

Chapter 11

Project-Based MOOC: Enhancing Knowledge Construction and Motivation to Learn

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ABSTRACT

This chapter describes a project-based massive open online course (MOOC) in nanotechnology and nanosensors that was offered in two languages: English and Arabic. A mixed methods research was conducted to examine the role of project-based learning in the process of knowledge construction and motivation to learn a MOOC. The study compared between three groups of science and engineering students: English MOOCers, Arabic MOOCers, and university students. Findings indicated positive attitudes about learning in a project-based MOOC, especially with relation to gaining work experience. Findings also indicated that in a project-based setting, MOOC participants were mostly driven by a desire to establish connections with peers, whereas university students were mostly motivated by their interest in the subject matter. Arabic MOOCers, who were less successful in solving ill-defined problems, narrowed the gap, and at the end of the course received similar grades in the final project.

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INTRODUCTION

In recent years, there is a growing drive among higher education institutions to develop distance education programs, in general (Barak, 2012) and massive open online courses (MOOCs) in specific (Barak, Watted & Hasick, 2016; Kizilcec, & Schneider, 2015). MOOCs are web-based courses, designed to provide free and accessible high-quality education to the masses (Barak et al., 2016; Cormier & Siemens, 2010). The term was first coined in 2008 to describe a course, titled: “Connectivism and Connective Knowledge”, offered online for free by the University of Manitoba (Cormier & Siemens, 2010). MOOCs are free courses, open to all participants from all ages and countries. They do not require preliminary qualifications or prerequisite courses. Most MOOCs include short segments of video lectures arranged according to the course topics. They also include an e-book or related articles, discussion forums, and learning tasks that participants are required to submit. Because masses of participants (thousands or even tenths of thousands) take these courses, the learning tasks are either automatically graded (e.g. closed-ended quizzes) or peer-graded (e.g. open-ended essays, written assignments).

In 2012, new MOOC platforms were developed, utilizing advanced information and communication technologies and automated computing to support the large number of participants who sought interest in taking the open courses. While in May 2012, there were 26 MOOCs, offered on various platforms, in January 2016, their number reached more than 4,500. The largest MOOC platforms are Coursera, Udacity, edX, and FutureLearn, all founded in 2012. Coursera and Udacity emerged from Stanford University, edX was founded by Harvard University and MIT, and FutureLearn is a private company owned by the UK’s Open University. Today, Coursera platform offers more than 1500 courses in a variety of subject matter areas, from humanities to sciences and engineering (see <https://www.coursera.org>).

Following this trend, the Technion – Israel Institute of Technology, launched in 2014 a course on nanotechnology and nanosensors in a MOOC format, which is running until this day. The course was developed by Prof. Hossam Haick, from the Faculty of Chemical Engineering, a renowned researcher in the field of nanotechnology. The nanotechnology and nanosensors course was the world’s first MOOC in this unique field, and the first that was simultaneously delivered in two languages: English and Arabic. In fact, it was the first MOOC delivered in the Arabic language. Our goal was twofold. First, to reach out to a wide range of people worldwide, even those who live in countries with no diplomatic relations with Israel. Second, to provide an example - a model for promoting sociocultural learning in the context of engineering education, by integrating project-based learning, multicultural teamwork, and peer assessment into the curriculum.

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