WHAT FACTORS INFLUENCE LEARNER ENGAGEMENT WITH FUTURELEARN MOOCS? A CASE STUDY FROM BATH

Flora Casson¹, Marie Salter², Momna V Hejmadi¹

¹ Department of Biology & Biochemistry, University of Bath (UNITED KINGDOM)
² Centre for Learning & Teaching, University of Bath (UNITED KINGDOM)

Abstract

The number of Massive Open Online Courses (MOOCs) has increased dramatically in recent years, including those from the UK provider, FutureLearn. Comparison of data between MOOCs shows that participation varies significantly across different demographics and courses. More detailed analysis of the gender, countries, ages and education status of participants across MOOCs of different subject matter would enable a better understanding of the reasons for variation. This paper explores the factors that influence learners to engage with FutureLearn MOOCs. A diverse range of MOOCs delivered by the University of Bath since 2014 were selected for this study. The content of the MOOCs ranged from ‘Inside Cancer’, ‘Quality Improvement in Healthcare’, ‘Remote Control Warfare’ and ‘Sustainability for Professionals’. Enrolment learner profiles and activity data at each step of the MOOCs was analysed. The demographic of Bath FutureLearn participants differed for those from Organisation for Economic Co-operation and Development (OECD) member countries and non-OECD countries in several aspects.

More females than males take FutureLearn MOOCs: Over 60% of females registered for FutureLearn courses on average, and this trend was also reflected in the University of Bath MOOCs, which were 63% female. More female registrants were seen in all of the top 10 participating countries, except for India and Nigeria, possibly reflecting the socio-cultural contexts of access to education for women in these 2 countries. All MOOCs in OECDs had a higher proportion of female learners, except for ‘Remote Control Warfare’, confirming assumptions that the subject matter may influence MOOC participation when it comes to gender. Participants from non-OECDs are younger: Non-OECD countries had an average participant age of 32 years old compared to 42 in OECDs. Average age also varied between courses being youngest in Sustainability and oldest in Quality Improvement in Healthcare.

Course popularity may reflect the socio-political environment of the participant countries: Country participation varied depending on course content. All 4 MOOCs, except for ‘Sustainability’ had more OECD than non-OECD participants. The Warfare MOOC drew a high proportion of participants from Ukraine, compared to the ‘Sustainability’ MOOC, which drew higher numbers from Brazil and the Netherlands. More participants from non-OECDs are already enrolled in tertiary education: More than 10% of non-OECD participants were already in full time tertiary education compared to 6% of OECD participants, potentially reflecting the different motivations for learning in non-OECD countries such as career progression or social mobility. Course adherence is lower in non-OECDs: Over 6% of non-OECD participants were still active at the end of the MOOCs compared to 16% of OECD participants.

The findings from this study contribute to the wider understanding of the profiles of global learner participation and engagement in FutureLearn MOOCs, and also provide fresh perspectives on the factors that influence learner engagement with these courses.

Keywords: MOOCs, FutureLearn, Education, OECD.

1 INTRODUCTION

1.1 Background

MOOCs are free, online courses that provide an accessible means of education for learners globally [1]. MOOCs are often designed to suit different subject matters and audiences. Those that focus on collaborative learning and take a connectivist approach to education are categorised as cMOOCs. Those that use more content based learning, with less focus on interactions between participants are categorised as xMOOCs [2]. Historically, xMOOCs attracted higher numbers of younger Science,
Technology, Engineering and Mathematics (STEM) learners, whereas cMOOCs tended to attract more lifelong adult learners [2, 3]. Others consider the categorisation as cMOOC/ xMOOC too restrictive, and believe it does not reflect the wide range of pedagogies and flexibility that MOOCs provide [4]. The University of Bath offer several courses on the UK FutureLearn platform, which could be categorized primarily as xMOOCs for the purposes of this study.

