

Evaluation of a MOOC on “Sustainability in Everyday Life” - The teachers’ experiences

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Abstract

Universities all over the world have been developing Massive Online Open Courses, MOOCs. In this paper, we discuss our experiences during the production of and running the MOOC “Sustainability in everyday life”, that was developed at Chalmers University of Technology. The MOOC ran over a period of 7 weeks, from early June until late July, 2015 and attracted about 9000 participants. The purpose of this paper is (1) to describe and evaluate the further development and content production, and subsequent running of the course; and (2) to share our experiences of running a MOOC for the first time. An action research approach, that focuses on the experience of the teachers, was combined with information obtained from the course statistics, and from the course evaluations by the participants. This approach was used to identify the challenges that were met during the development of the course material and running the MOOC. The results show that, on the one hand, the major challenges were the planning of the content production process and the formulation of the assignments. On the other hand, although time consuming, the production of the video content was perceived as a nice activity. The course statistics and evaluations by the MOOC participants reflected the teachers’ experiences to some extent, and this information can be used to improve the MOOC. The role of MOOCs in higher education for sustainable development (HESD) is not yet clear. This paper demonstrates that developing a MOOC from scratch is a complex process, and adaptation of on-campus courses may be a feasible alternative, thus making already existing courses more widely available.

1 Introduction

Massive Open Online Courses (MOOCs) have been growing in popularity as an online learning environment over the past couple of years. MOOC participants can be of all ages, all educational backgrounds, and they have an interest to learn more about a topic outside of a formal university curriculum. The number of participants can be massive, in excess of 250 000 participants (EdX, 2016b), creating opportunities but also challenges for the teachers and other actors involved. Universities all over the world are trying to reap the benefits by, for instance, using MOOCs as a tool (1) to brand the institution; (2) to open up higher education to a global audience; and (3) to build up experience in developing, implementing and evaluating MOOCs (Janssen & Stöhr, 2015).

Chalmers University of Technology has recently also become active in the MOOC arena. So far, Chalmers has published four MOOCs on the EdX platform (EdX, 2016a) of which one is the MOOC that is in focus in this paper, called “Sustainability in Everyday Life” (SiEL). The SiEL MOOC was first run over a period of 7 weeks, from early June until late July of 2015, and close to 9000 people enrolled in the course before its start. The SiEL MOOC targeted the informed citizen, which in the EU is defined by the 15-year old student passing the final national tests in compulsory school. The learning outcomes aimed at developing the participants’ capacity to

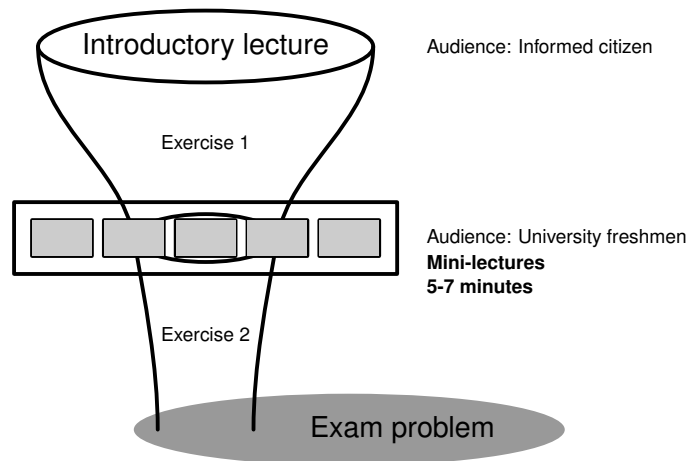


Figure 1: Addressing the topics in the SiEL MOOC: from an introduction to the topic, via more mini-lectures that discuss aspects in more detail, to the course exam (taken from Janssen, Nyström Claesson, and Lindqvist (2016))

appreciate the complexity of sustainability in everyday life by developing skills such as systems thinking and critical reflection on the information flow in the media. Five topics were identified that are frequently addressed in the media and are at the forefront of research related to sustainable development. These topics were chemicals, climate, energy, food and globalization, and they were used as the main themes around which the course was developed. All of these topics were taught as depicted in Figure 1. This started with a 15-minute lecture that provides an introduction to the topic. This was then followed by several so-called mini-lectures of 5 to 7 minutes which address several aspects that are part of the topic in more detail. Finally, the participants were asked to incorporate all of the five topics in answering the problem given in the course exam.

