

Can MicroMasters MOOCs accomplish their intended marketing role? Review of the first year and a half of the UQx Sustainable Energy MicroMasters series through edX

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Introduction

From January 2018, the School of Chemical Engineering, The University of Queensland (UQ), progressively offered four graduate level Massive Open Online Courses (MOOCs) and a capstone assessment delivered through the edX platform. These four courses and the capstone assessment make up the UQx Sustainable Energy MicroMasters® series. The four MOOC courses replicated, as far as possible, the on-campus Part A1 courses of the UQ Master of Sustainable Energy (UQ, 2019). The capstone assessment included a proctored examination covering the content of the four courses and a written assignment submitted to Turnitin and marked by an instructor. The overall pass mark of all courses and the capstone assessment was 70% (Coffey & Ashworth, 2019). The two aims for developing and delivering the UQx Sustainable Energy (SE) MicroMasters series were to (i) open the courses to as many people around the world as possible for free and (ii) to encourage participants to articulate to the UQ on-campus Master of Sustainable Energy (MSE) program to boost enrolment numbers (the marketing aim).

When enrolling, participants may select either the audit enrolment track or the verified enrolment track. Participants who select the audit enrolment track may access the course content for free, however, since January 2019, audit participants cannot access the assessment tasks and will not be eligible for a course certificate. Participants who select the verified enrolment track must pay the enrolment fee and have their identity confirmed. Verified participants are given access to the assessment tasks, and upon successful completion of the course (achieve at least 70% in the final grade), will receive a course certificate. In addition, verified participants have access to the course resources after the course closes, as long as the course is online.

In the second year that the UQx SE MicroMasters series was offered, two runs were delivered between 15 January and 31 July 2019. All courses opened together, had a duration of twelve weeks and all topics were available. Participants could enrol in one or more courses at a time and were able to progress at their own pace. In addition, the Sustainable Energy Capstone Assessment opened for the first time in January 2019 for three weeks. The capstone assessment was run a second time in May 2019, again for three weeks.

Background

In September 2016, edX, a not-for-profit MOOCs platform founded by MIT and Harvard, announced the commencement of 19 MicroMasters offered by a partnership of universities around the world. The media statement noted that each MicroMasters comprised a group of graduate level courses which “offer a credential with a pathway to credit” (edX, 2016, par. 1). From January 2019, edX introduced a new financial model which required all participants, wishing to complete assessment tasks and receive a certificate, to enrol in the verified enrolment track and pay the enrolment fee. These developments are reflected in the observation by Reich and Ruipérez-Valiente that “... financial sustainability for MOOC platforms may depend on reaching smaller numbers of people with greater financial means that are already embedded in higher-education systems rather than bringing in new

nonconsumers from the margins” (2019, p. 131). In addition, these authors noted from their review that “... the majority of new registrations and certifications came from the world’s most affluent countries” (Reich & Ruipérez-Valiente, 2019, p. 130).

A review of the MITx MicroMasters in Supply Chain Management examined 26 courses and four comprehensive final examinations offered from fall 2015 to February 2019 (Ponce-Cueto & Caplice, 2019), a time period of approximately four years. In their study, Ponce-Cueto and Caplice observed a “funnel of participation”, Figure 1 (2019, p. 189). They found that over all 26 MicroMasters courses and four final examinations, there were 279,310 registered participants (audit participants), 18,789 verified participants (7% of total enrolments), 9,920 participants passed at least one course (achieved at least 60%) and 1,592 participants passed the entire MicroMasters series (8% of verified learners) (Ponce-Cueto & Caplice, 2019, p. 189).

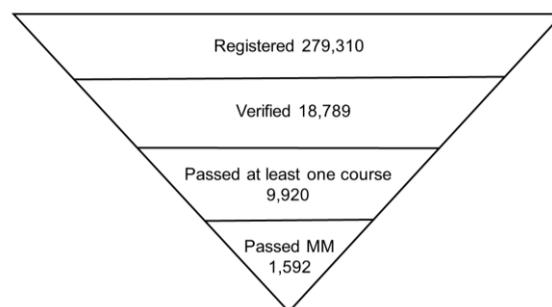


Figure 1: Funnel of participation for all courses in the MITx MicroMasters (MM) in Supply Chain Management during fall 2015 to February 2019.

