MOOCs activities at EPFL

Center for Digital Education    March 15 2013

Pioneer on MOOCs in Europe, joined Coursera in July 2012 and EdX in February 2013. Its first MOOC in 2012 was a huge success, three MOOCs are running in Spring 2013 and several more are in the pipeline. This document provides background information on MOOCs, why EPFL is strongly engaged, what is EPFL’s approach and what are the first results. This document will be updated every trimester.

What is a MOOC?

The simplest answer is to watch online MOOCs from Udacity, Coursera or EdX. The common format is a course of 7 weeks. A standard 2 hours lecture becomes in the online format a set of 5 to 10 videos of 10-12 minutes each. Students initially see the teacher introduce the topic, but soon thereafter the focus shifts on what the teacher writes. Instead of blackboards tablet computers are used, on which the professor writes on an empty or pre-filled screen, while speaking. Manual annotation of contents avoids the drowsy effect of Powerpoint. Some videos feature embedded quizzes: the video stops, students reply and the video continues.

The second major component of MOOCs is assignments. Students have to upload assignments every week, which in some of the most popular MOOCs can be very challenging. MOOCs are demanding for students: participants have to devote at least half a day per week to keep the pace of weekly assignments. Assignments are evaluated and graded automatically when possible, for instance, when students have to complete pieces of programming code. As an alternative, the evaluation is crowd-sourced to the students themselves, asking them to grade their peers. Experience shows that peer grading is quite reliable if the teacher provides the participants with clear evaluation criteria.

The third component of MOOCs is a forum, which adds a social dimension. Students massively post questions in the forums. They vote for questions they consider important, so that other students and even the teachers answer these questions with high priority. The possibility to vote about the posts also automatically takes care of quality insurance since off-topic posts are voted down.

How are MOOCs different from YouTube or Wikipedia?

The granularity of MOOCs is different from approaches such as Wikipedia or Khan Academy: on these platforms a single concept or idea constitutes a unit of content, while in MOOC the authors structure a large number of concepts, techniques and theories into a consistent whole in order to achieve a well-defined learning objective. The difference to other online learning platforms such as YouTube or iTunes-University is that a MOOC includes the whole learning experience, not only videos of recorded lectures: exercises or assignments play a central role as complement to the videos. A single MOOC corresponds to a course at a university: currently, there is no program or degree offered that is based on MOOCs, but this may change rapidly.
What is a cMOOC and an xMOOC?

The term ‘mooc’ was coined by G. Siemens 3 years before the rise of the successful MOOCs initiated by different professors of Stanford University. The philosophy underlying these first MOOCs was very different from today’s mainstream MOOCs: they were intended as a social platform for collaboratively sharing and building knowledge within a community of people. This approach is very interesting from a pedagogical perspective, but had only moderate success. In contrast, the more recent successful MOOCs rely on a more traditional model of education, based on lectures. Some authors use the term cMOOC to refer to the collaborative platforms and xMOOC to refer to the massive lecturing platforms.

Why all the excitement?

The huge interest of media is primarily due to the very large number of participants the first MOOCs could report. Several of them surpassed 100’000 registrations, which was a completely new phenomenon in online education. In addition, the idea of offering courses for free and sharing them with large numbers of students emerged exactly at a time where the US university system finds itself in a big crisis caused by bloating tuition fees and the resulting significant education debt problems. The possibility of making university education more efficient and less expensive is fuelling the fantasy of policy makers in education governance and at the same time creating profound worries for university administration concerning their business model.

Why now?

At a first glance, MOOCs are not very different from earlier forms of on-line education. They combine videos, quizzes, forums, assignments and web resources. Why do they reach a much wider audience than any of their predecessors? Are they actually different or have times simply changed? Probably both.

Did you ever consider how easy it has been to ban smoke in public spaces, while it would have simply been impossible a decade earlier? Some initiatives succeed where previous attempts failed simply because times have changed and people were ready for change. For MOOCs, several contextual factors may explain their massive impact. The financial difficulties of American universities are one of them. The ubiquity of new information technologies is another one: when the virtual universities failed in the early 2000, Internet access and laptops were widespread, but far less available and performing than today. The technological changes resulted also in an increased (hyper-) connectivity among people and of people with information and knowledge with resulting behavioural and cultural changes that affect in particular the younger generations. It is easier today to find a phone number on the web than in paper phonebooks and kids sitting in neighbouring rooms prefer to communicate through electronic media rather than through physical interaction.