1.2 Learner Profiles

MOOC learner profiles vary across different countries, courses and providers. They have the potential to provide education to people in developing countries who do not otherwise have access to higher education. However, this cohort is generally underrepresented among MOOC learners, with young, affluent and well educated learners often making up the majority of participants [5-7]. Data suggests that younger learners from non-OECD countries tend to study Computer Science or STEM subjects and also tend to have a Bachelor’s degree or higher [5]. Gender gaps are also seen in traditional forms of education, for example the mean number of years schooling is greater for males than females, with a greater disparity between genders in non-OECD countries, a pattern also reflected in MOOC learner profiles [8, 9]. Gender profiles of learners on MOOCs also vary across providers with edX and Coursera reporting higher proportions of male learners, whereas FutureLearn has stated that nearly 60% of their learners are female [5, 10, 11].

1.3 The Digital Divide

The digital divide is a term used to highlight the separation between those able to take advantage of technological advancements as well as differential use of technologies [12]. The digital divide is a major factor limiting individuals in non-OECDs from accessing MOOCs. In 2014 it was estimated that approximately 4 billion people worldwide were not online, 90% of these being from developing countries, making access to this target group problematic [13]. A study completed in 25 Latin American and African countries found that fewer women used ICT mainly due to lower-level education, income and unfavourable employment compared to men. Women used ICT more actively than men [14], indicating the huge potential of MOOC participation by women in developing countries, if measures can be put in place to bridge the digital divide.

Since its launch of two MOOCs in 2014, the University of Bath has expanded and diversified its portfolio of courses offered on the FutureLearn platform, but no analysis of learner profiles was undertaken. The aim of this study was to determine how participation and engagement of Bath MOOCs varies across demographics and courses. The 4 MOOCs chosen for this analysis were: ‘Inside Cancer’, ‘Quality Improvement in Healthcare: The Case For Change’ (Healthcare), ‘From State Control to Remote Control: Warfare in the 21st Century’ (Warfare) and ‘Make an Impact: Sustainability for Professionals’ (Sustainability). Our data shows the variation in learner demographics between courses in terms of age, gender and country participation. This analysis of learner profiles would help inform the development of future MOOCs by the University of Bath and help make the course content and dissemination more relevant. Analysing the opinions and behaviours of learners is an important part of determining the effectiveness of the course, its impact on lifelong learning and ascertaining how best to improve going forward.

2 METHODS

Table 1 shows the total number of runs for each course and the runs with profile data available.

<table>
<thead>
<tr>
<th>Course</th>
<th>Number of learners enrolled on selected profile data runs</th>
<th>Number of learners enrolled with profile data (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside Cancer</td>
<td>8,399 (2 runs in 2016)</td>
<td>836 (10.0)</td>
</tr>
<tr>
<td>Healthcare</td>
<td>3,637 (1 run in 2016)</td>
<td>434 (11.9)</td>
</tr>
</tbody>
</table>

Table 1. Summary table of the number of runs and learners for each MOOC, with and without profile data. Data was collected from the FutureLearn enrolment datasets. Changes in the FutureLearn system in 2016 meant that some historical data was unavailable and therefore profile data for the selected runs is shown above. Profile data relied on individuals filling in this information upon enrolment, which 2,274 out of 22,104 (10.3%) of learners completed.
2.1 Data Analysis

Participants’ ages were collected in age brackets and subsequently allocated the midpoint of that bracket to enable average age calculations. The under 18 category was allocated an average age of 15 as it was assumed to be unlikely that any participants were younger than 12 years old [15, 16]. The Learner ID is found in both the Enrolment and Step Activity datasets and was therefore used to link the two. A Vlookup formula was used to match up participants’ profile and step activity data. Anyone who enrolled but did not participate in any step of the MOOC did not appear in the step activity data and was therefore allocated a final step of 0. This was calculated using an IFERROR statement in the formula =IFERROR(VLOOKUP(A2,'Step activity Data'!$C:$D,2,FALSE),0)

2.1.1 Graphs and Tables

Microsoft Excel was used to produce all graphs and figures unless stated otherwise. Pivot Tables were used throughout the data analysis to enable rapid collation of data. The radar graph in Fig. 4 was used to display how distribution across the 4 courses differed between countries and relied on runs with profile data. The percentages given are of total learners from that country enrolled on each course per run. Participants who selected ‘Full Time Student’ as their employment status and had a highest education level of above secondary were classified as ‘Tertiary education’.