Adapted from Ponce-Cueto, E., & Caplice, C. (2019). MicroMasters are not just a bunch of MOOCs: Lessons from the first MicroMasters program. *Proceedings of EMOOCs 2019: Work in progress papers of the research, experience and business tracks*. 6th European MOOCs Stakeholders Summit, EMOOCs 2019, Naples, Italy, May 20-22, 2019, Figure 1, p. 189. Retrieved from http://ceur-ws.org/Vol-2356/experience_short18.pdf

As well as other large MOOC platforms, such as FutureLearn and Coursera, other institutions are offering MOOCs. An example of a short, five week MOOC titled ‘MOOC Energy Transition: Innovation towards a Low-carbon Future’ was offered for the first time by the IFP School, Energies Nouvelles, French Institute of Petroleum, from 18 March – 19 April, 2019 (IFP, 2019). The MOOC was open to the public, taught in English with French subtitles and had an expected work load of two to three hours per week (IFP, 2019). Interestingly, although the MOOC was free, participants who successfully completed the course received a certificate (IFP, 2019). A review was undertaken by Thirouard, Cahagne, Bernaert and Jehl (2019) of similar IFP MOOCs offered between 2014 and 2018. The three goals for producing the IFP MOOCs were: to catch the attention of young people with an interest in transport; to highlight that the IFP school was continually updating its curriculum to keep abreast of new developments in transport; and to “improve the recruitment of excellent students from all over the world” (Thirouard, et al., 2019, p. 180). As well as videos and discussion forums, the learning activities included: games, enigmas, virtual reality and storytelling. These activities were supported by a book that contained all the content (Thirouard, et al., 2019, pp. 179-180). The review found relatively high completion rates (the proportion of certified participants to enrolled participants) ranging from 19% – 33%, with completion rates decreasing with increasing content difficulty (Thirouard, et al., 2019, pp. 180 & 187).

Purpose

A review of the first one and a half years of the UQx SE MicroMasters series (15 January 2018 – 31 July 2019) was undertaken to: (i) investigate enrolments and educational outcomes, including articulation to the UQ on-campus MSE program; and (ii) to identify ways to improve the UQx SE MicroMasters (MOOC) courses, particularly with respect to raising the quality of participants’ work and improving academic integrity.

Method

At the closure of each UQx SE MicroMasters course, enrolment and achievement data were obtained from the downloadable edX gradebook and student profile reports and analysed using Microsoft Excel. Data from all courses were then integrated to provide a report of all verified participants who were eligible to receive course certificates. Data on fees and course attributes were collected from course websites.

Results

Enrolments

Raw enrolment numbers are often used by institutions to indicate the success of a MOOC course – “We are glad to see that almost 13,000 students have now joined the course!” (pers. comm. BerkeleyX Marketing Analytics: Marketing Measurement Strategy, course email, 12 September 2019). However, raw enrolment numbers include staff from a range of institutions, as well as potential participants who later decide not to participate in the course. During the one and a half years the UQx SE MicroMasters series has been offered, there were 29,636 enrolments over all courses of the MicroMasters and runs. However, only 592 participants (2%) selected the verified enrolment track and paid the enrolment fee, a necessary requirement to working towards: (i) a course certificate; (ii) a MicroMasters series certificate and (iii) possible articulation to the UQ on-campus MSE program. In the two runs of the UQx SE MicroMasters series offered during January – July 2019, where all courses and topics were open, 7,543 participants enrolled in total over the four courses, excluding the capstone assessment, with 251 participants (3%) selecting the verified enrolment track (Table 1).

Table 1: Number and proportion of participants in the audit and verified enrolment tracks, UQx Sustainable Energy MicroMasters, January – July, 2019 (Runs 1 & 2)