While we described our (the teachers’) experiences during the design and early development of the SiEL MOOC in Janssen, Nyström Claesson, and Lindqvist (2016), the purpose of this paper is (1) to describe and evaluate the further development and content production, and subsequent running of the course; and (2) to share our experiences of running a MOOC for the first time. The paper continues with a literature review on the experiences of teachers in MOOCs and the role of MOOCs in higher education for sustainable development (HESD). This is followed by describing the applied evaluation methodology, the results and their discussion, and conclusions are made.

2 Literature review

The recent surge in the number of MOOCs launched on platforms like EdX, Coursera or Futurelearn has received a lot of attention. This attention has resulted in increased scrutiny of MOOCs regarding e.g. their academic creditability (Kolowich, 2013), educational value (Kellogg, 2013) and instructional design quality (Margaryan, Bianco, & Littlejohn, 2015). One of the topics that has not received a lot of attention is the role of the teachers and their motivations for engaging with MOOCs. Ross, Sinclair, Knox, Bayne, and Macleod (2014) showed that the presence and visibility of MOOC teachers is an important issue, and that paying attention to the complexity of the teacher’s experience and identity may determine the success of MOOCs as an educational format. Stöhr, Eriksson, and Adawi (2015) found that, among others, experimentation with something new and innovative, and teaching a MOOC as contributing to their professional development were motivations of the MOOC teachers involved at Chalmers University of Technology.

Implications of MOOCs on higher education were discussed by Yuan and Powell (2013). They argue for establishing an autonomous business unit in order to make an appropriate response to the emergence of online teaching innovations such as MOOCs. Jacoby (2014) reviewed the disruptive potential of MOOCs and she concludes that the impact of MOOCs on higher education will be

significant via changes in definitions of completion, pedagogical approaches, delivery methods, certification, and business models. Studies in an American context also focus on the cost of higher education and tuition fees. The cost factor may play a big role in changes in on-campus education, and may help to alleviate related problems such as unsustainable costs and unmanageable student debt (Dennis, 2012; Billington & Fronmueller, 2013).

There is a significant body of work on higher education for sustainable development (HESD) that focuses on, among others, the development of competencies for sustainable development (Barth, Godemann, Rieckmann, & Stoltenberg, 2007) and their integration in higher education (Lambrechts, Mulà, Ceulemans, Molderez, & Gaeremynck, 2013), and learning outcomes of education for sustainable development (Svanström, Lozano-García, & Rowe, 2008). However, to the knowledge of the authors, there has been little work done on the role of MOOCs in HESD, or on their contribution to HESD. Zhan et al. (2015) provide a content analysis of sustainability education in MOOCs based on 51 courses. These MOOCs provided mainly introductory-level courses without prerequisites. Some of the main topics identified were energy, natural resources, ethics and climate change. Videos and discussion forums were mostly used for the teaching, and forums regarding lecture reflection were popular. Nevertheless, it remains unclear how and to what extent MOOCs may contribute to HESD.

3 Research method

A mixed method approach (Johnson & Onwuegbuzie, 2004) was taken to describe our (the teachers') experiences and to evaluate the content production for and running of the SiEL MOOC. An action research approach, that focuses on the experience of the teachers, was combined with an analysis of the information obtained from the course statistics (quantitative), and from the course evaluations by the participants (quantitative and qualitative).

Action research is grounded in experience, and is action-oriented and participative (Reason & Bradbury, 2001). Furthermore, Baskerville and Myers (2004) argue that action researchers need to be participant observers, and that a collaborative team is involved in reasoning, action formulation, and action taking. In our previous paper about this MOOC (Janssen et al., 2016), we also took an action research approach in order to share our first experiences regarding the MOOC's design and early development, and to identify our role(s) and its features during the course design and early development. We chose to use the action research approach again because, besides being the designers of its concept, we were all involved in the further development of, content production for, and running, the SiEL MOOC.

