

# Teaching with MOOC: Conducting Programming Courses for Undergraduate Students

**Mohd Norafizal Abd Aziz, Haslinda Noradzan, Nor Zalina Ismail, Roslan Sadjirin**

*Abstract : Technologies adoption in learning has given opportunities that may support practitioners and learners as well as learning institutions to empower their learning implementation with the current technologies available. From e-learning concept towards the cloud learning implementation nowadays, it has shown significance of having technologies in learning implementation. For the practitioners views of implementation, technologies adoption will provide various platform of learning resources to be adopted by the practitioners to the learners to learn. As for the learners, the opportunities of having technology will help them in managing their individual learning platform. Instead, learners may use the technologies in learning to learn at anytime and anywhere with support by their own learning platform created.*

# **INTRODUCTION**

Previous studies in having various technologies in learning implementation has shown significant impact using the technologies that will help practitioners and learners to empower their learning into new paradigms (Norazah et.al,2016; Saidatul et.al, 2016). Therefore, with the new online learning platform as in web and cloud environment, various learning applications available to be adopted by the practitioners in their learning implementation. Example of online learning platform available nowadays include YouTube, Microsoft 360, Google Drive, Powertoon, Wikipedia and others has being designed to give more choice for the practitioners and learners to empower their teaching and learning implementation. The current use of open online course with Massive Open Online Course (MOOC), this open online course platform has being created to empower learning that share the learning resources in open mode towards various learners in the world. In Malaysia education environment, the Ministry of Higher Education (MOHE) has Malaysia Education BluePrint (2015-2025), with one of the concentration is focusing in online globalised learning. This initiative will guide the higher learning institutions to have a strong learning platform that acquire the learning process to be access globalised by the various learners in the world. This strategies emphasize the use of MOOC platform that need to be initiated by the respective public and private universities in Malaysia. Therefore, this paper will discuss our academic experience in designed selected technical course according to the teaching requirement and developed using MOOC platform. The development of MOOC platform will be discuss and follow by the impact of learners academic performance for control group (CG) and experimental group (EG) will be discussed to investigate the significance impact of adopting MOOC platform in our teaching and learning implementation.

# **BACKGROUND OF STUDY**

Massive Open Online Course also known as MOOC are online course which offer the learning in a high-scale in participations (Masters, 2011; Stephen & Jan, 2012) and access through thousands of user at a single time access. In Malaysia education environment, the initiative of having MOOC platform has been initiated by the Ministry of Higher Education through Malaysia MOOC platform that will gather learning resource sharing among public and private higher education that will offer open learning among institutions,

practitioners and learners. The most important benefits of using MOOC in teaching and learning is to introduce the use of technology in the classroom while transferring knowledge using the 'Open Learning' will empower learners to create their own learning as individual and institutions that will adhere quality in teaching and learning that able to share the resources to the other learners and institutions through the platform.

In the development form of MOOC, there is no specific development strategies available that will guide the practitioners and learning institutions to create and develop their MOOC platform. As for Malaysia education practices, the development of MOOC is depend on the higher learning institutions to decide. As for now, some research initiative to investigate the impact of using MOOC platform in some non-technical courses. Saidatul et al. (2016) studied the factors of teaching and learning outcome for TITAS course in using MOOC which the findings emphasize on learning activities that will determine the success implementation and delivery of MOOC. Hence, the acceptance of MOOC among students is merely contribute by the positive perception that will create the learning to be enjoy, fun and allow learners to be more focus in their learning (Abdul Fatah et al., 2015). Towards the implementation of MOOC in learning, various factors may contribute to the success experience in using MOOC platform to support teaching and learning. Norazah et.al (2016) and Shahrman et.al (2012) had discovered factors that will ensure the MOOC success implementation which emphasize on learners attitude, self-efficacy and anxiety with positive impact in the overall perception for each factors being study and this findings support the impact of MOOC technology that will allow Malaysian learners to enjoy learning with technology to support their learning implementation.

With MOOC platform, various learning resources can be embedded in the platform in a various forms of resources such as 2D and 3D animations in notes and video, real-time blogs for group discussions (Norman et al., 2014; Embi & Nordin, 2013; Nordin et.al, 2016). With such variety features provided in MOOC, this will empower the practitioners in the development of MOOC which allow more benefits learning resources to be added that will benefits and guided learners who had difficulties in learning as well mentor in their learning (Ryberg & Christiansen, 2008). Therefore, the MOOC creation as a new online learning tools that will provide benefits to the learners as well as practitioners, it also benefits the learning institutions who

had start adopting the MOOC platform that will also address the Malaysian learning strategies and concept to the other side of the world that can share the experience that Malaysian have to be access as a global online learning.

