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MOOCs as ‘chemical attractants’

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Abstract

This study explores the outcomes of a chemistry MOOC, delivered on two occasions through the FutureLearn platform. Learner background and course feedback, including managing the expectations of potential participants, course facilitation, the importance of having a strong presence on the forums and the tutor having a ‘face’, is explored. The findings will be especially relevant to practitioners interested in learning more about how MOOCs could contribute to a university strategy for internationalisation, widening participation and public engagement. It adds to the growing literature on an educator’s experience, providing an insight into the rewards and challenges of teaching in MOOCs, and aims to encourage and support other higher education providers considering developing related online courses.

Keywords

Course structure, educational courses, massive open online course, MOOC

Introduction

In current terms, the term ‘digital learning’ would incorporate any learning experience which makes use of technology in its delivery and facilitation (McKnight, O’Malley, Ruzic, Horsley, Franey & Bassett, 2016). From a contemporary perspective, the term would also suggest a strong sense of student interaction, as opposed to the simple sharing of digital assets such as e-books or other media which may have constituted a pre-2000 digital learning experience. Such a digital learning experience may be delivered exclusively online, such as MOOCs (Massive Open Online Courses), distance learning provision, or form part of a blended learning approach, whereby the availability of a digital learning environment augments, rather than replaces, the physical classroom activities.

The notion of MOOCs offering free education accessible worldwide has received universal acclaim (Regalado, 2012). Currently, millions of people are enrolling in hundreds of MOOCs delivered by universities and other public and private organisations worldwide. All that is needed is a personal computer, Internet access and some computer literacy skills to participate, and is likely to suit individuals that have difficulty accessing other forms of education due to disability or limited

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resources. MOOCs offer teachers the opportunity to explore digital pedagogy and experiment with new learning designs.

As the initial hype surrounding MOOCs has begun to subside (Knox, 2017; Reid, 2014) the key driver remains the search for a suitable role for this much-maligned digital vehicle (Parr, 2015) within the existing academic framework. The rapid pace of MOOC discussion has demonstrated a marked shift from 2012 being declared the 'Year of the MOOC' by the New York Times (Pappano, 2012), the proclamation by Aoun that MOOCs signalled 'the end of higher education as we know it' (Aoun, 2012). Thrun's (2012) prediction as reported by Leckart (2012) that "in 50 years, there will be only 10 institutions in the world delivering higher education". Along the way, we have witnessed the more philosophical debates regarding the fundamental differences between xMOOCs and cMOOCs (xMOOCs being based on a more traditional classroom structure, centred around a teacher, while participants in cMOOCs take on the dual role of both teacher and learner as they share information with each other) (de Langen & van den Bosch, 2013; Decker 2014), the notion of MOOCs being a 'disruptive innovation' (Yuan & Powell, 2013), and accusations of MOOCs causing a new form of cultural imperialism, according to Trucano (2013) "crashing across borders, washing over (or possibly washing out) local educational institutions, cultural norms and educational traditions".

At the very heart of these debates remains an institutional imperative 'not to be left behind', evidenced by a United Kingdom (UK) Department for Business, Innovation and Skills report which sets out many of the potential motivating factors for engagement:

> 'Wait and see' is not a viable policy for universities. Disruption to demand and supply of education is very likely although estimates of the severity and timing of the disruption vary… Universities face a critical challenge in how they respond to MOOC opportunities (which will implicate many other issues they face). How they negotiate MOOC-driven disruption around income, access, curriculum, certification, and the challenge from non-educational providers will determine their capacity to innovate and survive… whether the MOOC format stalls, or continues to accelerate, and with or without accreditation, MOOCs mark the coming-of-age of the digital toolset in learning. (The Department for Business, Innovation and Skills (BIS), 2013, p.99).