2.1.2 Statistical Analysis

Chi squared testing was used to determine if there was a statistically significant difference between figures. This was carried out using Statistical Package for the Social Sciences (SPSS) software and where p < 0.05, the result was taken to be significant. Chi squared testing assumes that each subject contributes to only one of the groups of data.

3 RESULTS & DISCUSSION

The profile of FutureLearn MOOC learners differs from that of other providers by having more female than male learners. Gender enrolment was however affected by course content and the OECD status of a country, similar to traditional forms of pedagogy. There was a lower proportion of female learners from non-OECD countries. Course content also appeared to affect enrolment across countries, potentially varying in line with their governmental policies and political environments. Course completion was lower among non-OECD country participants. Learners from non-OECD countries were younger, as were those taking the Sustainability and Inside Cancer MOOCs compared to the other courses. A greater proportion of non-OECD learners were already in full time tertiary education, compared to those from OECDs.

3.1 FutureLearn MOOCs have a higher proportion of female learners than other providers

Over 60% of learners on FutureLearn courses from all institutions were female [10] and this trend was also reflected in the University of Bath MOOCs, in which 63% of learners were female. MOOC courses run by other providers however tend to be male dominated [17] [11] such as the Coursera courses run by the University of Pennsylvania, for which 56.9% of learners were male [5].

3.2 Course content influences gender participation

More females participated in the Bath MOOCs, with the exception of Warfare which had a significantly higher male participation (Fig. 1). The lower female to male ratio in the Warfare MOOC is in line with the gender gap seen in more traditional forms of education. Between 2013 and 2015, in European tertiary courses covering Military and Defence topics, 74% of learners were male according to the Eurostat database. Health and Welfare related courses had more females in both Bath MOOCs and Eurostat data [18]. Gender participation also varied on MOOCs run by the University of Edinburgh [19] and on the 68 MITx and HarvardX courses [20]. This indicates that subject matter may be a key factor of gender participation in MOOCs, similar to traditional courses.
Non-OECD countries have a lower proportion of female participants than OECD countries

MOOC learners are typically from developed countries, which is in line with the findings shown in table 3, where 60% of Bath MOOC participants come from OECDs [5, 21]. Sustainability was the only one of the four MOOCs to be taken by more non-OECD than OECD learners. The ratio of OECD to non-OECD learners was significantly lower for Sustainability than for the other 3 MOOCs, p < 0.001 (3sf).

Table 2. Data summary of the gender split within each MOOC for OECD and non-OECD countries. Participants who selected ‘Non-binary’ and ‘Other’ as their gender were collated into the ‘Other’ category due to their small numbers. Data was collected from the FutureLearn enrolment datasets and includes all runs with profile data as detailed in Table 1.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Non OECD</th>
<th>Inside Cancer</th>
<th>Healthcare</th>
<th>Warfare</th>
<th>Sustainability</th>
<th>OECD</th>
<th>Inside Cancer</th>
<th>Healthcare</th>
<th>Warfare</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>499</td>
<td>173</td>
<td>91</td>
<td>38</td>
<td>197</td>
<td>924</td>
<td>425</td>
<td>205</td>
<td>70</td>
<td>224</td>
</tr>
<tr>
<td>Male</td>
<td>400</td>
<td>101</td>
<td>63</td>
<td>47</td>
<td>189</td>
<td>441</td>
<td>134</td>
<td>74</td>
<td>126</td>
<td>107</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

As seen in Table 2, although both OECD and non-OECD countries had more female than male learners (67% and 55% respectively), the proportion of females compared to males was 12% greater in OECDs than non-OECDs. This data on FutureLearn supports similar findings on Coursera MOOCs, where the percentage of male participants was greater in non-OECDs than OECDs [9]. A key contributory factor could be the cultural barriers, where access to education is prioritised for male children in low income households in developing countries, and girls conform to traditional lifestyles, resulting in lower levels of education for women [22].
All top 10 participating countries had more female than male registrants, except for India, Nigeria, and Canada (Fig. 2). Australia had the largest disparity, with 81% female participants. It is also worth noting that there was a significant difference in the total number of participants between these countries, from 800 in Great Britain down to 34 in Ukraine.

