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MicroMasters: the pursuit of the Holy Grail in online learning

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Abstract

In the MOOC world new concepts hatch every month, trying to find the Holy Grail of online learning. Last year edX adopted the new MIT concept of a MicroMasters credential: a series of graduate level courses offered by top universities to advance their career. The credential is credit-eligible and can accelerate a Master's Degree if the learner is admitted.

Delft University of Technology (TU Delft) decided to join this new development after an extensive elaboration on TU Delft's online course design, educational and assessment policies, involvement of stakeholders inside and outside the organization and the underlying business model.

The aim of this paper is to describe the lessons learnt in this process (adoption, development and running of the MicroMaster), its implications on TU Delft's ambitions in open and online learning and the effect on campus programme admission and enrolment. This paper will focus on the Solar Energy Engineering MicroMasters, a programme of four MOOCs and a capstone project. Learners following the whole programme and successfully finish their exam receive a MicroMasters credential. Learners who apply to the Master of Science program Sustainable Energy Technology (SET) or the Master of Science program Electrical Engineering (track: Electrical Power Engineering) holding this credential, can send a formal ECTS waiver request to get accepted for part of the on campus Master Programme at TU Delft. Add the abstract you submitted here.

Keywords: MOOC, MicroMasters, open education, online education, accreditation, inverted admission, credits.

1. Introduction

In the area of Open Educational Resources, MOOCs were seen as a new way to expand access to education. However, empirical data indicates that the highest percentage of MOOC learners already have a high level of education (Rohs & Ganz, 2015). In fact, many Higher Educational Institutions identify as institutional strategy using MOOCs (1) for reputation / visibility reasons (e.g., student recruitment, marketing potential / reach new student), (2) as innovation area (e.g., improve quality of on campus offering, contribute to the transition to more flexible and online education, improve teaching), or (3) responding to the demands of learners and societies (Jansen, Schuwer, Teixeira & Aydin, 2015). Moreover, the necessity of having a sustainable business model is continuously forcing the MOOC providers to set clearly their product services in order to take competitive advantage. Besides this competition between MOOC providers, inside a specific provider we also

have institutions/people trying to have strong marketing campaigns of their courses so they can be the frontrunners in a specific topic. Within the scope of this MOOC context, edX created the MicroMasters credential, a series of Master’s-level credit-eligible courses which aim to help learners to advance their careers or/and may be applied to accelerate a Master’s Degree.

2. MicroMasters

The first MicroMasters was launched in October 2015 on the topic of Supply Chain Management (SCM), where learners could do fully online on the edX platform the equivalent of one semester and finish the master's degree on campus, without the need to attend the full course on campus (MIT News, 2016). This is seen by edX as an “inverted admissions” process because universities can gather more information about their learners when compared to the typical admission proceedings. Moreover, this product is also focused on learners who are only interested in pursuing a professional career, by doing only the different MOOCs of the MicroMasters programme.

This MIT MicroMasters is composed by five courses and a final capstone exam. The courses have a time effort of eight to ten hours per week and the duration can vary from 8 weeks to 11 weeks. MIT considered the first run as a successful experience with “over 127,000 students enrolled in at least one course and more than 7,000 have signed up for verified ID certificates in at least one course.” (MIT News, 2016). From more than 1,100 learners who finished all five courses, 622 succeed in the capstone exam, allowing them to apply to the master’s degree (MIT News, 2017). The full MicroMasters program of SCM costs \$1350 per learner.

After this first trial, in September 2016 edX launched 19 MicroMasters programmes from 14 universities (edX, 2016). One of these programmes was the International Hospitality Management (IHM) MicroMasters from The Hong Kong Polytechnic University, formed by four 6 week courses and a final comprehensive exam (Qiu, 2017). In June 16th 2017 IHM MicroMasters had 24,182 enrolments with 203 verified learners. The full MicroMasters program from IHM costs \$600 per learner.

Table 1: Comparison of two MicroMasters Programmes

	SCM (MIT)	IHM (Hong Kong PU)
Number of courses	5 MOOCs + 1 Proctored Exam	4 MOOCs + 1 Proctored Exam
Extension of MOOCs (weeks)	8 – 11 weeks	6 weeks
Average cost	\$225	\$120

From this two examples we can see that it is possible to find different approaches according to the institution. So how does it fit in TUDelft?