The number of students registered with FutureLearn (a digital education platform, founded in 2012, and owned by The Open University, UK) continues to grow exponentially (with in excess of seven million learners in January 2018) demonstrating that despite claims that the MOOC bubble has burst, there remains a growing appetite for free large scale provision of this nature. Late 2017 saw Udacity's Vice President Clarissa Shen declare rather dramatically that MOOCs 'are dead.' (Warner, 2017) but perhaps that speaks more to the overly ambitious vision of MOOCs that was established at the outset, rather than the current form they now take. Knox (2017) posits a more conservative mandate for MOOC future development and purpose, highlighting "an increasing focus on data science, business, and programming subject disciplines… deliberate strategies to reduce class sizes in the name of productive learning and… the prevalence of automation and analytics" (p. 403); moreover, Hollands and Tirthali (2014) set out a number of institutional reasons for MOOC engagement, incorporating (in priority order) extending reach and access, building and maintaining brand, improving economics, improving educational outcomes, innovation and research on teaching and learning, many of which still seem strongly applicable to the xMOOC model adopted by most Higher Education Institutes (HEIs). Like most technologies, after the initial hype has faded, there would still seem to be a place for MOOCs within the online landscape, but the question remains how best to utilise their popularity for mutual learner and provider benefit.

The University of York's (UK) own approach to MOOC development was all-encompassing when work began in 2015, with courses selected on the basis of supporting recruitment, developing brand, showcasing research, exploring innovative teaching methodologies and developing partnerships. *Exploring Everyday Chemistry* (abbreviated eeDc) focused primarily on the first of these ambitions, seeking to engage with pre-higher education students with a view, primarily, of demonstrating the benefits of studying an undergraduate degree in chemistry at York. MOOCs represent a compelling way to reach new student markets as competition in the higher education sector intensifies. However, as demographic statistics of MOOC learners typically show their age is between 30 and 40 years (Glass, Shiokawa-Baklan & Saltarelli, 2016) a four-year analysis of MITx and HarvardX courses highlighted a median learner age of 29 (Chuang & Ho, 2016), this provides some challenges. The profile of a learner in a MOOC is usually different from students who attend a school or college, but a solution may involve designing courses specifically tailored to supporting and building on their classroom studies.

Exploring everyday chemistry

eeDc is a pioneer University of York MOOC delivered in 2017 on two separate occasions, by the FutureLearn platform. This four-week course highlighted a range of chemistry-based topics relating to our everyday lives, designed to take the learner typically no more than four hours per week to complete, or 16 hours in total. However, it was acknowledged that the range of time needed to complete the MOOC would differ depending on the prior knowledge of the learner. It was intended that the bulk of study time would be devoted to reading and watching materials put together by the course team, and then taking part in discussions and debates, moderated by 'mentors'. Although a number of other chemistry MOOCs are available (see for example, Leontyev & Baranov, 2013), our research showed this course offered a unique combination of chemistry topics together with a number of notable features designed to aid learner engagement and learning, with a particular emphasis on learners at high school (16-18 year olds). This article explores the challenges of delivering such a MOOC. It will discuss the course content and design (based around short bite-sized video clips) and the balance between encouraging course completion and offering deep, critical learning. This discussion includes strategies for dealing with a diverse range of learners (varying age, experience, culture, language, preparedness, and motivation) with widely different chemistry backgrounds (from high school to PhD-level chemists (i.e. those looking to refresh their chemical knowledge), from leisure learners to practising professionals).

Analysis of completion rates and learner engagement (including contributions to online discussions and the challenge of providing learners with regular, authentic, accessible, and structured opportunities to engage in conversation with other learners about the course material) will be discussed in this paper as will the proportion of students who included a mention of the MOOC in their application to study chemistry at the University of York.

Results and discussion

The eeDc course was designed to emphasise the importance of organic chemistry in our everyday lives from chemical attractants (from perfumes to pheromones) to the race for new antibiotics, from understanding brewing to chemical innovations in sport. Topics were chosen with the aim of attracting a wide pool of learners, and were selected because of their importance in modern living. For example, subjects like doping in sport and resistance to antibiotics regularly make headlines in the news, and affect most of us. These topics also allowed us to apply concepts taught on pre-university chemistry courses (including British A-levels and International Baccalaureate courses) to new, high profile applications (i.e. those that have attracted high levels of media or public interest), so helping learners to build on and extend their chemical knowledge. One academic member of staff developed the course material in collaboration with York undergraduate chemistry students. This collaboration helped ensure an appropriate choice and balance of topics. New course material was written and designed specifically for an online delivery.