However, it would be a mistake to explain the MOOCs phenomenon only by contextual factors. We understand the intrinsic novelty of MOOCs as the synthesis between two antagonist visions of learning. MOOCs rose at
the collision point between a traditional model of university courses and the so-called Web 2.0 culture. Some ideas characterizing MOOCs clearly belong to the Web culture: free knowledge access, segmenting videos in slices of 10 minutes, like in YouTube, the rich social interactions in forums, the freedom to work anywhere, the use of crowd-sourcing, business models that multiply very small revenues by large number of customers, etc. On the other hand, MOOCs adopt a very traditional model of education: the priority is given to the quality of contents by choosing top professors from top universities; the main pedagogical approach is lecturing followed by exercises (there are few constructivist approaches); the MOOCs impose a strict time structure, with grades and certificates. Students who do not deliver assignments on time are out, in other words, MOOCs are not simply "cool" things. Most of them are demanding and highly structured. It may be that this new combination explains the success. For instance, the weekly time structure leaves some freedom to learners to manage their time but, by synchronizing large numbers of learners, enables the crucial social effects, virtually in the forums and physically in study groups. Marathon runners know that it is easier to suffer with thousands of other people than suffering alone.

Do students get certificates?

Yes, students can get a certificate, sometimes they also pay for it. The current certificates are not based on the reliable identification of the students that performed the MOOCs, a fact that is clearly stated on the document, and are thus of limited value. They are nevertheless surprisingly highly demanded. MOOCs platform providers are starting to offer proctored exams in testing centres (e.g. Pearson, ACE) as well as solutions that rely on web-based identification of students (e.g. using webcams and keystroke identification).

Our experience is that cheating occurs massively on MOOCs. Participants often post solutions to assignments on other websites. In the SCALA MOOC, the level of plagiarism reached almost 20%. EPFL will explore the possibility to partner with other universities to develop solutions, such as mutually organising exams for the other universities’ students.

Why does EPFL engage in MOOCs?

The EPFL MOOCs initiative aims at developing on-line courses with the following goals:

1) to enhance the reputation of EPFL as world class teaching institution;
2) to develop new responses to EPFL educational needs, especially for large classes;
3) to make EPFL knowledge accessible to anyone with Internet access, especially French speaking countries in Africa;
4) to have a strong presence of European culture in the MOOCs landscape;
5) to share teaching resources across the various sites of EPFL (Neuchatel, Valais, RAK,...);
6) to gain experience in new forms of online education and blended campus classes.

These goals lead us to define 5 categories of MOOCs
“USP MOOCs” (Unique Selling Point) primarily address goal 1 by teaching topics where the EPFL author has such a unique reputation or approach that one may expect students from all over the world to choose the EPFL MOOC rather than a MOOC on the same topic from another institution.

“InsideMOOCs” primarily address our internal needs (goal 2, 3 and 4). The massive increase of freshmen in EPFL-wide compulsory courses is an example of such internal needs. These MOOCs are designed for inside needs, but should be open worldwide. Another example of internal needs is the optimal sharing of teaching resources across EPFL sites (Neuchatel, Valais, RAK).

“RescifMOOCs” primarily address goal 3. These tools will be (initially) proposed to the RESCIF network and developed with our partners from the North (e.g. ENS de Lyon, UC Louvain, Poly Montréal) and those of the South (e.g. Poly Yaoundé, Poly Dakar, 2iE Ouagadougou, etc).

“Cont’MOOCs” are MOOCs proposed for continued education. EPFL pursues this strategy in particular in the context of EuroTech, a network of 4 European science and technology universities.

“CitizenMOOCs” are tools for communicating scientific knowledge to broad audiences in an interactive way. The audience consists typically of people who would watch a 2 hours documentary on the topic, but are not willing to spend 7 hours per week during 7 weeks as for the typical xMOOCs.

Where does EPFL stand now?

EPFL launched its first MOOC in September 2012. Its topic was the programming language SCALA, that extends JAVA and is popular in Web 2.0 companies, but is currently taught in very few universities, if at all. No less than 50'000 students registered and, more importantly, 10'000 completed this demanding course, which constitutes the highest retention rate among all MOOCs on the Coursera platform so far. This led to interesting findings reported hereafter.

Three new MOOCs started in February 2013, including the first in French on the Coursera platform, and 7 more are scheduled for fall 2013, including 4 in French.

By having taken the lead in Europe EPFL received a lot of attention from other universities, as well as from many companies and organizations interested in education. Several research projects on MOOCs have already been started at EPFL. In order to consolidate its technical activities in the context of MOOCs, EPFL will inaugurate a new Center for Digital Education in April 2013.

Do students appreciate MOOCs?

We can report first experiences from the SCALA course given in fall 2012. Among the students who completed the course, about 50 were from EPFL. Since our semesters are 14 weeks long while MOOCs are about 7 weeks, the local students where taught another 7 weeks in traditional format. At the end, Prof. Odersky who was teaching the course asked the students about their preference on the course format if it were given again. As illustrated below, the online version was largely favoured over the face-to-face course.
We don’t have yet the data for the 3 MOOCs currently running, but informal discussions with students show us that they are not positive BEFORE the MOOC, fearing an increase of their workload or reduced contact with the professors. Our perception is that these fears vanish rapidly.

