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An Interactive OOP Learning Environment for Teaching and Learning with Java

Wan Saiful 'Azzam Wan Ismail^{1*}, Maznie Manaf², and Marina Ahmad³

^{1,2,3}Universiti Teknologi MARA Kelantan saifulazzam@kelantan.uitm.edu.my, maznie@kelantan.uitm.edu.my, marina170@kelantan.uitm.edu.my

*Corresponding author

Abstract: Massive Open Online Courses (MOOCs) are said to be a form of online learning. MOOCs are a creature of the digital age and born of cloud computing. Millions of individuals have participated in thousands of these higher learning courses. The aims of MOOCs program to make the learning process are simple, easy, anywhere and anytime, and become the globalized online learning. The Object-Oriented Programming (OOP) is the subject for Diploma in Computer Science in MARA University of Technology (UiTM) which necessitate students to learn and apply the concepts of objects and classes, abstraction, encapsulation, inheritance and polymorphism. Students also learn on how to apply concept of OOP to store and retrieve data using text files. Teaching and learning quality of students in this course can be more interactive with MOOCs. In typical MOOC has specific topic to learn and discuss with incredibly large numbers of students and facilitators. The main elements used in these interactive learning is building an online system that provides an integrated environment for students doing programming activities and coursework; providing students with timely and useful feedback about programming activities without the need to have instructors and students meet at the same time and the same place.

Keywords: Massive Open Online Course, Object Oriented Programming, JAVA, Interactive Online Learning

1. Introduction

The MOOC “Object Oriented Programming Using JAVA” consists of 6 modules. The content of the modules is a mix of text, videos, interactive modules, quizzes and discussions. The MOOC platform used is OpenLearning. The MOOC included 7 interactive videos and 2 interactive presentations as learning objects. The main objective of this study is to build an online system that provides an integrated environment for students doing programming activities (JAVA) and coursework, also to provide students with timely and useful feedback about programming activities without the need to have instructors and students meet at the same time and the same place. MOOC gives freedom to students to learn at their own pace for free, while instructor has more flexibility and diversity to deliver their content. The platform itself provides a lot of build-in tools to be used in preparing the contents especially for the exercises and assessments. The tool really helps the instructor in making their exercise and assessment more attractive and interactive. One of the most interesting in OpenLearning platform is students can be rewarded with badges and certificate upon successfully completed the course.



2. Overview of MOOC

MOOC as an online course open to anyone without restrictions, normally organized around an arrangement of learning objectives in an area of study, which regularly keeps running over a particular timeframe on an online platform which allows interactive possibilities that encourage the development of a learning network. As it is the situation for any online course, it provides some course materials and (self) assessment tools for independent studying (Alario-Hoyos et al., 2016).

Despite the huge popularity of MOOCs, their future and potential impact on the education domain as a whole is still difficult to predict (Billsberry, 2013). MOOC platforms, their pedagogical paradigms and their business models are still in the early stage of development. Thus, different development directions can be adapted. MOOC development opens opportunities for exchanging ideas, collaborating between institutions, educators and learners around the world, and for enabling more meaningful engagement in teaching and learning (Breslow et al., 2013; Hansch et al., 2015; Nawrot & Doucet, 2014). However, according to (Yuan & Powell, 2013), a few numbers of the main aspects of openness are emerging in different areas, such as open curriculum, open learning, open assessment, and open platform, such as those illustrated in Figure 1.

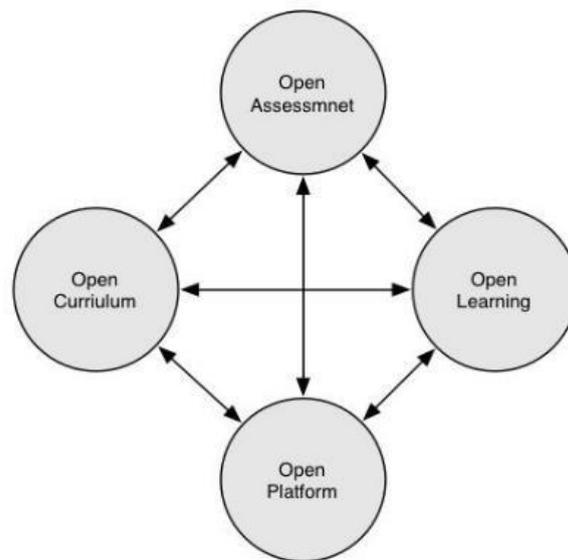


Figure 1: Main Aspects of Openness in Higher Education

Open Curriculum: learners mix educational resources, activities for different disciplines to meet their needs. Learners are in charge of their own learning and they will choose what they need to learn to meet their personal objectives and requirements.

Open Learning: instructors, learners, teaching assistants and/or peers will collaborate and engage in various activities, sharing their ideas and new findings during the learning process. This provides learners with opportunities for discussing, questioning and answering while making the learning process more interesting and effective.

Open Assessment: the assessment of what learners have learned is carried out by their instructors, peers and others during the learning process via peer to peer or crowd-sourced assessment.

Open Platform: This provides a learning platform open for all, supporting a dynamic and interactive open education community, where any one gets engaged and share their ideas.