| Course | Run | Enrolment ^a | | Verified participants | | |
|-------------|-----|------------------------|------------------------------|-----------------------|------------|------------|
| | | Number | Audit participants Number | % | Number | % |
| ENGY0x 2019 | 1 | 1879 | 1798 | 95.7 | 81 | 4.3 |
| ENGY1x 2019 | 1 | 507 | 488 | 96.3 | 19 | 3.7 |
| ENGY2x 2019 | 1 | 454 | 442 | 97.4 | 12 | 2.6 |
| ENGY3x 2019 | 1 | 362 | 352 | 97.2 | 10 | 2.8 |
| Subtotal | | 3202 | 3080 | 96.2 | 122 | 3.8 |
| ENGY0x 2019 | 2 | 2128 | 2054 | 96.5 | 74 | 3.5 |
| ENGY1x 2019 | 2 | 872 | 851 | 97.6 | 21 | 2.4 |
| ENGY2x 2019 | 2 | 798 | 776 | 97.2 | 22 | 2.8 |
| ENGY3x 2019 | 2 | 543 | 531 | 97.8 | 12 | 2.2 |
| Subtotal | | 4341 | 4212 | 97.0 | 129 | 3.0 |
| Total | | 7543 | 7292 | 96.7 | 251 | 3.3 |

^a Includes UQ staff, staff from other institutions and participants who unenrolled (count by User ID).

Educational outcomes

During January 2019 – July 2019, 42% and 39% of verified participants achieved 70% or higher in the first course of the UQx SE MicroMasters series (ENGY0x Energy Principles and Renewable Energy, Runs 1 and 2, 2019, Table 2). In contrast, a majority of verified participants achieved 70% or higher in the other three courses (Table 2). Even so, over a quarter of verified participants did not successfully complete the course (achieve at least 70%) in both ENGY1x Climate Science and Policy and ENGY2x Energy and Development (Table 2). Nearly 16% of all verified participants enrolled during January 2019 – July 2019, did not attempt any of the assessment tasks, Table 2.

During the one and a half years the UQx SE MicroMasters series has been offered, 166 participants were eligible to receive a certificate in one or more courses (Table 3). However, around three quarters of these participants (74%) were only eligible to receive a certificate in one course. Eight participants achieved at least 70% in all four courses and obtained at least 70% in the capstone assessment. These eight participants were then eligible to receive an edX-UQx SE MicroMasters series certificate. No participants have articulated to the on-campus MSE program, although a few participants may be considering enrolling.

Table 2: Number and proportion of verified participants who: (i) achieved at least 70% in each course and (ii) did not attempt any of the assessment tasks, UQx Sustainable Energy MicroMasters series, January – July, 2019 (Runs 1 & 2)

| Course | Run | Verified enrolments | Verified participants who achieved at least 70% in the final grade | | Verified participants who did not attempt any of the assessment tasks | |
|--------------------------|-----|---------------------|--|-------------|---|-------------|
| | | | as a proportion of all verified learners | | as a proportion of all verified learners | |
| | | | Number | % | Number | % |
| ENGY0x 2019 | 1 | 81 | 34 | 42.0 | 10 | 12.3 |
| ENGY1x 2019 | 1 | 19 | 11 | 57.9 | 3 | 15.8 |
| ENGY2x 2019 | 1 | 12 | 7 | 58.3 | 2 | 16.7 |
| ENGY3x 2019 | 1 | 10 | 7 | 70.0 | 3 | 30.0 |
| ENGY0x 2019 | 2 | 74 | 29 | 39.2 | 17 | 23.0 |
| ENGY1x 2019 | 2 | 21 | 11 | 52.4 | 0 | 0.0 |
| ENGY2x 2019 | 2 | 22 | 14 | 63.6 | 4 | 18.2 |
| ENGY3x 2019 | 2 | 12 | 11 | 91.7 | 0 | 0.0 |
| Total¹ | | 251 | 124 | 49.4 | 39 | 15.5 |

¹The total may include participants who enrolled in multiple courses

Table 3: Number and proportion of participants who achieved at least 70% in one, two, three and four courses or four courses and the capstone assessment, UQx Sustainable Energy MicroMasters, January 2018 – July 2019

| Number of courses or UQx Sustainable Energy MicroMasters series certificate | Participants | |
|---|--------------|---|
| | Number | Participants as a proportion of all participants who achieved at least 70% in at least one course |
| 1 | 123 | 74.1 |
| 2 | 14 | 8.4 |
| 3 | 9 | 5.4 |
| 4 | 12 | 7.2 |
| 4 courses + capstone assessment (eligible to receive an edX-UQx SE MicroMasters series certificate) | 8 | 4.8 |
| Total number of participants who achieved at least 70% in one or more courses | 166 | |

During the first one and a half years of the UQx SE MicroMasters series, instructors observed that the standard of written work did not always meet a Master's level. Some participants had little knowledge about, or adherence to, acknowledging sources and referencing, even though three guides were provided. In addition, many participants reported that they received little feedback in the peer-assessed written papers and some participants even reported peer-marking that either marked too high or too low.