At the start of the project, research was carried out into what related MOOC courses were available, including what an xMOOC typically looks like (through 'student' experiences), and what is established good practice on designing a MOOC (Bali, 2014; Beaven, Hauck, Comas-Quinn, Lewis; de los Arcos; 2014 & Höfler, E., & Kopp, M. 2014). This included considering the instructional design quality of MOOCs (including asking questions like: are the learning resources authentic, do they provide expert feedback, are they supportive of learners with varying learning needs?) - instructional design quality is an area in which many courses have been found to score poorly (Margaryan, Bianco & Littlejohn, 2015). The course objectives and typical weekly workload were made clear from the outset and learners were encouraged to get involved in the (non-compulsory) discussions.

A common concern amongst prospective tutors, and those who have delivered MOOCs is that it takes more work and time than they anticipated (Evans & Myrick, 2015). This project required around two weeks of development time per week of course content, with the work divided up amongst university staff, undergraduate students and a video production company. We had both internal and external quality assurance stages, which ensured we had few typos or content errors.

The course was comprised of 85 individual learning steps, supported by more than 30 videos and screencasts. An overview of the course with exemplar course content is shown in Table 1. The videos were produced in collaboration with a professional media company to ensure a high-quality product. In line with good online practice (Guo, Kim & Rubin, 2014), shorter videos are found to be more engaging. Therefore, each video and screencast were restricted to a maximum of five minutes to complement the optimal attention span of leaners. Learners had the ability to control the pace, pause, rewind, explore and return to the content. The videos typically focused on 'talking head' shots of the instructor with direct eye contact with the camera, as it was felt important for the course to have a 'face'. For the screencasts (in-house produced short clips mainly capturing action on a computer screen), we moved away from a traditional PowerPoint style delivery, by using animation to help engage learners along with a wide selection of striking images, free from copyright. For the second running of the course, we introduced some more informal short videos where the instructor narrated the step-by-step problem-solving walkthrough. This style has been found to engage learners more effectively than screencasts (Guo, Kim & Rubin, 2014). Transcripts were provided for all videos and screencasts (Futurelearn expects course material to meet accessibility standards). Although these were mainly intended for those who could not hear the audio, they may also have helped those who preferred reading text, and those who were not fluent in English (the language in which the audio was presented).

Table 1. An overview of the eeDc course, with exemplar content

Exemplar content	*Week 1 Chemical attraction*	*Week 2 The race for new antibiotics*	*Week 3 Understanding brewing*	*Week 4 Chemistry in sport*
Articles	The fragrant compounds in oranges	Understanding penicillin resistance	The stages of brewing	Understanding the role of polymers in nutrition
Videos	Human pheromones: welcome to the party	The history of antibiotics	Introduction to brewing	Chemistry in sport including stadiums
Screencasts	Theories of smell	The mode of action of penicillin	The organic flavour components of	Understanding medicines in sport

			tea	
Discussions	End of week summary	Understanding the economics and morality of antibiotic discovery	Antioxidants: Vitamin C	PET recycling
Kitchen experiments	Making a molecular model	Making a medicinal lava lamp	Serial tea and coffee extraction	Making a natural plastic
Tools of the trade	Understanding chemical structures	Understanding nucleophilic acyl substitution	Understanding free radicals	Making polymers

In terms of classification, this course is chiefly in the xMOOC camp, being based on a traditional classroom structure and behaviourist pedagogy. The course content was delivered in a structured linear order, followed by self-assessments (automatically graded multiple choice questions) designed to check whether the particular learning objectives had been mastered. In the first course the assessments were free to access, while in the second, learners were required to pay a subscription. Agarwal, Bain and Chamberlain (2012) have argued that such quizzes provide learners with an opportunity for retrieval learning, enhancing long-term memory of facts by recalling information from short-term memory. The typically limited interaction between learners on xMOOCs (such as on discussion forums that do not count towards achieving a participation certificate) is often seen as a reason for the frequently high dropout rates (Khalil & Ebner, 2013). However, our learners were also offered an active learning approach, through a series of kitchen experiments, designed to promote interaction in the course and facilitate 'learning by doing'. This was coupled with the opportunity to engage in online collaborative tools, to share images of their practical work, their results and opinions in order to help each learner draw their own conclusions. Also, the FutureLearn platform enables constructivist pedagogies, where learning can occur through conversations between participants. Tools on the platform support reflection, comments and responses. Each content step offers discussions alongside it.

