

Design and development of OER-based MOOCs course initiative

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Sheng Hung Chung

Wawasan Open University, Malaysia

Email: shchung@wou.edu.my

Ean Teng Khor

Wawasan Open University, Malaysia

Abstract

Massive Online Open Courses (MOOCs) is increasingly being used in open distance institutions and covers all form of learning at scale. This study proposed the research for the design and development of open access course delivery in MOOC environment using OER-based computing course namely Programming Fundamentals with Java in Open Distance Learning (ODL) mode. The OER-based course was previously offered to distance learners from remote regional centers namely: Kuala Lumpur, Penang, Johor Bahru, Kuching, Ipoh, Kota Bahru during the three semesters with course span from Jan 2013 – July 2013, July 2013 – December 2013 and Jan 2014 – July 2014. The proposed MOOC's study focuses on the OER-based course materials which emphasize the content delivery of derived modules within the timeframe and to achieve online facilitation study through the reuse of OER and sharing learning objects in an open access environment. The initiative is proposed from the mainstream of MOOCs as referred to as xMOOCs in providing learning environment for the learners who seek to pursue fundamental of programming skills in Java and introduction to computer technology. The initiative focuses on more exploratory assessment methods such as simulations or mini projects to facilitate learner's learning path in dealing with specific problem-solving scenarios or case studies and also highlights the engagement between facilitators-learners and between learners themselves to promote peer learning.

Keywords: MOOCs, OER, Open Access Course Delivery

Introduction

As the open access learning technology has seen tremendous and phenomenal growth in recent years and with integration of more learning modes in the world of higher education, this paper present the concept study of design and development of OER-based MOOCs course. MOOCs initiative has been considered as an important role in the landscape of higher education. According to Selingo (2013), the idea of offering MOOCs to thousands of students has become the latest and feasible way to deliver courses in higher education. The MOOCs initiatives are driven and promoted by education-technology entrepreneurs to use MOOCs format aims to fulfil four tasks namely to reduce costs, improve learning, increase access and produce revenue for institutions. In the recommendations endorsed by the World OER Congress in the OER Paris Declaration (2012), the use of OER-

based course delivery in MOOCs format attempt to fulfil three recommendations endorsed in the declaration namely (i) to promote awareness and use of OER; (ii) improve media and information literacy (iii) develop tools to facilitate access to OER. This paper presents the development concept of OER-based MOOCs initiative in ODL environment and proposed the use of OER-based course (TCC121/05 Programming Fundamentals with Java) as an example in reducing the cost for higher education. The design and domain control proposed in preparation of the OER-based MOOCs initiative are described and

MOOCs Delivery in Various Institutions

Massive Open Online Courses (MOOCs) is defined as a new form of online teaching or classes that are taught online to large numbers of students, with minimal involvement by the MOOCs facilitators (Chronicle of Higher Education, 2014). MOOCs is defined as a learning activity to immense online classes that are generally available freely for anyone to engage for a period of time (Carmen, 2014). MOOCs are delivered through short video lectures and assessments that are graded either by Learning Systems (LS) or by peer assessment. MOOCs support large capacity of learners within a class via the support of MOOCs technology providers such as edX, Coursera, Udacity, Khan Academy and Udemy. In this section, we discuss the MOOCs implementation undertaken by various institutions and MOOCs exemplary projects planned by respective institutions in distance learning. The following **Table 1** illustrates MOOCs courses offered and presented by different entities representing higher education in Asia regions.

Country	Participating Institutions	MOOCs Platform
Malaysia	Taylor's University	OpenLearning
Japan	Kyoto University	edX
	The University of Tokyo	Coursera
Korea	Seoul University	edX
	Korea Advanced Institute of Science and Technology	Coursera
Singapore	Nanyang Technological University	Coursera
	National University of Singapore	Coursera
China	South China University of Technology (SCUT)	Open2study
	The Chinese University of Hong Kong	Coursera
	Shanghai Jiao Tong University	Coursera
	Fudan University	Coursera
	Peking University	Coursera
	The Hong Kong University of Science and Technology	Coursera
	Tsinghua University Beijing	edX

Table 1 MOOCs course offered by institutions in Asia regions

OER-based MOOCs Design and Development

In this section, this study attempt to analyze and explain the design and development of OER-based MOOCs initiative based on WOU computing course namely *TCC121/05 Programming Fundamentals with Java*. This section also covers the scope of Java computing course in composing a detailed MOOC syllabus and structure. The OER course delivery since 2009 is highlighted and discussed in the following **Table 2**:

Course Presentation History	
Date of first presentation: (semester & year)	<ul style="list-style-type: none"> Semester 1/2009
Course Revision History	
No. of revisions since first developed	<ul style="list-style-type: none"> 1st revision (Semester 1/2010) 2nd revision (Semester 1/2012) (re-write as OER materials to be presented in January 2013)
Explanatory notes on development/presentation/ last revision	<ul style="list-style-type: none"> The re-write that has been planned for January 2013 semester has made the course material up-to-date with integration of OER WikiBooks. The units are updated with the latest Java programming software (JDK 7, JCreator LE v.5.00). The re-write course includes more updated hands-on programming activities in Unit 1, 2, 3, 4 and 5.