Although the number of participants who achieved at least 70% in one or more courses was relatively low and some participants had concerns with the peer assessment, many of the

participants posted positive testimonials for the courses. Testimonials for Run 1 in 2019 courses included:

“Highly informative course, I really enjoyed this course. I learned about so many aspects of climate science, and appreciated the delivery of high quality and insightful video material and the identified additional readings. I feel I have a much rounder and deeper understanding of the issues which will have practical relevance to my work”.

Fees

As fee levels may affect the number of verified enrolments and possible articulation to the UQ on-campus MSE program, a survey of fees from comparative edX MicroMasters series was undertaken. Of the selected MicroMasters series listed in Table 4, the University of Edinburgh had the highest MicroMasters fee (\$1,500 USD), noting that the first course opened in September 2019 and the other courses will be delivered in 2020. The UQx SE MicroMasters series had a relatively high fee of \$1,495 USD, which has been offered at that fee since January 2018 (Table 4). The Cybersecurity MicroMasters from Rochester Institute of Technology and Supply Chain Management from Massachusetts Institute of Technology both had a series fee of \$1,200. An illuminating comment was made by an eligible candidate from the Netherlands for the UQx Sustainable Energy Capstone Assessment on the enrolment fee which is \$799 USD: “... given that the cost is equivalent to half a year university tuition here ...” (email, 18 September 2019). The candidate withdrew and did not pay the capstone assessment fee.

Table 4: Selected edX MicroMasters series showing number of courses, typical duration, total verified enrolment fee and overall pass mark in each course (as at 17 September 2019)

| edX MicroMasters ¹ | Courses (typical duration in weeks) | Total fee USD \$ | Pass mark in each course % |
|--|---|------------------------|----------------------------------|
| EdinburghX Predictive Analytics for Business Applications | 4 courses (6) + final project | 1,500 | 50 |
| UQx Business Leaders | 4 courses (10) + capstone | 1,497 | 65 |
| UQx Sustainable Energy | 4 courses (12 pre-Sept 2019) + capstone | 1,495 | 70 |
| PennX Robotics | 4 courses only (12) (two proctored exams/course) | 1,396 | 60 |
| UQx Corporate Innovation | 4 courses (10) + capstone | 1,345 | 70 |
| UQx Leaders in Global Development | 4 courses (~ 9-11) + capstone | 1,350 | 65 |
| ColumbiaX Artificial Intelligence | 4 courses only (~ 12) (proctored final exam/course) | 1,275 | 60 |
| DelftX Solar Energy Engineering | 4 courses (9-12) + exams | 1,250 | 60 - 65 |
| MITx Supply Chain Management | 5 courses (13) + exam | 1,200 | 60 |
| RITx Cybersecurity | 4 courses (8) + capstone | 1,200 | ? ² |
| BerkeleyX Marketing Analytics | 4 courses only (4) | 996 | 70 |

¹ <https://www.edx.org/micromasters>

² RITx Cybersecurity commences January 2020

Many edX MicroMasters series were designed to offer participants a pathway to higher-degree programs delivered by universities by offering credit to approved applicants who had achieved a MicroMasters certificate (UT Delft, 2019). Some MicroMasters series enable credit to approved students for a number of participating institutions (MIT, 2019). Program rules were revised by The University of Queensland (Table 5) to enable potential students to apply for credit for successfully achieving the UQx SE MicroMasters certificate. As edX MicroMasters fees are low in comparison with on-campus Master program fees, the fee difference between a UQ semester length set of courses completed on-campus and courses completed from the UQx MicroMasters and one on-campus course was calculated. Domestic students from UQ who completed four MSE courses on-campus would pay \$12,086 (USD)

more that Australian students who completed the similar UQx SE MicroMasters series and the on-campus bridging course. International students who completed four UQ courses on-campus would have to pay \$13,844 (USD) more than international students who completed the similar UQx MicroMasters series and the on-campus bridging course (Table 5).

