Chapter 11
MOOCs in Engineering Education:
First Practical Experiences from two MOOCs

Martin Ebner
Graz University of Technology, Austria

Alexei Scerbakov
Graz University of Technology, Austria

Michael Kopp
University of Graz, Austria

Kristina Neuböck
University of Graz, Austria

ABSTRACT

Massive Open Online Courses (MOOCs) are a phenomenon of these days. Therefore it seems just a consequent step to carry out research studies how MOOCs can be integrated best in our daily life. This work aims to describe first experiences from the implementation of two MOOCs on a new developed platform. Both courses are related to engineering education: one to physics and one to mechanics. First the concept as well as the development and then also the evaluation is pointed out. It can be concluded that there is potential for educational institutions, but also barriers which must be taken into account.

INTRODUCTION

Since the introduction of the World Wide Web the way we deal with learning and teaching content has changed arbitrarily. In the very first beginning back in the early 2000 so called Web Based Trainings and Learning Managements Systems (Helic et al, 2004) popped up with the idea to deliver educational content to the learners via a new distribution channel (Maurer, 1996). Students as well as teachers were able to download digital content and to communicate using different possibilities as discussion forums or chats. Some years later the term Web 2.0 described a new way how users deal with the WWW (O'Reilly, 2006). Weblogs, Wikis or even Social Networks allow us to interact with online content or other people directly. Stephen Downes (Downes, 2005) introduced E-Learning 2.0, describing the use of Web 2.0 tools for teaching and learning (Ebner, 2007). Since then the use of Weblogs (Farmer & Bartlett-Bragg, 2005), Wikis (Augar et al, 2004),

DOI: 10.4018/978-1-4666-8803-2.ch011

Podcasts (Towned, 2005) and Social Media (Ebner, 2013) in education became quite popular. Nowadays also the increase of mobile devices and fast (mobile) Internet access allows working with learning content nearly anytime and anywhere (Ally, 2007). Finally the access to digital learning content is getting more and more easier based on so called Open Educational Resources (Schaffert, 2010) as defined by the UNESCO (UNESCO & COL, 2011) in 2002.

Bearing in mind all these steps it becomes obvious that the connection of learners interested in a specific learning content might be from special interest. Siemens (2005) called this the idea of connectivism: A group of learners learn through online discussions and by using their personal learning environments in manifold ways. It follows the idea on the one side that learning and teaching situations occur through the connection of people and that on the other side the distribution of learning content is done from different sources (e.g. Weblogs of students). Following consequently this approach Siemens and his colleagues started a first online course in 2008 on trends and possibilities of learning with the Internet (McAulley et al, 2010). Due to the fact that more than thousand students attended the course, it was called a Massive Open Online Course. "Massive" because of the high number of students and "Open" because of his open nature – anyone can attend and any learning content is free available and useable. Just a couple of years later very famous universities like Stanford, Harvard or MIT attracted thousands of learners all over the world with their MOOCs, too (Carson & Schmidt, 2012). But there is an important difference between Siemen's course and such of these universities. As mentioned above Siemens based his idea on the learning approach of connectivism by connecting people and their personal tools. In contrast the courses of the universities offer an own developed platform with courses on them for the public. Nowadays we call courses according to Siemen's idea cMOOCs ("connectivism") and the others xMOOCs ("extended").

Table 1 points out the main differences between these two possibilities. Of course in practice the borders are not so explicit – for example an xMOOC has not to follow exclusively the behaviorism learning theory, there are also examples for a constructivist learning approach (Kukharenko, 2013). It must be seen as a first rough classification.

When a closer look is done it becomes quite clear, that for a traditional university with more a less typical face-to-face lectures a so called xMOOC fits more to their today's role. An xMOOC can be simplified described as a free accessible lecture done online. Due to the fact that the first xMOOCs attracted more than 100.000 students the term MOOC became very popular and many universities jumped onto it. Today there is a debate if such MOOCs are able to change universities' roles or if they even revolutionize Higher Education.

Based on those developments the University of Graz and Graz University of Technology started a project on developing a MOOC-platform in September 2013. The focus is strongly related to offer xMOOCs because of the low budget (providing

Table 1. Difference between cMOOCs and xMOOCs

	cMOOC	xMOOC
Learning Theory	Connectivism	Behaviorism
Learning Content	Emerging, teacher offers topic and students bring in	Structured, brought in by a lecturer
Communication	Different possibilities (social media, video conferencing)	Discussion forum (often not moderated)
Learning Outcome	Completely open, highly self-regulated	Self-Assessment, based on curriculum
Role of Teacher	Coach, facilitator	Instructor