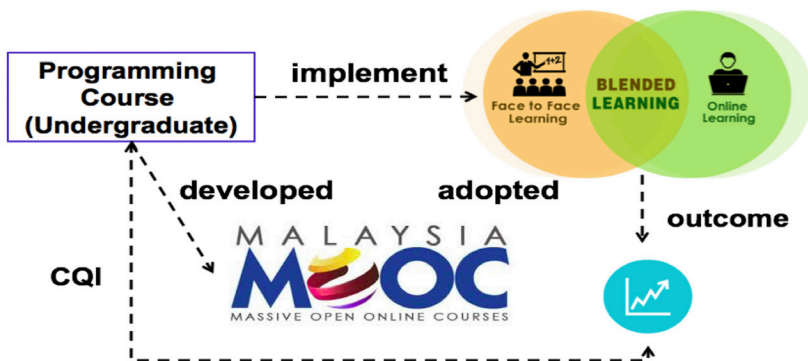
## **The Design and Development of MOOC platform**

The design and implementation of our MOOC platform in general is shown in Figure 1 while the development of MOOC platform varies among learning institutions and practitioners. Norazah et al. (2016) has introduced the ADDIE framework which consists of phases which are analyse, design, develop, implement and evaluate. Therefore, for this research we use ADDIE framework in developing our MOOC platform for technical course in programming as illustrate in Figure 2. In our previous implementation of teaching and learning, we have to design the teaching and learning strategies according to the scheme of work provided for a particular courses. Most of the design has been done manually. This is part of autonomy being given by the learning institutions to the practitioners to plan their own teaching and learning strategies which include the learning resources and materials and assessments. As in our MOOC platform design, we include additional assessment requirements consists of assessments and activities which will be include as online access in MOOC platform. The online notes consists of syllabus structure according to the chapter for the selected course. In addition, for MOOC platform design we had include additional assessment consist of online assessment and activities. The online assessments will include gamification for a selected topics. The gamification is the concept of having gaming in learning which can be apply during the learning process either during the traditional or online learning implementation. For this research, we had select Kahoot! Game to be include into our MOOC platform. The game will take three (3) to four (4) minutes to complete and it must be done at the end of the class or during the non face to face session as implemented in our Blended Learning (BL) mode. As in MOOC platform, practitioners may also include student work gallery as this feature is included in the MOOC design platform. This student gallery will show student assignment or project submission work which include programming code exercise according to the selected technical topics in programming. In addition, we also include forum and discussion environment for students' discussion between learners and instructors as feature in MOOC platform

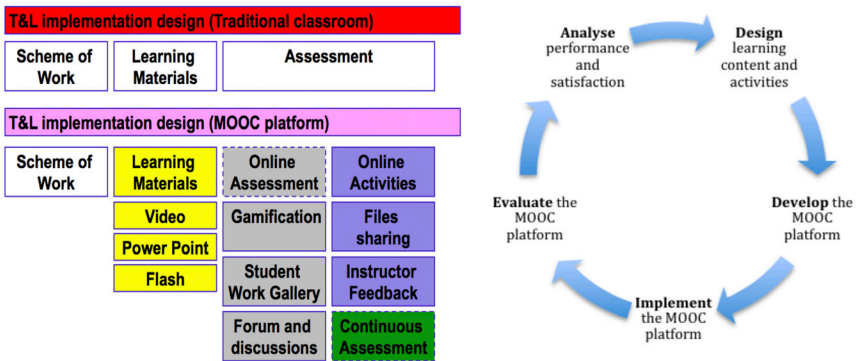
which allow learners to have collaboration and sharing information which can be apply at learners' convenience.

In order to improvise assessment in a MOOC platform, we also had include online activities which required learners to actively take part according to the activities. This online activities can be conducted during the Blended Learning mode which acquire learners to complete the task in the online activities. The online activities will be design according to the selected topics in programming but our focus is more in engaging learners with the programming code and features to determine output and input according to the programming code provided. In order to ensure learning continuity of using MOOC platform, we had also include file sharing features which acquire learners to share any relevant information which include video, text, URL link or any other resources according to the relevance topics in programming. In the real assessment of learners in MOOC platform, we have design set of assessments that will be used for the students to complete as a task. Every single assessments activities will consists of short quizzes, lab work tutorial which cater on the programming concept according to the selected topics and any others assessments that is relevant to the course. After the submission, learners work will be observed by the practitioners and include the feedback for each assessments. This will guide and help learners to identify any improvements as well as their ability towards the topics being evaluated.