Table 5: Comparison of fees for Part A1 and A2 of the UQ Master of Sustainable Energy (MSE) (as at 9 September 2019)

| Program | Courses | 2019 fees (AUD) | |
|--|--|-------------------------|-------------------------|
| | | Domestic | International |
| Note: Part A1 & Part A2 are equivalent | | Cost per set of courses | Cost per set of courses |
| | | \$ | \$ |
| UQ MSE Part A1 ¹ | ENGY7000 Energy Principles and Renewable Energy | 4,760 | 5,346 |
| | ENGY7001 Climate Science and Policy | 4,760 | 5,346 |
| | ENGY7002 Energy and Development | 4,760 | 5,346 |
| | ENGY7003 Low Emission Technologies and Supply Systems | 4,760 | 5,346 |
| UQ MSE Part A2 ¹ with courses from the SE MicroMasters ² plus on-campus bridging course ¹ | ENGY0x Energy Principles and Renewable Energy | 145* | 145* |
| | ENGY1x Climate Science and Policy | 292* | 292* |
| | ENGY2x Energy and Development | 292* | 292* |
| | ENGY3x Low Emission Technologies and Supply Systems | 292* | 292* |
| | ENGYCAPx Capstone Assessment | 1,173* | 1,173* |
| | ENGY7010 Bridging Course for Sustainable Energy MicroMasters | 4,760 | 5,346 |

¹ <https://future-students.uq.edu.au/study/program/Master-of-Sustainable-Energy-5684>

² <https://www.edx.org/micromasters>

* Australian dollars equivalent as at 9 September 2019 given on the edX course websites

Discussion

Enrolments and educational outcomes

The proportion of participants who intended to work towards a course certificate was low as was the proportion of verified participants who successfully completed one or more courses (achieved at least 70%). Although there were 29,636 enrolments over all courses of the SE MicroMasters and runs during the first one and a half years, the proportion of participants who intended to work towards a course certificate by enrolling in the verified enrolment track was only 2%. Of the verified participants in January - July 2019, less than half achieved at least 70% in the first course of the UQx SE MicroMasters series during the two runs in 2019 (ENGY0x: 42% and 39%) and only a modest majority achieved at least 70% in the second and third courses during this period, ranging between 52% - 64% (ENGY1x and ENGY2x), Table 2. The fourth course experienced better results with 70% and 92% of verified participants achieving at least 70%, probably due, in part, to some participants having worked through the earlier courses. Nearly 16% of all verified participants enrolled during January 2019 – July 2019, did not attempt any of the assessment tasks, Table 2. This may be due, in part, to the edX marketing strategy of encouraging participants to enrol in the full MicroMasters series by offering a 10% discount. Some participants may have found themselves enrolled as a verified participant in more than one course. Another reason why some students may not have attempted one or more assessment items may have been the relatively short 12-week duration of the courses in Runs 1 and 2, 2019. In addition, the high 'pass mark' of 70% may have inhibited some participants attempting assessment tasks.

The number of participants who were eligible to receive a course certificate was low. During 15 January 2018 and 31 July 2019, 123 participants were eligible to receive a certificate in one course. However, only 14 participants were eligible to receive certificates in two courses, 9 participants were eligible to receive certificates in three courses and 12 participants were eligible to receive certificates in four courses (Table 3). These figures align with the disquieting observation by Reich & Ruipérez-Valiente that “the vast majority of MOOC learners never return after their first year” (2019, p. 130). Only eight participants (out of a total enrolment of 29,636), were eligible to receive an edX-UQx SE MicroMasters certificate since the UQx MicroMasters has been offered (Table 3). Not one participant has articulated to the on-campus program in one and a half years.

The low number of participants who successfully completed the UQx MicroMasters series over the one and half year period the series has been offered, does not augur well for articulation to the UQ on-campus MSE and boosting the enrolment numbers. The marketing aim of offering the UQx SE MicroMasters series to enhance on-campus enrolment numbers is not, at present, being fulfilled. It is noted that potential participants cannot obtain information on the assessment regime from the relevant edX websites until after they enrol. This means that some participants can enrol in the verified enrolment track and pay the course fee before they know that a UQx SE MicroMasters course has a pass mark of 70% and that they will be required to prepare an extended written assignment in English. It is therefore recommended that the assessment regime for a course be included on the MicroMasters series’ and the individual course’s ‘About’ pages.

Following the delivery of the two runs of the UQx SE MicroMasters series in 2019, modifications to the courses were implemented from 27 August 2019, with the aim of raising the quality of participants’ work and improving academic integrity (Table 6). Recommended changes for 2020 are also listed in Table 6.