The goal of using the mixed method approach is to strengthen the results obtained from the action research with both additional quantitative information, such as learning analytics data, and qualitative information, such as the course evaluations by the participants. This may provide a deeper understanding of our experiences and how these correspond to the experiences of the MOOC participants. This does not mean that one methodology can explain the results of the other. When the results from different approaches converge they confirm each other, and when they diverge they highlight areas that need alternative and richer explanations.

4 Results & discussion

4.1 Video production

Four types of videos that were part of the teaching material were recorded: (1) the introductory lectures and (2) mini-lectures for each of the five main topics (see Figure 1); (3) additional videos that contained introductory material to the MOOC in general, and further background material to the five topics; (4) update videos in which we addressed topics that were discussed on the course forum or in the popular media related to sustainability. In total, 51 videos with a total length of close to 6.5 hours were recorded.

Table 1: Number, length and complete views of the videos per topic in the MOOC

Topic and kind of video	Number of videos	Average video length	Total video length	Average video completion
<i>Introduction</i>				
Welcome	1		3 min 2 s	81.0 %
Introductory mini-lectures	6	5 min 34 s	33 min 24 s	71.8 %
<i>Energy</i>				
Introductory lecture	1		14 min 39 s	54.6 %
Mini-lectures	4	8 min 21 s	33 min 24 s	73.6 %
Background videos	1		5 min 39 s	79.8 %
<i>Globalization</i>				
Introductory lecture	1		15 min 49 s	63.5 %
Mini-lectures	6	8 min 20 s	49 min 57 s	76.0 %
Background videos	2	8 min 19 s	16 min 38 s	74.1 %
<i>Climate</i>				
Introductory lecture	1		13 min 10 s	68.3 %
Mini-lectures	6	5 min 57 s	35 min 41 s	69.8 %
Background videos	1		6 min 6 s	80.8 %
<i>Chemicals</i>				
Introductory lecture	1		16 min 16 s	63.4 %
Mini-lectures	5	7 min 48 s	39 min 2 s	73.8 %
Background videos	3	7 min 1 s	21 min 3 s	72.2 %
<i>Food</i>				
Introductory lecture	1		15 min 6 s	62.8 %
Mini-lectures	4	6 min 29 s	25 min 57 s	67.9 %
Background videos	1		8 min 58 s	80.9 %

4.1.1 First experience: The teaser video

Our (the teachers, and the first two authors of this paper) first major experience with the production of video content was the production of the so-called teaser video. This is a promotional video whose goals are to introduce the MOOC before its start and to attract participants. Based on our own ideas and on the ideas of the production team, we wrote a script for a video of approx. 2.5 minutes. This was a very creative process which took several hours. We settled on a casual conversation among us with a competition element in it (Who of us has the most sustainability life style?) in order to introduce the different topics we would address in the MOOC. We were well prepared and the recording of the video went well. The teaser video was first shown at the launch of the MOOC, and was well received which gave us confidence for the recording of the other video material and a sense of pride.

4.1.2 Introductory lectures

We were able to engage colleagues at our department, and who are leaders in their fields of academic expertise, for the recording of all of the introductory lectures. Two of these lectures were recorded with an audience on campus, an attempt to mimic the appearance of lectures such as those appearing on Ted. Two of them were recorded entirely on location, and one was recorded on location and in a studio. The average length of these lectures was 15 minutes (see Table 1). We discussed with them what we were going to address in more detail the mini-lectures related to their topic, but we did not give further instructions on how they should shape to their own lecture. The introductory lectures were well received by the MOOC participants. However, the completion rate for these lectures was lower than expected (from 55 % to 68 %, see Table 1). The length of these videos is most likely the main reason for this lower completion rate.