3. Open and Online Learning at TUDelft

In 2013 TU Delft started to offer online courses for a global population through its Massive Open Online Courses (MOOCs). In 2014 the TU Delft Extension School for Open and Online Education was launched. The programme has a mission to educate the world and improve education. The objectives are:

- to deliver high quality open & online education (O2E) to the world;
- to improve education; and
- to grow academic output

The portfolio of the Extension School consists of different types of courses and series of courses. The focus is on working professionals. This means shorter courses that are flexible, have a manageable workload per week next to their work and offer directly applicable knowledge or skills for their job.

To structure this, we defined different products:

- OpenCourseWare: course materials of our regular campus courses shared online with an open license.
- MOOCs: all the DelftX MOOCs offered via edX platform.
- Professional Education: online courses targeted at the working professional.
- Online Academic Courses: the online variants of regular campus courses.

The MicroMasters concept is a hybrid product, hard to fit into one of the products. It is identified as a MOOC, nonetheless the principles TU Delft defends in a MOOC (material released under an open license with no restricted areas to access to content or activities). In addition, it was important to provide a more supportive learning experience to the ID verified learners, similar to what we offer in our ProfEds and Academic Online Courses, since we were offering a program with the development of a learning community for ID verified learners in mind.

4. Initial results from TU Delft’s MicroMasters

In the process of moving forward with a MicroMasters, the decision was clear by defining it as a pilot. This way TU Delft has the opportunity to evaluate if it fits with the online programme goals. Since we are talking about a new and very specific product, a big number of stakeholders were involved in the process.

The Extension School has a dean and a director of education who are responsible for online education. They have a mandate to make decision regarding online education. Because the MicroMasters provide students with a weaver for campus courses, it has to go through all decision and approval processes for campus programmes. The biggest discussion was on the setup of the assessment: how to align the rules and regulations of the Examination Board with the flexible online learning experience we want to offer in our MOOCs. During the involvement of all stakeholders, it was decided to move forward with the Solar Energy Engineering (SEE) MicroMasters, which consists in 4 courses and 1 capstone project.

Looking at the 4 products offered by TU Delft, the MicroMaster could be considered as a combination of MOOC, but with a cohort area similar to what is offered in an Academic Online Course, since the learning experience aims to be more supportive for the ID verified learners. In a regular MOOC there is no distinction in the way we address the audit learners and the ID verified learners. Another relevant aspect for the business model of the MicroMasters is the inverted admission process for campus course. Due to this fact and the extra online support given by the course team, both considered as an added value to the product, the program of SEE costs, in total, \$1,400 per learner. As comparison, EU students pay 2,000 euro tuition fee per year, while non-EU students pay 15,000 euro per year.

Table 2: Comparison of the previous MicroMasters Programme, with TU Delft

	SCM (MIT)	IHM (Hong Kong PU)	SEE (TUDelft)
Number of courses	5 MOOCs + 1 Proctored Exam	4 MOOCs + 1 Proctored Exam	4 MOOCs + 1 Project capstone
Extension of MOOCs (weeks)	8 – 11 weeks	6 weeks	11 weeks

Average cost	\$225	\$120	\$280
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Once again we see different approaches in the three institutions. In our case, the decisions which led to these differences were mainly to align with what we offer in our campus course. Thus, this had a strong impact in the way the course design was set.

4.1 Course Design

At TU Delft, there are two major principles when we are creating our MOOCs

- The content should be released under a CC-BY-NC-SA 4.0 license
- All learners should have the same learning experience

Our MicroMasters courses have a weekly structure, with several topics to study with video lectures and exercises. The exercises had a formative and summative approach, since they had multiple attempts for learners to practice and counted 15% for the final grade. The weekly exercises had only one deadline in the end of the course, although we recommended their completion on a weekly basis to help keep the pace.

With the introduction of the MicroMasters and the Professional Certificate, the edX platform started to have more options for differentiated content¹. As a result, we can find in edX courses areas which are restricted to the ID verified learners, such as specific videos, case studies, papers, textbooks, discussion forums, live events, proctored exam, and many more. This can also lead to differentiation in assessment, for instance, an activity can be set as peer-review for the audit learners and staff graded for the id verified learners, which means that in the first case the feedback is provided by the fellow students, while in the second case from the course team.