Table 6: UQx Sustainable Energy MicroMasters: (i) Runs 1 and 2, 2019; (ii) Run 3, 2019 (changes shown in bold); (iii) Recommended changes for 2020 (shown in bold)

| Attributes | Jan – July 2019 | 27 Aug – Dec 2019 | Recommended |
|--|---|--|--|
| Number of courses | 4 + Capstone | 4 + Capstone | 4 courses only |
| Number of topics | 10 | 10 | 10 |
| Duration (weeks) | 12 | 14 | 14 |
| Effort (hours/week) | 10 - 12 | 10 - 12 | 10 - 12 |
| Pass mark (%) | 70 | 70 | 60 |
| Assessment regime of courses | 30% weekly quizzes 35% final quiz (all topics) 35% written paper, peer assessed | 10% weekly quizzes 40% quiz (all topics), timed 50% written paper, Turnitin , staff-marked | 10% weekly quizzes 40% quiz (all topics), timed & proctored 50% written paper, Turnitin, staff-marked |
| Assessment regime of capstone assessment | 30% timed & proctored exam 70% written paper, Turnitin, staffed-marked | 30% timed & proctored exam 70% written paper, Turnitin, staffed-marked | No capstone assessment |
| Scaffolding | Technical writing & referencing • Three written guides | Technical writing & referencing • Three written guides | Technical writing & referencing • Three written guides with videos • Other resources |

From 27 August 2019 (Run 3) and in all four courses:

- the duration of the courses was extended from 12 weeks to 14 weeks to allow time for participants to research and write their written assignment
- the written assignment was given more prominence with a weight of 50%, was required to be submitted to Turnitin and will be instructor-marked
- the final graded examination on all topics was given more weight (40%) and is timed.

The results of the study also point to the following recommendations. From 2020, it is recommended that:

- the capstone assessment be removed
- a description of the assessment regime should be included in the 'About' pages of the MicroMasters series and individual courses before participants are asked to pay
- additional scaffolding resources should be incorporated to support participants
- the timed final graded examination should also be a proctored examination in all courses
- given the academic integrity measures introduced from 27 August 2019 (Turnitin and instructor-marked written papers) and if the recommended proctored examination is introduced in each course in 2020, the 70% pass level could be lowered.

Fees

The academic integrity measures implemented from 27 August 2019, such as instructor-marked written papers in four courses rather than only in the final capstone assessment, require further resourcing which may affect fees. The current study showed that the UQx SE MicroMasters already had a relatively high fee compared to comparable edX MicroMasters, although the UQx SE MicroMasters was only \$245 (USD) higher than the Solar Energy Engineering MicroMasters offered by Delft University of Technology (Table 4). However, the study also showed that the UQx SE MicroMasters fees resulted in considerable fee differences between students enrolled in the full UQ on-campus MSE and those students who may articulate to the UQ on-campus MSE using the UQx SE MicroMasters series as credit (Table 5). Taking into account the additional resourcing requirements required for each course offered from 27 August 2019 and the fee differences between fully on-campus UQ students and articulating students from the UQx SE MicroMasters series, it is recommended that the UQx SE MicroMasters fees and credit pathway be reconsidered.

Conclusion

The UQx Sustainable Energy MicroMasters® series, with four courses and a capstone assessment, has been offered for over one and a half years through the edX platform as MOOC courses. The four MOOC courses replicated, as far as possible, the on-campus Part A1 courses of the UQ Master of Sustainable Energy. The first aim of delivering the UQx SE MicroMasters series, namely, to open the course to as many people around the world as possible for free has been met, with 29,636 enrolments into the MicroMasters series in the first one and a half years. However, the second aim, the marketing aim, of encouraging participants to articulate to the UQ on-campus MSE to boost enrolment numbers has still to be achieved. To raise participants' educational outcomes and academic integrity, the courses were revised in August 2019, including extending the course duration from 12 to 14 weeks, requiring written papers to be submitted to Turnitin and moving from peer-assessment to instructor-marking. It is recommended that from 2020 the assessment regime be described in the edX about pages before participants enrol, additional scaffolding be incorporated, the timed examination in all courses be proctored and the 70% pass mark be lowered. In addition, it is recommended that the MicroMasters series fees and the credit pathway to the on-campus MSE be reconsidered.

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