Table 2: Views and completion rates for update videos for all topics compared to total average number of views per video and completion rates during the same week

Topic	Update topic	Number of update views	Update completion rate	Total average number of views	Total average video completion
Energy				796	71.1 %
Globalization	Energy	606	77.7 %	390	73.9 %
Climate	Globalization	148	68.9 %	286	70.7 %
Chemicals	Climate	64	76.6 %	244	71.7 %
Food	Chemicals	38	81.6 %	226	69.2 %
	Food	31	66.7 %		
	Final update	22	71.0 %		

4.1.3 Mini-lectures and background videos

Most of the recording of the mini lectures was done in a sprint over a 3-week period. We tried to engage more of our colleagues in this production process, but we were not entirely successful with this. We gave them the opportunity to suggest a topic, and tried to give them a sense of ownership. This did not work well because we had probably not been communicating well enough what we were doing in the MOOC. We (the first two authors of this paper) recorded almost half of all the mini-lectures ourselves and all of the background videos, and divided the workload according to the topics of the videos. This increased our workload in the MOOC quite significantly. The first step in the production of the mini-lectures was writing the scripts for them, and finding material for producing slides to be shown in the mini-lectures. Depending on the topic, this could be a fast or slow process. For instance, preparing the script for a 6-minute mini-lecture on a lesser known topic took a full day, while preparing a 11-minute mini-lecture on a well-known topic took half a day. Preparing the scripts for the mini-lectures was a learning experience, both in doing it and topic-wise.

During the recording of the videos we used a teleprompter that displayed the script. This made the recording of the videos highly efficient because very few retakes had to be done. One drawback the use of a teleprompter may be that it becomes apparent that the lecturer is reading from it, or that the lecturer is not animated enough and the listener loses interest. This was commented on by MOOC participants in the post-survey.

The average length of the mini-lectures and background videos varied per topic, from 5.5 min to 8.5 min. There also was a large spread in the length of these videos, from 4 min to 14 min (see Table 1). Furthermore, the average rate of completion ranged from 70 % to 81 %, and was thus higher than for the introductory lectures, except for the case of the climate topic. This may again be explained by the length of the videos.

4.1.4 Update videos

We continued to produce content after the MOOC had started. We recorded weekly update videos in which we addressed issues that were discussed in the forum. We monitored the forum for such issues, and we tried to get involved in some of the discussions. One example of such a discussion was the problems that the MOOC participants had with some of the assignments that we constructed (see section 4.2). In the weekly updates we also addressed topics that were in the popular media that week and that were related to sustainability or sustainable development. One example of such a topic was the court ruling in the Netherlands in which the government was ordered to increase its efforts to cut carbon emissions from 14 % to 25 % (Neslen, 2015).

One of the goals of the weekly update videos thus was to further discuss the course material. However, the MOOC participants did not take advantage of this to a great extent (see Table 2). Except for the update on the energy topic, the number of update views was much lower than the average number of views per video during that week, and continued to drop during the MOOC. The

Table 3: Number of submissions and correct solutions for all topics and assignment types. Introductory assignment is related to the introductory lecture, weekly assignment is related to the mini-lectures.

Topic and assignment	Number of submissions	% of correct solutions
<i>Energy</i>		
Introductory assignment v.1	755	63.4
Introductory assignment v.2	425	84.0
Weekly assignment v.1	538	29.9
Weekly assignment v.2	357	81.0
<i>Globalisation</i>		
Introductory assignment	466	74.9
Weekly assignment	416	77.4
<i>Climate</i>		
Introductory assignment	396	84.6
Weekly assignment	186	53.1
<i>Chemicals</i>		
Introductory assignment	352	93.5
Weekly assignment	353	94.3
<i>Food</i>		
Introductory assignment	327	83.5
Weekly assignment	312	83.7

completion rate was however similar to the completion rate of the other videos. This trend may question the pedagogical value of the update videos that we recorded.