A survey comparing the male/female ratios in MOOC enrolliers found that 80.9% of Indian learners were male, compared to 59.2% among non-Indian learners. The major barriers to participating in MOOCs include the need for reliable access to the internet; language barriers; free time; and basic prior education. These barriers are especially applicable to women and rural populations in India. However, the Bath MOOCs showed that 63% of all participants and 45% of Indian participants were female, indicating that the Bath MOOCs are reaching women in both India and other countries more effectively than the average MOOC.

The two countries with the lowest Human Development Index (HDI) values out of the 10 countries shown are India at 0.624 (medium) and Nigeria at 0.527 (low). The HDI considers three main factors of human development; life expectancy, the ability to obtain knowledge and the ability to have ‘decent’ living standards. India and Nigeria also have the lowest Gender Development Index values [8]. The positive correlation between lower HDI countries with the lowest proportions of female learners may reflect the socio-cultural contexts of access to education for women in these countries. The male to female ratio of enrolment in tertiary education has been shown to increase with a linear relationship as GDP per capita decreases. Having a cultural preference for sons and wanting to preserve the ‘purity’ of girls through gender segregation are examples of reasons for this trend [23].

3.4 Course popularity may reflect the socio-political environment of the countries

As shown in Fig. 3, course popularity varied between countries. For the 4 non-OECDs; Brazil, India, Nigeria and Ukraine, Sustainability was especially popular, accounting for between 35% and 44% of learners. The course covers how to integrate sustainable development strategies into businesses, which may be more relevant to these non-OECD countries. As economic growth in non-OECDs is highly reliant on natural resources and these countries are more vulnerable to changes in water, food and energy supplies, sustainability is paramount to ensuring continued development [24]. This may also reflect the relatively scarce resources and examples of sustainable businesses in non-OECDs. Not only can MOOCs help to fill this gap but non-governmental organisations (NGOs) are also providing support on sustainable business planning by collaborating with multinational enterprises that are entering non-OECD markets. For example, Nestlé has collaborated with NGOs in West Africa to help promote sustainable farming [25]. They also run e-learning courses and have held Environmental Sustainable Leadership workshops in several countries around the world [26].

![Figure 3. Radar Graph showing the % participants within a country taking each MOOC per run. Data was collected from FutureLearn enrolment datasets and includes all runs with profile data as detailed in Table 1. For Inside Cancer and Sustainability where there were 2 runs, an average number of participants was calculated to equate them to Healthcare and Warfare which had 1 run each.](image-url)
The only top 10 OECD country with a popularity for Sustainability was the Netherlands, where 51% of learners took this MOOC. Sustainability has been high on the Netherlands’ government agenda since the 1980s with the implementation of the National Environmental Policy Plan and is considered by the OECD to be ‘a forerunner in environmental policy’ [27]. Government policy may explain the level of interest from the Netherlands. Additionally, the Dow Jones Sustainability Index identifies the Netherlands as having 14 companies considered to be world sustainability leaders [28]. Of the 28 countries included in the index, only Switzerland has more of these companies per million of population. Ukraine had the highest proportion of its participants, studying the Warfare MOOC at 37%. Ukraine has in recent years been subject to remote control attacks, for example the hack of the Ukrainian power grid on 23 December 2015 [29] and a similar attack on 17 December 2016. Furthermore, the ongoing conflict and use of Russian drones in Eastern Ukraine may be increasing public interest in military and warfare related topics in Ukraine [30].

Inside Cancer was especially popular with OECD learners (ranging from 28% up to 41% of learners), reflecting the interest to learn more about the disease which has seen increasing incidence rates due to increasing life expectancy [31]. It is now the second leading cause of death in OECD countries with mortality rates per 100,000 being greater in more developed than less developed countries [32, 33].

Our data indicates that popularity of MOOC courses could reflect the political, economic and social environments in different countries.