Appropriately trained undergraduate chemistry mentors were used (typically three per week), not only to monitor learners' progress but also to provide additional information and helpful hints on facilitating the learning process. It was felt important to have a strong facilitator presence and so the tutor and student mentors contributed extensively in all of the discussion forums, making an effort to reply to all of the technical queries. For example, Chen, Lin and Kinshuk (2008) found that interactions and instruction were the two most important factors in student satisfaction. Throughout the course we posted numerous clear, well-defined discussion points to trigger conversations and learning. The discussions were carefully planned to encourage all learners, not only the experts to contribute. Discussions played a key role in our course as they helped to establish a learning community.

Notable features

One of the major challenges in MOOC design is to strike the right balance – the bigger the audience, the more heterogeneous it is and if the course becomes too abstract too quickly, learners will be lost, whereas if it stays too simple for too long, then others will get bored. Scagnoli (2012) underlined the importance of these elements of instructional design as a real guideline for instructors: "Audience heterogeneity makes it very hard to create a course that will appeal to all levels; so the elements proposed will help an instructor plan and be prepared for diversity, creating a space that will give inspiration and intellectual challenge to any levels of participation" (p.2). The course was advertised as being designed for anyone with an interest in chemistry, noting 'a GCSE level of science is recommended' (a UK qualification in a science subject typically taken by school students aged 14–16 years), and that it "will be particularly useful for sixth formers to aid the transition to study science at university"(Future Learn, n.d.) In common with MOOC audiences in similar areas (O'Malley, Agger & Anderson, 2015), we had learners from a wide range of backgrounds from beginners to those with chemistry doctorates. To support novices we included an extensive glossary and the brief explanations of keywords (accessed, for example, by clicking on the keyword when it first appears), often with associated diagrams, that proved a popular resource with many learners posting how useful it was. Various 'tools of the trade' sections were included throughout, which covered introductory material studied at GCSE and beyond, and positioned just when needed. For example, in the first week, a section on 'understanding chemical structures' introduced the different ways of representing organic structures, while the final week included a discussion on 'making polymers' that provided the necessary background for making good progress on the subsequent sections. We included some challenging topics, designed to stretch those studying an advanced level chemistry course, for engagement and motivation.

Humour can create a more positive atmosphere amongst learners, which can facilitate the learning process (Garner, 2006). It can build bridges between tutors and learners by showing a shared understanding and a common psychological bond. Consequently, we decided to use humour in a number of ways, from a chemistry joke in our promotional trailer to quirky facts about organic compounds in the glossary, to using fun animations in our course videos and including amusing facts in some postings. Importantly, as jokes and humour can be easily misinterpreted, the humour was specific, targeted and appropriate to the subject matter. It was also used to provide a more relaxed atmosphere to learners and helped to break down barriers between the tutor, mentors and learners – building rapport with the aim of making learners less inhibited about contributing to discussions. Indeed, learners have identified the importance of humour, fun and games in improving learning capabilities, as a characteristic of successful MOOCs (Holstein & Cohen, 2016).

For teaching chemistry, the importance of practical work is widely accepted – it helps engage learners, allows them to develop important skills, and to understand the process of scientific investigation, including identifying risks and safe working (Woodley, 2009). The opportunity for learners to do experimental work in a MOOC has been identified as a major challenge (Leito, Helm & Jalukse, 2015). For example, a related MOOC course has involved a virtual laboratory (O'Malley, Agger & Anderson, 2015) designed to allow students to conduct experimental measurements. However, a distinctive feature of the eeDc course is the inclusion of 'kitchen' experiments (that use inexpensive and common household items), with the opportunity for learners to share and discuss their results using the networking tools Padlet (an online bulletin board) and Twitter. This approach was designed to help bring the subject to life, from determining the antimicrobial properties of spices to constructing a molecular model using household items, to making a medicinal lava lamp.

Reference materials were freely accessible and we exploited some YouTube clips made by our undergraduates. For example, videos made by our first-year undergraduates (as part of their undergraduate degree course) were showcased in the final week to illustrate the importance of polymers in sports. We also had links to videos made by colleagues in our teaching laboratories, which demonstrated practical techniques and how to use laboratory instruments. This had the added benefit of subtly promoting our university chemistry courses and facilities.