When designing the first SEE course the main differentiation aspect was the extra support provided to learners. There were 4 areas considered in this support, where only the ID verified learners had access: (1) exclusive discussion forums, (2) a webinar, (3) additional support before the final exam, (4) personalised e-mails to help learners in self-regulation.

From the initial survey the personalised e-mails and the support before the final exam were seen as the most important, followed by the webinar, and finally the exclusive discussion forums (Figure 1).

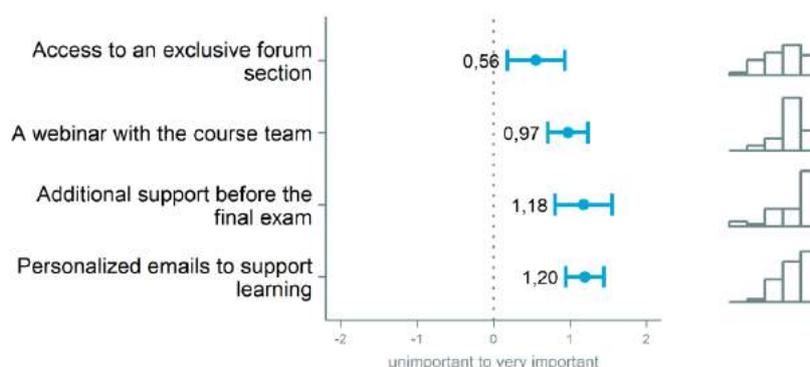


Figure 1: Importance of additional services. Means with 95% confidence intervals (N=36-46).

¹ For more information consult <http://edx.readthedocs.io/projects/edx-partner-course-staff/en/latest/index.html>

When it comes to the satisfaction of these services, the learners identified in the post-survey the webinar with the highest level, followed by the exclusive discussion forums and the additional support before the final exam. The service with the lowest level of satisfaction was the one identified as the most important in the pre-survey: personalised e-mails (Figure 2).

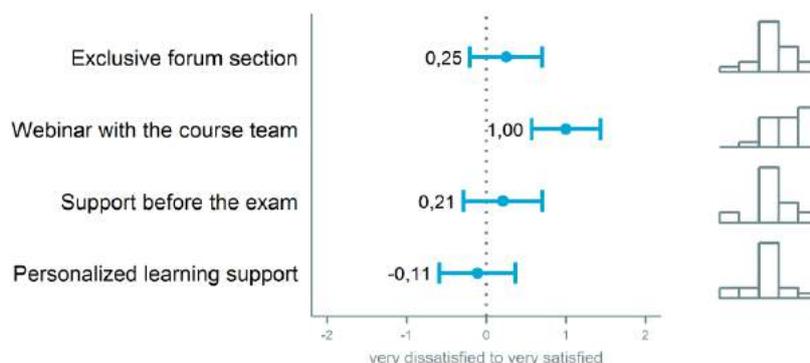
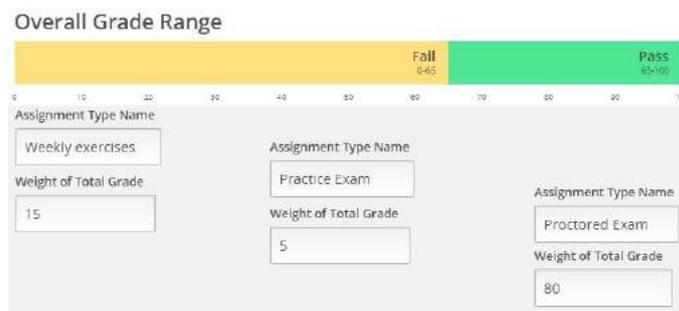


Figure 2: Satisfaction with additional services. Means with 95% confidence intervals (N=18-21).

Specifically, for the personalised e-mails, we created an e-moderation document guide where learners' activities and performance were monitored. Based on this e-moderation guide, specific e-mails were sent to learners in the end of weeks 1, 2, 6, and 9, based on their activity in the course. From the initial results we decided to provide more personalised emails: weeks 1 and 3 to give feedback about their activity inside the course (active/non-active), week 5 about their performance, week 7 about their progress, and week 9 about their performance on the practice exam.