Preferences expressed by EPFL students from the SCALA MOOC (data from M. Odersky and H. Miller)

Who are the students?

MOOCs blur the distinction between undergraduate education and postgraduate and continuing education. In the case of the SCALA MOOC that was designed for EPFL undergraduate students, the course was followed by 50% of graduates, as illustrated in the figure below. This pattern may be quite specific to the skills provided by that MOOC, however, there is evidence that MOOCs due to their flexibility are in particular interesting for students that are in work life.

Participants to the SCALA MOOC (data from M. Odersky and H. Miller)

The majority of the students come from USA and from Europe, with a relatively high participation from Eastern Europe. The EPFL goal of opening this new form of education to students from African countries remains a challenge.
The end of EPFL lectures?

EPFL does not intend to replace all courses by MOOCs, but to introduce MOOCs where they are relevant and provide added value. For example, courses that rely on students’ hands-on experience with physical equipment will not be easily replaced by MOOCs. This is also the case for some advanced courses, with low numbers of students but high requirements in terms of working on complex projects or case studies. Also for courses in areas where the content is changing at a higher pace than MOOCs can be produced the format seems less suitable. Our current EPFL strategy is to move forward, gain experience and benefit from the best of the two worlds, MOOCs and traditional education.

No more contact with professors?

One goal of MOOCs is to increase the contact between our students and their professors, not to decrease it. MOOCs foster this by enabling “Flipped Classes”. Traditionally, students listen to their professor in lectures on campus and do exercises or study at home. This is inverted: MOOCs allow watching the lectures at home and have more interactive sessions with teachers on campus. Our first experience is that this increase of interactivity does not occur spontaneously. Teachers have to enforce that students watch the video before the contact hours. If they do, our short experience seem to indicate that students come better prepared to exercise sessions, which are will be conducted on campus with EPFL teaching assistants.

Are EPFL funds used to train students from other countries?

The effort that a professor invests in his lectures are beneficial to our students and can, without additional cost, be made available to students worldwide. This is slightly different for exercises or assignments. The EPFL students who participate to an EPFL MOOC benefit from a close follow-up from our teaching assistants. Since these teaching assistants have a high teaching load at EPFL, we can’t offer the same level of services to MOOC
participants who are not at EPFL. Typically, TA’s could for instance give individual feedback for the assignments uploaded by their 200 EPFL students but use peer grading for the 20'000 other MOOC participants.

If a MOOC is given to external students, without any EPFL students being involved, the support for the MOOC should not be provided through EPFL teaching assistants. However, experience shows that, among the students who complete the same MOOC before, many volunteer to become TA – for free – for the new edition of the course.

**Will MOOCs produce asocial students?**

MOOCs allow students to work at their own pace, to read what they need, etc. They support some individualisation of instruction that contributes to effectiveness. However, as on any online platform, life around MOOCs is highly social. Students participate massively in forums and help each other. Participants all over the world create spontaneous study groups by posting messages such as “If you study SCALA and live around Geneva, let’s meet at the Café de la Gare every Sunday at 16:00”. Currently, 50 EPFL students participate to study groups at the Rolex Learning Center. One of our first observations is that watching videos together generates very rich interactions in student groups, which would allow them to elaborate more deeply the information conveyed by the video.

**Are MOOCs easy to produce?**

Even if the course already exists and has been given for many years, turning it into a MOOC implies a huge amount of work for the teacher and his team. Recording videos while speaking to a computer is not trivial for teachers who are used to speak in front of an audience. Preparing assignments requires extremely careful design, because any ambiguity generates hundreds of questions or complains in forums. Finally, the teacher’s workload is increased by the need to reply to the forum messages (and to journalists). Therefore, we recommend to start a MOOC project if the course has already be given, if teaching material is ready and if the professor has a team available.

**Will MOOCs kill BOOKs?**

Experience is that, when a book is associated to a MOOC, its sales actually increase. This occurred both for digital versions and for paper versions of the book. If the electronic version of a book is sold for 20 CHF instead of 80, but to 20'000 students, it will still generate more revenue than most academic paper books.

**Why is EPFL on Coursera and EdX?**

Both platforms offer a great visibility worldwide. As a public university, we consider it better to be associated with more than a single partner. This diversity also broadens our experience. Actually, there are many other actors in the online education business and many of them are interested in collaborating with EPFL.
Who can join the Center for Digital Education

The center will first be a “MOOC Factory” for EPFL internal needs but many institutions, NGOs and companies have expressed their interest to benefit from the EPFL experience. The center will also conduct R&D on MOOCs. Initially, five EPFL labs will be associated to this research program and several companies have expressed their interest to collaborate on research projects.

The Center will offer institutions and corporate actors a range of possibilities for association with the center. Interested parties may contact Prof. P. Dillenbourg (pierre.dillenbourg@epfl.ch)