Table 2 TCC121/05 Course Presentation History

The following **Table 3** illustrates the OER courses highlighted during three presentation in ODL mode span from Semester 1 (January 2013 – July 2013), Semester 2 (July 2013 – December 2013) and Semester 1 (January 2014 – July 2014). During these three consecutives semesters course delivery, an individual mini project which consists of simulation of Java program development and application is introduced to test the student's understanding in the concept of exception handling, validation of input and flow chart control in Java programs. The external OER resources were also provided in timely manner updated in *WawasanLearn* LMS as additional study resources related to Java.

OER Course Progress	Course Presentation Highlights
Semester 1/2013 • The course has been conducted smoothly and the course materials Semester 2/2013 were sent to the students on time. Semester 1/2014	<ul style="list-style-type: none"> No major problems were reported by students or tutors. The students satisfied with the supplementary study aids made available on LMS and the learner supports given. All two TMAs were available at start of semester. Software/compiler JCreator and JDK 7.0 were ready and available in the labs as well as LMS. CC, tutors have been consistent and gave clear comments for student feedback in LMS and provide up-to-date sourcecode/software to support students' learning in the course.

Report on LMS activities	Tutors' and students' progress were monitored in the LMS in these three consecutive semesters and it was found that they participated quite actively in the forum discussion. Student posted the questions related to the TMAs questions and mini projects. The CC and tutors guided the students by providing useful links in the extra OER resources and actively involved in mini projects coaching and development.		
Assessments (Tutor Marked Assignments and Examination)	TMA1 (25%)	TMA 2 (25%) (Mini Project)	Final Exam (50%)
Feedbacks	The students were satisfied with the TMA, mini projects assessments and the TMAs' comments were found to be constructive and detailed. The course coordinator has incorporated exception handling, validation of input and flow chart control in Java programs in particularly TMA 2. The external OER content and resources were also provided in LMS as additional references to promote the learning of Java related OER resources.		

Table 3 TCC121/05 OER-based Course Presentation Highlights

The proposed OER-based MOOC course based on TCC121/05 Programming Fundamentals with Java is illustrated in Table 4 with partial concept adapted from Siemens (2014). The descriptions serve as the guidelines and checklists associated with the scalability, diversity, openness of the MOOC course in considerations of designing computing related courses. The design study provides several aspects (1 – 11) in articulating the prerequisites of preparing the outline of an OER-based MOOC course. The design of the present Java programming-based MOOC course's topics are identified by considering the topics that demand for learning in Java programming areas. Computer-gradable assessments (University of Illinois, 2013) such as multiple-choice questions, mix and match and Java programming assignments is taken into considerations with respect to the given number of participants.

Area of study	Domain controls	Descriptions
1. Facilitators	<ul style="list-style-type: none"> Professors, instructors Guest speakers Video lectures 	Clustered subject area
2. Course structure (Landscape)	<ul style="list-style-type: none"> xMOOC 	Coursera, edX is considered as formal, structured teaching
3. Length/Durations	<ul style="list-style-type: none"> 4 weeks to 9 weeks Course can begin anytime 	Lesson design plan (one lesson per week for a month), mirroring campus-based/ODL durations.
4. Topics/Content	<ul style="list-style-type: none"> Introductory content Classes and objects Control statements Arrays 	The topics derived should consider whether the topics will attract MOOC learners.
5. Resources	<ul style="list-style-type: none"> OER materials Learning objects (LOs) 	Identification of OER resources and smaller learning objects on the topics.

6. Participants/Target audiences	<ul style="list-style-type: none"> • Content • Language • Prior knowledge 	The expected participants should be analysed in the aspect of content, language and with prior knowledge of Java program compiling and debugging skills.
7. Assessment	<ul style="list-style-type: none"> • Open-ended mini projects • Simulations • Multiple Choice Questions, Quizzes • Short Answer • Mix and Match • Code Interpretations • Output Predictions 	Lessons and assessment will be released in a time-based MOOC basis.
8. Grading system	<ul style="list-style-type: none"> • Learning System • Instructor, facilitator • Peer assessment (Rubric) • Self assessment 	Cost effective, Rubric grading prevents over-strict and superficial grading. Self evaluation is carried out after peer assessment is done to reinforce learning.
9. Learning outcomes measurements	<ul style="list-style-type: none"> • Establish learning outcomes 	Mapping and measurement of desire outcomes according to assessments
10. Testing and analysis	<ul style="list-style-type: none"> • Learners with or without prior knowledge of Java programming 	Testing and analysing the outcome of the course before the actual run, students selectively review the MOOC to provide feedbacks.
11. MOOCs visibility	<ul style="list-style-type: none"> • Professional networks • MOOC-list • Social networks (Twitter, Facebook, Blogs) 	Engagement of social media to promote MOOC course

Table 4 Design of OER-based MOOC Course

Conclusion and Discussions

A number of discussions, digital reviews and reports took place with regards to the roles and perspective of MOOCs in higher education institutions. This study discusses the initiative of delivery of MOOCs course using OER-based materials as an opportunity for establishing and providing an open platform for exploration, interaction and collaboration using OER. The presented design and development of OER-based MOOC course in this study signifies the OER course development framework movement presented by Chung and Khor (2012) in an effort to bring the OER course delivery in WOU towards wider audiences specifically in distance learning environment. This study also provides insights and review of feasible and sustainable framework for engaging in OER-based MOOCs course delivery.

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