Besides the support, another aspect covered was the assessment. In the development of online courses, TU Delft has the concern to have graded activities spread throughout the course, in order to help learners keep the pace in their learning activities. With the inverted admission process for campus, the faculty's examination board and the educational advisors had a role in this discussion of the MOOC course design, because it should fit the necessary requirements to get ECTS credits for campus. One of the requirements was the introduction of a proctored exam with more weight in the final grade. In order to match these requirements and the usual course design of our MOOCs, the final solution was to have the weekly assessed activities with 15% weight in final grade, 5% in the practice exam and 80% in the Proctored Exam (Picture 3), all with the same deadlines, with a passing grade of 65%. The course team also decided to restrict the proctored exam to the ID verified learners, giving the audit learners no access to a final assessed activity, which was criticized by some learners.



Picture 3: Grading scheme. Passing grade 65%. Weight: 15% weekly exercises, 5% practice exam, 80% proctored exam

Finally, the MicroMasters courses have the duration of 11 weeks, which is longer than a typical MOOC offered by TU Delft. In addition, the time effort per week is also higher, with the learners saying that, in average, they spent more than 10 hours, which, according to the pre-survey, is more than they intended (Figure 4). The decision of having a weight of 15% in the final grade for the weekly assessed activities seems to have been a reasonable choice due to the difference of hours available and the real time they needed. If the weekly graded activities had a bigger impact, probably the ID verified learners would have felt more pressure and, consequently, the number of drop-out would have been bigger. On the other hand, a higher weight for the weekly exercises, similar to what happens in the majority of TU Delft’s MOOCs, could have led to a more continuous learning process for our learners, with benefits in the final results.

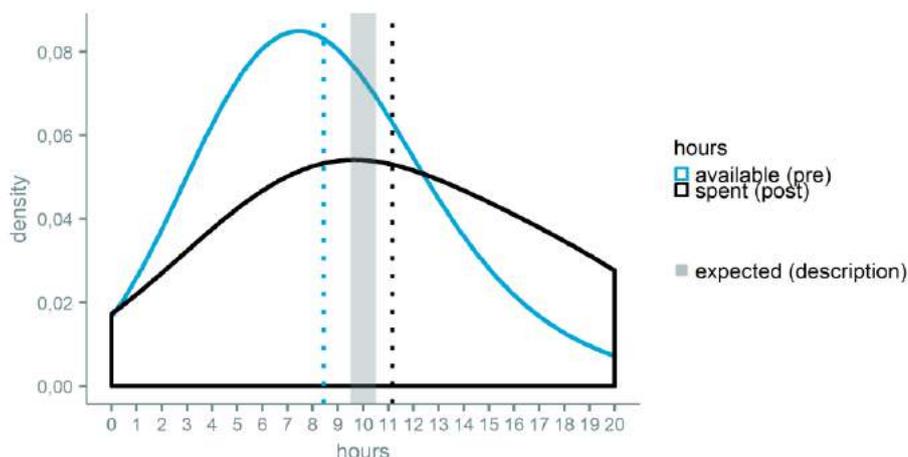


Figure 4: Comparison between hours available (N=1443, blue), hours spent (N=47, black) and time effort per week in the course description (grey).

With these changes in the course design, we can consider it as a hybrid model of the Online Academic Courses and MOOCs.

5. Conclusions

The first course of the MicroMasters programme has finished and the second one is about to start, still 9 months until we can judge the full potential of the programme.

When looking at the results of the first SEE course, we can consider it as a successful pilot, still with adjustments to do, in order to fine tune this product with the current products TU Delft offers.

Concerning the Course Design, the lessons learned allowed us to fine tune how we wanted to provide the necessary support during the course and do small adjustments in what is offered. The webinars will be available for all learners, which is more in line with the approach we have in all our MOOCs, and have the exam support section opened from the start, so that learners can have the necessary support from the beginning.

This was the first time we connected an online programme to a campus programme. Although the process wasn’t easy and smooth, we managed to succeed and get approval. This opens the way for more innovative initiatives connecting the online learners with campus programmes.

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