### 3.5 Course completion is lower in non-OECD countries

The percentage of participants that enrolled on a MOOC but showed no activity, across all runs on all courses, was lowest in Sustainability at 49% and highest in Warfare at 58%, as shown in Table 4.

<table>
<thead>
<tr>
<th>MOOC</th>
<th>% of learners who never showed activity</th>
<th>% of learners who showed activity and completed the course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside Cancer</td>
<td>54%</td>
<td>18.14%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>53%</td>
<td>12.10%</td>
</tr>
<tr>
<td>Warfare</td>
<td>58%</td>
<td>19.14%</td>
</tr>
<tr>
<td>Sustainability</td>
<td>49%</td>
<td>16.16%</td>
</tr>
</tbody>
</table>

The furthest step of activity for active learners showed a similar pattern across all 4 courses from Bath. For all courses, between 12% and 20% of participants were active in the final step of the last week, the highest being for Warfare at 19%. Although the pattern is consistent across courses, the overall completion rate was significantly higher in Warfare and Inside Cancer than it was in Healthcare, indicating that different courses retained learners to varying extents. It is widely acknowledged that MOOCs have a low level of course completion [34, 35]. However, a study reports that some learners enrol on MOOCs with no intention of completing the full course [36], suggesting that considering completion rate as a proportion of participants who intended to complete is a more accurate representation of successful completion [37].

When only considering runs where profile data was present, only 6% of non-OECD learners were active at the final step compared to 16% of OECD learners. Additionally, 58% of non-OECD learners enrolled but were never active, compared to 42% of OECD learners. This supports other research where lower socio-economic status has been linked to a lower completion rate [38, 39]. A strong relationship has also been seen between HDI and certification rates for HarvardX and MITx courses [40]. Non-OECD learners face more barriers such as limited and expensive internet access, poor computer literacy and language barriers [6]. Lack of time and awareness of MOOCs have been found to be barriers among non-MOOC users [21], whilst feeling unwelcome and under social identity threat has been cited as a reason for lower completion rates in non-OECDs. Social belonging and affirmation interventions can help to counteract this [39].

Male and female completion rates were not significantly different consistent with other reports [41] [42] [11], although females had a higher completion rate than males in Colombia, South Africa and the
Philippines [21]. The relatively low percentage of participants still active at the end of the course in both genders also supports previous research that shows completion rate to be an issue for MOOCs.

### 3.6 Participants from non-OECDs were younger

Non-OECD countries had an average learner age of 32 compared to 42 in OECDs. Figure. 4 shows that the age of OECD learners is more evenly distributed, with 7.8% being over the age of 65, compared to 0.78% in non-OECDs. In non-OECDs age was far more concentrated in the young adult age groups with 65% of learners being between the ages of 18 and 35, compared to 38% in OECDs. These findings are in line with previous data which shows non-OECD MOOC learners to be younger than those from OECDs [5, 21]. Improving job prospects and preparing for further education are key motivations for MOOC learners in non-OECDs and are most relevant to younger learners [21]. Developing countries have higher pupil to teacher ratios, an average of 19.5 compared to 12.1 in secondary education [43]. Studies suggest that MOOC participants from countries with higher pupil to teacher ratios tend to be younger, possibly because they are trying to supplement their current education [44]. The youngest average ages of the top 10 participating countries were in India, Brazil, Nigeria and Ukraine, the 4 non-OECD countries, whilst the oldest average ages were in the US, Australia and Ireland. The average age of female participants was 36, compared to an average age of 39 for males, indicating that gender does not have a substantial impact on the age of participants.

![Figure 4. Graph showing the age distribution of OECD and non-OECD learners, using FutureLearn enrolment datasets for runs with profile data. The age of non-OECD learners is more skewed to younger age groups.](image)

### 3.7 The Sustainability MOOC had the youngest participants

As shown in Fig. 5, the average age of participants varied between courses. Healthcare had the oldest average age of 42, whilst Sustainability had the youngest at 34. In HarvardX and MITx courses, the average age also varies across different courses and subject areas, with STEM courses having the youngest participants [11, 40].