Differences between the courses

Following the first delivery of the course, some small changes were made when the course was delivered six months later. Apart from updating the content (typically by updating links to recent news stories), we introduced a weekly competition where a prize was awarded based on the results of a designated kitchen experiment. Some learner postings (from the first course) highlighted the technical challenge of some of the content in week 2, so we moved the more challenging content to a further reading section. A key change was for trained undergraduate chemistry students to have a stronger presence in facilitating the course, such as taking the lead on answering technical queries, creating a friendly and social environment, and ensuring that we gave feedback to as many postings as possible. Clear criteria for communicating with learners were put in place in order to avoid false expectations (for example, the level of interaction provided by the course facilitators).

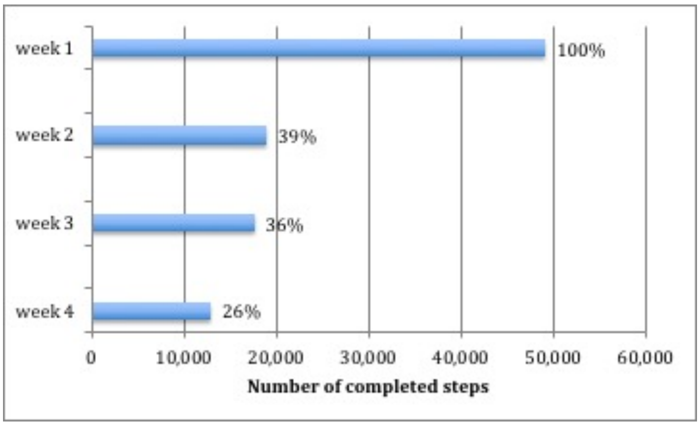
Course outcomes

The four-week eeDc course was delivered on two separate occasions in 2017, first in January (called 'course 1') and then in July ('course 2'). Both courses were advertised in a number of ways. For example, FutureLearn advertised it on their website, including the short promotional video, and through targeted electronic mailings, and social media was employed by the University of York and an associated eeDc course Twitter site (eeDcAndy). Also, postcards and posters were sent to over 200 UK schools and colleges teaching pre-university chemistry courses, and the second running of the course was advertised on two university open days. The success of this targeted marketing was evidenced in the feedback to the pre-course survey. For example, for the first course, when asked if they were taking this course to support current or future studies, of the 342 respondents, 49% said they 'strongly agree'; and when asked if they were taking the course to support a university application, 45% said they 'agree' or 'strongly agree' to this statement. A similar picture emerged from the survey feedback for the second course: of 237 respondents, when asked if they were taking the course to support a university or college application, 48% said they 'strongly agree' to this statement. In terms of the learner background and expertise, for the first course, when asked 'what previous experience, if any, do you have in this subject area?' of the 356 respondents, 66% said they studied it at school and 28% had studied it at university; for the second course, 58% said they studied it at school and 19% had studied it at university. For both courses, just 10% indicated that they had no previous experience, which likely reflects targeted messages in the advertising material. It was interesting when asked about job roles, to see that a number of chemistry high school teachers had signed up, some commenting on wanting to sample the course, before potentially recommending it to their students. Also, at the beginning of the first week, participants were asked to describe who they are and what their motivation to take part is. Analysing these statements it turns out that apart from students, the audience was heterogeneous, consisting of academics and retirees amongst others, all having different approaches and expectations.

In total, both courses attracted 9192 enrolments with the first course being slightly more popular (5623 enrolments). Learners from over 100 countries registered on the course and so there was significant participation of learners from outside the UK. The percentage of learners with ≥90% step completion was 12.2% for the first course and 10.5% for the second. In addressing the 'success' of this MOOC, we emphasise caution about using success completion in the course. MOOCs are known to have a typically low completion rate, often around 10%, which is much lower than either face-to-face or online education to date (Warr, 2016). Also, the heterogeneity in learner expertise and background may make it difficult to engage in meaningful and sustained interaction with fellow learners (Tawik et al., 2017). However, completion is a poor way to evaluate the success of MOOCs, because learners sign up for the courses for a variety of reasons. Many who leave early have gained what they wanted from the course and do not see themselves as dropouts. Indeed, this MOOC was designed to allow learners to dip into topics of interest, rather than complete the course in entirety (as would be required for continuing professional development (CPD)), much like reading a newspaper or magazine. It also targeted a small sub-section of learners, namely those interested in learning more about advanced chemistry, especially those with aspirations to study chemistry at university.

