compared.) An alternative approach, supported by Laurillard (2013) and Reich and Ho (2014), although they do not state it in these terms, is to ignore completion rates and measure the impact of a SOOC in terms of its reach. Laurillard provides the example of a course on use of ICT in primary education developed under the auspices of the UNESCO Institute for Information Technologies Education. The course reached 8,000 teachers who, she estimated, could each train 25 others using the resources developed for the course. In turn, each of the trainees could train eight village teaching apprentices to become trainee teachers, a total reach of 1.6 million.

Conclusion

The rapid growth of MOOCs and public and educational interest in them has been accompanied by a massive collection of data. Whilst the data provide many opportunities for quantitative analysis of users, their learning journeys and their use of learning resources, data analytics makes – as this paper shows – only a very small contribution to evaluation of the success of a SOOC. The ability to meet and sustain institutional goals, to produce satisfactory outcomes for teachers, and to develop and sustain teacher and technical team capacity and capability are all critical factors in successful open online courses. Data analytics can contribute indirectly to understanding open online course use and user satisfaction, but direct questions about reasons for use,

Category	Class ^a	Market analytics	Include in User reach (demographics)	Completion rate calculations
Registrant	Information seeker	✓	×	×
	Window shopper	✓	×	×
	Sampler (1-2 session trial)	✓	×	×
Downloader Participant	Starter (participates in first activity then ceases to follow course)	✓	✓	✓
	Partial participant (audits or participates beyond 1st activity but does not complete)	✓	✓	✓
	Auditing full participant (follows all or almost all of course but does not complete any activities)	✓	✓	✓ ^b
	Active full participant (completes course and all or most activities, but does not take certificate)	✓	✓	✓ ^b
	Full participant, with certificate (completes course and activities and takes out certificate)	✓	✓	✓ ^b

Notes: ^aClasses and class names are an amalgamation of classes and names defined by Kizilcec *et al.* (2013), Klobas *et al.* (in press), Perna *et al.* (2013); ^bcandidate behaviour for course completion, depending on the purpose of the evaluation

Table VI. Bases for analysis of reach and user participation in open online courses

goal attainment and satisfaction will provide a deeper understanding of what is meant by success in open online learning and how it can be attained.

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