3. Interactive Learning Activities

Massive open online courses (MOOCs) are attractive to many students, but a dropout rate up to 96 % is a challenge for many MOOC providers (Brinton et al., 2014). Based on Nawrot and Coucet (Nawrot & Doucet, 2014) an overview of reasons for withdrawal from MOOCs ranged by percentage. Among the top five reasons is contents are not attractively presented with 15.35 % of the withdrawal reasons. Most of the videos provided in MOOCs are one-way presentations, from the teacher to the students. Thus, the students become relatively passive viewers of the videos, from the beginning to the end.

Interactions are limited to play, rewind or pause the presentation. This may provide a monotone learning situation, which fail to engage the students in constructive learning activities. An alternative learning approach is active communication where the students have to take part in the learning activities in different ways. Introducing various ways that enable the students to interact with the learning material forces the students to reflect, underpin important parts, take stance and choose progress for their learning activities. Interactivity seems to be overlooked as an opportunity in former research of MOOC criteria. As criteria to assure the design quality of MOOCs, based on the study at (Yousef, Chatti, Schroeder, & Wosnitza, 2014) evaluated 14 video content categories, e.g. clear sound, level of details provided about the subject, offer references for facts/information, provide a summary of the video lecture and use short video clips not more than 20 minutes. The intention of using interactive modules in a MOOC is to motivate and activate the students especially for programming student through interactive videos and interactive presentations.

4. Video as an Interactive Tool

An important objective of the study is to make all modules which is to design and use interactive learning modules to activate and engage with the students. We discriminate between interactive videos and interactive presentations. Interactive videos and interactive presentations rely on different logic when it comes to how they are activated by the user. However, the two logics can work together, and the distinctions between the two forms are not absolute. This becomes evident in some of the modules that was developed for this MOOC.

In this MOOC, it has been designed with learning content to help learners to understand the programming language JAVA by practicing in class. In total there were 24 exercises including assessment was designed as part of this MOOC, the 9 videos with the average duration 3 minutes and provided with student feedback for each activity. Almost these activities correspond to the formative evaluation and are distributed throughout the 6 modules that covers up all basic elements of OOP using JAVA. In the process to prepare all of these activities, the built-in tools are used such as multiple choice questions, multiple response questions, text input questions, drop-down list questions, drag and drop exercises and peer-review activities.

Video content plays a central role in most MOOCs and other forms of online learning. It is typically the main form of content delivery, as well as the greatest cost driver of MOOC production. However, many questions regarding the effective use of video remain unanswered. With all of the recent hype surrounding teaching and learning online, it seems that the use of video in this field has come to be taken for granted, despite a relative lack of evidence as to video's effectiveness for learning.

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All things considered, video is the fundamental technique for content delivery in nearly all MOOCs. MOOC videos have a tendency to be organized as short pieces of content, frequently isolated by assessment questions. This seems to be one of the few best practices that is broadly acknowledged inside the field. Based on paper in Alario-Hoyos, Delgado-Kloos, Esteves-Ayres, Ferababdez Panadero, et al. (2016) and Guo, Kim, and Rubin (2014) plitting videos into 2-3 minute segments or 6-minute chunks maximizes viewer engagement. However, according to Apple (2010) and Baloian, Breuer, Hoeksema, Hoppe, and Milrad (2004) pointed out that shorter videos also tend to present their content in a tight, concise manner. So, although research might indicate that students prefer shorter videos, this result might represent student preference for succinct content presentation, independent of video length. Furthermore, they found two video production styles that are most commonly used (1) the talking head style, where the instructor is recorded lecturing into the camera, and (2) the tablet capture with voiceover style. In this MOOC, the second style was used and apply in interactive module.

Today, videos are one of popular media resource for the online learning. Most student use the video such as tutorial video to learn something news. YouTube is one of the popular online platforms used nowadays to access any kind of video. Educators have been recording instructional videos for nearly as long as the format has existed. In the past decade, though, free online video hosting services such as YouTube have enabled people to disseminate instructional videos at scale. These online courses are mostly organized as sequences of instructor-produced videos interspersed with other resources such as assessment problems and interactive demos. A study of the first edX course (6.002x, Circuits and Electronics) found that students spent the majority of their time watching videos (Alario-Hoyos et al., 2016; Breslow et al., 2013).

Video can serve as a powerful teaching tool. According to Koumi and Jack (2006) describes three types of value that video is well placed to add in an educational context: (a) cognitive, (b) experiential, and (c) nurturing. Cognitive value includes visual strategies to assist learning, such as demonstrations of processes using animated graphics. Experiential value provides vicarious experiences, allowing viewers to see something in a video that they might not be able to see in everyday life. Nurturing value refers to video's power to motivate and connect with its audience through the affective domain.

5. Conclusion

MOOCs for computer programming course can help to attract learners into this field especially students from higher learning institution. This dry course can be more attractive and interactive with OpenLearning platform since there are many built-in tools provided by the platform to help the instructors in preparing their contents. MOOCs also have the potential to help students personalize their learning experiences at a reasonable cost since MOOCs are free at all. Obviously MOOC can help students to learn at anytime and anywhere of their preference or at any preset timeframe determined by the instructor. Students also can be alerted by announcement made by the instructor for any updates on the learning activities, therefore every student should not missed out every MOCC activities arranged by their instructor. For inactive students, reminder will be sent once a week through email. Further interactivity can be seen in active collaboration where students and instructor are able to discuss on the lesson.



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