![Figure 5. Bubble chart showing the average of learners on each course. The percentage of learners from OECDs as opposed to non-OECDs is also shown to provide context, as this variable has also been to shown to impact average age](image)
There were differences in the average ages between courses for non-OECDs compared to OECDs, as shown in Table 4. Sustainability had the youngest average age for OECDs but Inside Cancer was the youngest for non-OECDs. The younger learners from non-OECD countries may be motivated by career progression or social mobility, but further survey-based research is needed into this.

Table 4. Table of average age for learners from OECDs and non-OECDs for each MOOC. Data collected from FutureLearn enrolment datasets and includes all runs with profile data.

<table>
<thead>
<tr>
<th>MOOC</th>
<th>OECD average age</th>
<th>Non-OECD average age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside cancer</td>
<td>40.5</td>
<td>28.6</td>
</tr>
<tr>
<td>Healthcare</td>
<td>45.5</td>
<td>35.7</td>
</tr>
<tr>
<td>Warfare</td>
<td>43.5</td>
<td>33.7</td>
</tr>
<tr>
<td>Sustainability</td>
<td>36.3</td>
<td>32.6</td>
</tr>
<tr>
<td>Total</td>
<td>40.9</td>
<td>32.0</td>
</tr>
</tbody>
</table>

3.8 A greater proportion of non-OECD participants were in tertiary education

It was found that a significantly higher proportion of non-OECD compared to OECD learners were already studying full time in apprenticeships or higher than secondary level education, 10% compared to 6%. A study looking at MOOCs across a range of providers identified that in 2015, nearly 40% of Indian students were in tertiary education [45]. This may be due to the Indian Government allowing Universities to include MOOCs from the SWAYAM provider as course credits, raising awareness of MOOCs among University students in India [46]. It may also be due to different motivations for learning such as career progression or social mobility. Alternatively it may indicate that in non-OECDs MOOCs are being used to supplement the lower levels of education that have been observed [45] [47].

4 CONCLUSION AND FUTURE WORK

In summary, a wide range of factors contribute to the engagement and demographic profiles of Bath MOOC learners. Whilst other platforms have been found to have more males enrolling than females, the FutureLearn platform has more females enrolments. Gender differences were seen in the Bath MOOCs across different topics and countries, reflecting similar patterns seen in traditional forms of pedagogy. The socio-economic status of a country has been linked to several factors including gender ratio, age and course completion rates. Interestingly a greater proportion of non-OECD learners on Bath MOOCs were already currently enrolled in tertiary education compared to OECD learners.

Considering whether learner intentions before starting the course affect completion rate and behaviour during the course, especially for OECD and non-OECD participants would be an interesting future study. This will require the Learner ID to be incorporated into the pre-course survey dataset to link the two. It should be noted that users may have started being active only half way through the course, which could also be taken into account when considering the term ‘completion’ in future work. Demographic analysis relied on profile data, which only a small percentage of learners had completed. Interestingly this proportion was smaller for the Bath MOOCs compared to FutureLearn’s total population of learners. To minimise barriers to enrolment, completion of profile data is not compulsory but as more runs are completed the volume of profile data available will increase.

Work is being done to improve access, efficacy and understanding of MOOCs and their learners. The Réseau d'excellence des sciences de l'ingénieur de la Francophonie, has a network of 14 universities across several continents and aims to promote technological innovations to optimise the use of MOOCs [13]. Interventions to overcome problems with social anxieties associated with online learning environments is another way in which research can help improve learner experience and course completion rates, especially among non-OECD learners [39]. Understanding learner and participant demographics will help to target these interventions towards those who will benefit the most from them and from the opportunity to gain an education through MOOCs.

Although the majority of MOOC participants are currently from developed countries, this study has shown that Bath FutureLearn MOOCs attract a higher proportion of females from non-OECDs than MOOCs from other institutions and providers, contributing towards the wider goal of improving equal
access to education globally. There is more work to be done to enable MOOCs to reach their full potential which with the appropriate understanding, infrastructure and strategies could provide life-changing access to education.

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REFERENCES