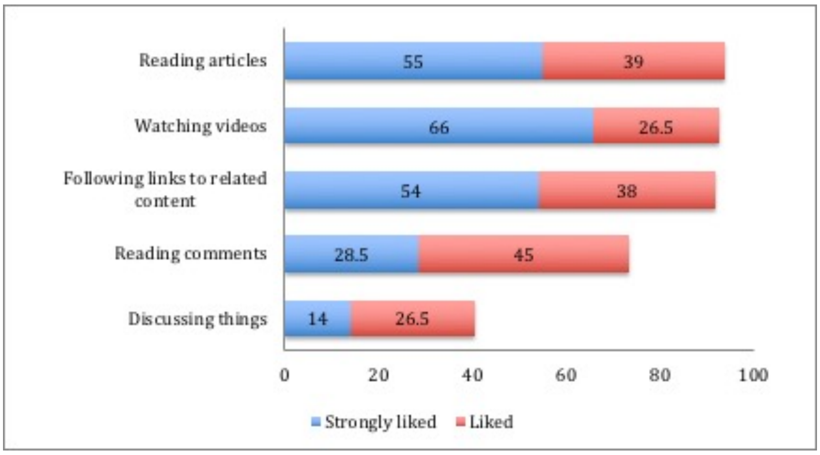
Tracking the number of completed steps per week allowed us to monitor learner activity over the four weeks of the course. For both courses, learners completed a total of almost 105,000 steps. A remarkably similar profile was seen on both occasions the course was run (e.g. in week 4, the number of completed steps for the first course was 25% of that in week 1, and 26% in the second course). The combined number of completed steps for both courses is shown in Figure 1. It shows the anticipated drop in completion as the courses progressed, with a particularly big drop on going from week 1 to 2, as has been observed for related courses (Kerr et al., 2015). However, learner activity after week 2 stayed reasonably consistent.

Figure 1. Completion of steps over weeks 1-4 for both courses



In total, for both courses, only 98 completed post-course surveys were received (50 from the first course and 48 from the second). Nonetheless, this revealed some interesting trends. For example, learners were asked to rate from strongly liked, to strongly disliked, how they felt about their learning on the course (the six categories were 'strongly liked', 'liked', 'neither liked nor disliked', 'liked', 'strongly liked', and 'not applicable'). They liked and strongly liked feedback for five aspects of the two versions of the course (Figure 2). While learners enjoyed reading articles, watching videos and following links to related content, they were less inclined to enjoy reading comments and particularly discussing things. This has been shown to be an issue for other xMOOCs, and the design of such courses has been noted as a possible reason for the lower levels of learner-learner interaction (Margaryan, Bianco & Littlejohn, 2015). Over both courses just over 5000 comments were posted, and we included a number of discussion points throughout the MOOC. Postings were facilitated by the FutureLearn platform. The discussion points were designed to encourage contributions from a wide range of learners, including novices, but the technical content of the subjects may have limited such contributions.

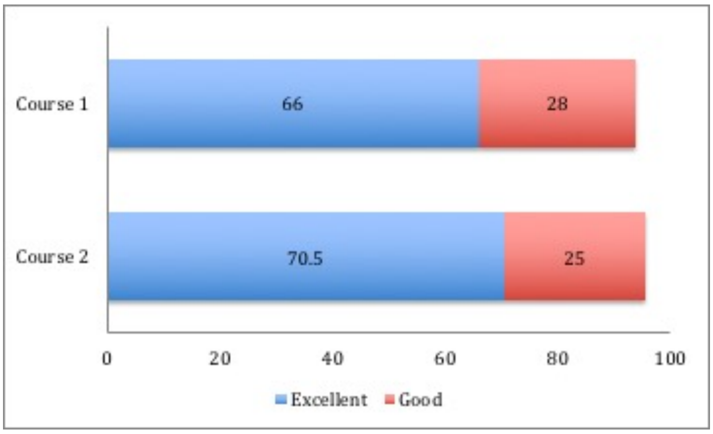
Figure 2. Percentage of learners who liked and strongly liked aspects of the courses (from the post-course surveys)



The course included some challenging concepts, designed to stretch pre-university chemistry students. In terms of course difficulty, 84% of learners thought it was about the level they wanted in the first course and a similar 77% in the second course. In postings, some learners mentioned that they struggled with particular concepts as they had not done chemistry for a number of years, but then commented they were glad they had persevered and completed the course. The technical difficulty of the course did not increase as the course progressed. Threshold concepts were introduced when needed, so if learners struggled on the content in earlier weeks, they could still make progress on topics later in the course, and this was emphasised by supportive facilitator postings.