4.2 Quizzes, assignments and exam

For all topics we constructed assignments linked to the introductory lecture, and assignments based on the material discussed in the mini-lectures. Furthermore, we made a set of quizzes for each of the mini-lectures. All of the assignments and quizzes were graded. The quality of the first quizzes and assignments that we constructed unfortunately suffered from the amount of time we had available to invest in them. This was to some extent caused by the extra amount of time we had to invest in preparing and recording the mini-lectures and background videos (see section 4.1.3). We received a lot of criticism from MOOC participants on the forum about these assignments. Especially the introductory and weekly assignment for the energy topic were heavily criticized. The former required doing some calculations which was not appreciated, while the latter was a qualitative assessment of several future energy scenarios in multiple-choice form. Unfortunately, the first versions of these assignments were not well formulated. We decided to redo these assignments which improved their quality. The number of correct solutions increased significantly for both, from 63 % to 84 % for the introductory energy assignment and from 30 % to 81 % for the weekly energy assignment (see Table 3). For the weekly climate assignment we experienced technical difficulties with one of the questions (a drag-and-drop exercise) which resulted in a low percentage of correct solutions (53 %, see Table 4.2). After these problems during the first week of the MOOC, we engaged β -testers in order to improve the quality of the assignments. This resulted in the desired effect because the number of complaints on the forum decreased significantly and the percentage of correct solutions was high (see Table 3). Besides the help of the β -testers, we also quickly learned how to better formulate these assignments.

The last major production task was the construction of the exam. We had thought of creating a game before, but we abandoned this idea. Nevertheless, this idea was the inspiration for the exam we constructed. We asked the MOOC participants to construct two scenarios, one about a week in their everyday life, and one about a trip they would like to make. These scenarios needed to be constructed based on describing 5 activities, and finally they had to do an assessment of the sustainability of these scenarios. The results of this exercise were peer-assessed which was met

with mixed feelings. While there were some questions and complaints about it, the exam was quite well received despite a problem with the grading of the exam. Some MOOC participants were of the opinion that it was too much work, but others enjoyed working on the exam.

4.3 Post-survey of the course and reflection

The MOOC participants were asked to fill out a post-survey after the course had finished. In general, the results of this survey showed that the MOOC participants were positive about the course material. They particularly liked the choice of the topics and the videos that were produced. They were more critical of the ambiguous nature of some of the assignments (see section 4.2) and answers in the mini-lecture quizzes. This is also reflected in our own perception of the production of the course content. While time consuming, the production of the videos was a nice activity. The formulation of the quizzes and the assignments were more troublesome, but we were able to improve it by learning and by engaging β -testers. The use of peer assessment was met with mixed feelings, especially in the exam. The good qualitative feedback can be taken to improve certain course elements before a re-run.

Our general perception was that almost everything that we did in the development of this MOOC was something new for us, and that we were on a steep learning curve. Examples were the writing of the scripts for and the recording of the videos, and the formulation of the assignments. The support of the production team was crucial to cope with all this novelty. Finally, although the production process did not always proceed very smoothly, the experience to be part of the team of this MOOC was very rewarding and a great learning experience. One of the main lessons we learned as teachers in this MOOC was that planning is crucial in the production phase and that there needs to be room to be agile.

5 Conclusions

This paper describes and evaluates the development and content production, and running of the MOOC “Sustainability in Everyday Life” (SiEL) at Chalmers University of Technology. It is a follow-up on the paper by Janssen et al. (2016) on the design and early development of this MOOC, and examines the teachers’ perspective. The results show that, on the one hand, the major challenges were the planning of the content production process and the formulation of the assignments. On the other hand, although time consuming, the production of the video content was perceived as a nice activity. The course statistics and evaluations by the MOOC participants reflected the teachers’ experiences to some extent, and this information can be used to improve the MOOC.

The role of MOOCs in higher education for sustainable development (HESD) is not yet clear. Designing and developing a MOOC from scratch is however a highly complex and time consuming process, especially when many people are involved. This is demonstrated in this paper for the SiEL MOOC. The time and effort needed should be considered beforehand. Building on material from an on-campus course, or adapting an on-campus course to a MOOC format may be an alternative to reduce the complexity of the MOOC development process. Courses with a focus on sustainable development offered at institutions for higher education may thus become more available to the general public. Offering such courses in a MOOC format may also reduce educational costs and make higher education more affordable and thus reach more people.

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