In terms of overall course experience, for course 1, a total of 94% of respondents rated it either excellent or good, and course 2 achieved a similar rating of 95.5% (Figure 3). The learner postings on the end of the course summary typically mentioned how interesting and enjoyable they found the content, with a fair spread of favourite topics across the four areas. There were a number of positive comments from learners about doing the kitchen experiments, suggesting a good level of engagement, especially with the experiments in the earlier weeks. The number of images uploaded on social media provide some evidence for this. Learner postings on Padlet and Twitter offered the opportunity for us to advertise the course on social media. In places, to further exemplify key concepts, links to YouTube videos were included. These also proved popular with learners, especially clips made by some of our first-year chemistry undergraduates. Learners commented positively on the contributions of our student mentors, particularly in the second iteration of the course, noting how much they appreciated the number of postings and quick replies. It was also interesting to see how much the students mentors enjoyed their role, which they described as an 'entertaining and enlightening experience'.

Figure 3. Percentage of learners who selected excellent and good when asked 'how would you rate the overall experience of the course?'. (Data from the post-course surveys.)



Finally, we monitored the number of applicants who mentioned the MOOC in their UCAS application to study chemistry at York. (In the UK, the Universities and Colleges Admissions Service, or UCAS, operates the application process for all British universities.) At the end of the application season (2017-18), a creditable 17% of applications had mentioned engaging in a MOOC. Almost all specifically mentioned eeDc, with a discussion of course content of particular interest to them. The fact that 1 in 6 applications specifically mentioned a MOOC indicates the importance of such courses in strengthening university applications; helping candidates to stand out from the crowd, by giving evidence to support their passion and enthusiasm for a subject.

Conclusion

This study contributes to an exchange of good practice to promote effective online student learning of relevance to those interested in learning more about how MOOCs could contribute to a university strategy. We believe that MOOCs can provide an entry level to higher education in many ways. They help students decide if they are genuinely interested in a subject or not without having to 'pay' for it, and may learn more about life as an undergraduate student (including sampling some of our videos on practical chemistry techniques and learning about some of our recent research) and what an institute has to offer.

Although there was a small response at the end of the course to the final survey, the responses are helpful in determining if the online pedagogy MOOCs outcomes were recognized and/or achieved. For example, learners enjoyed the variety of activities, including the kitchen experiments and the short videos and screencasts as well as the contributions from our student facilitators. Like other MOOCs, our course continues to evolve. For example, alternative strategies to help engage a wide range of learners, with differing expertise, will be explored, including the use of polling steps. Learner feedback posted on the site will also be taken on-board, especially with regard to aspects of the course that learners felt were too complicated, or too lengthy. More extension activities to allow learners to learn more about the topic will also be trialled, as will more self-graded activities to permit participants to regularly check their understanding of the topic.

MOOCs have the potential to achieve the policy aim of widening access. To achieve this, their reach needs to extend to the under-represented groups; that is, people from specific minority ethnic groups, lower socio-economic backgrounds, low participation neighbourhoods, or those who have been in care or are disabled. Moving forward we will be making alternative admissions offers, which incorporates the completion of eeDc, to students from groups currently under-represented in higher education.

The field of MOOC research is both relatively new and rapidly expanding and this study adds to the growing literature on an educator's experience, providing an insight into the rewards and challenges of teaching in MOOCs, and aims to encourage and support other higher education providers considering developing related online courses. Back in 2013, nearly one-third of 103 professors surveyed by *The Chronicle of Higher Education* were 'somewhat' or 'very' sceptical about online-only courses before teaching a MOOC (Kolowich, 2013). Afterwards, more than 90% were enthusiastic about online classes, noting the process is time-consuming but often successful. The benefits of increased visibility of the institution and subject, within the media and the general public, and the opportunity to pick up tips to improve classroom teaching are just two incentives that we hope will inspire others to give MOOCs a go.

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