Figure 1: The Design and Implementation of MOOC Platform

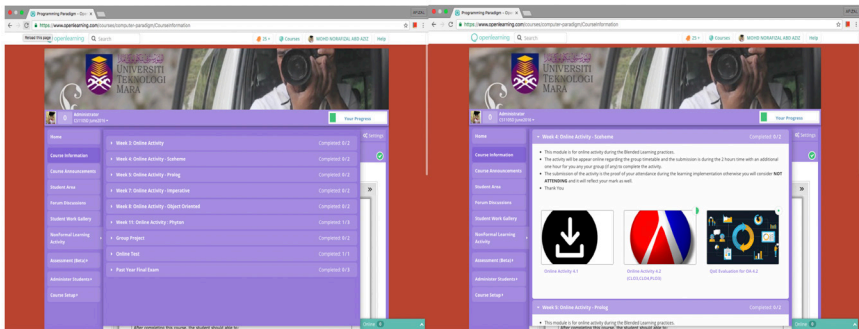


**Figure 2: The Development of Course Structure in MOOC using ADDIE Framework**



### Implementation of MOOC Platform Participants

The participants of this research project were the semester two undergraduates students (N=75) at Universiti Teknologi MARA Pahang (Raub Campus) selected purposively for this study. The participants took programming course in Computer Organization with four (4) group of students enrolled into this course. For this research, we have coded the selected participants from two groups as experimental group (EG) while the other as a control group (CG). The EG will use the MOOC platform as learning conducted using Blended Learning mode while the other group will not involved in using the MOOC platform and using the normal learning mode which is traditional method of learning with face-to-face classroom and some online learning resources provided. The course structure for the programming course consists of six (6) chapters that consists of computer organisation topic with assembly language as the programming language use.



**Figure 3: Example of Learning Resources and Activities created in MOOC Platform**

The average age of the participants were around twenty one (21) with good level of ICT proficiency and skills as the learners is in the second semester of study. All the participants have not involved in any learning practices with MOOC or any others online learning environment previously. The class instructor also participated in this study. The instructor was responsible in teaching and learning over 14-week semester. The instructor have been involved in teaching the programming course for more than 5 years at the Universiti Teknologi MARA Pahang (Raub Campus).

## RESULT AND DISCUSSION

This study employed learners performance result using the MOOC platform for the programming course according to the continual assessments and final examination result. The continual assessments consists of test , quizzes, lab work tutorial and project. For this study, we compare the learner's performance between the experimental group (EG) and control group (CG). The only different between both group is only EG will implement learning with MOOC platform with activity will be base in the MOOC platform while CG will implement the class as traditional class with lecture notes and activities will conduct during class. The findings will consists of learners performance for both group according to the assessment done for both group. The next section will describe the learner's performance according to the EG and CG.

Learners Performance in Final Assessments

Figure 4 show the comparison on performance between control and experimental group in final assessments that has been done during the respective semester. According to the diagram, there is three indicators being used which is average marks, minimum marks and maximum marks according to every questions in the final examination. The comparison between the groups in maximum marks has shown increase score by the EG in a subjective question 5, 7, 8, 9 and problem solving question 1 and 2 compare to the CG. However in objective and other subjective questions has show equal score for both group. While in average marks for both group, the increase of EG is only show in subjective questions 4 and 8 while the rest has shown no difference in average mark between the groups. While for the minimum marks score for both group has shown small differences and the EG has higher score in problem solving question 1 and subjective question 2 and 8 but not in the subjective question 3 which the EG score lower than the CG score.

Therefore, from this result we can see the overall impact on performance of EG using MOOC platform given positive significant impact on the performance as the learners enjoy the learning environment with MOOC platform as a new way of learning implementation. From the finding, it showed the positive acceptance of learners in using MOOC platform that will also reflect learners performance in their learning.



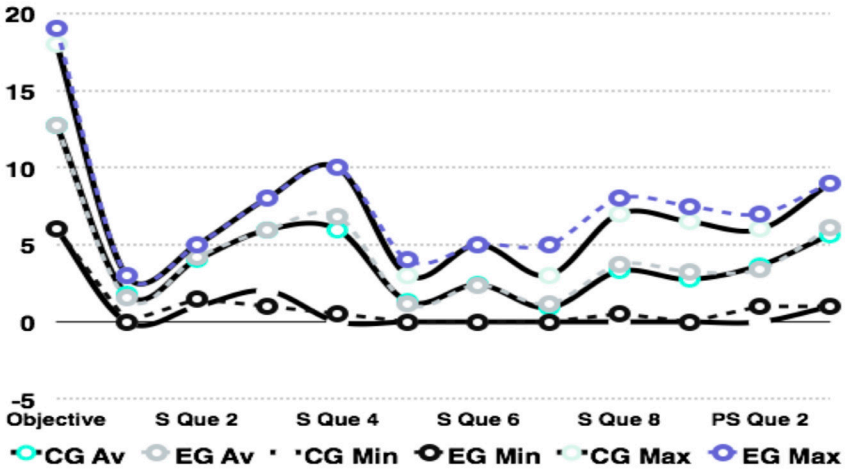


Figure 4: Learners Performance according to Final Assessment Components

### Learners Performance in Continuous Assessments

Figure 5 show the learners performance according to maximum and minimum marks on continuous assessments. The performance of EG in ongoing assessments which consists of test1 and lab test has score lower in maximum marks but not in test 2 which the EG score higher compare to the CG marks. While in minimum marks finding, the difference between EG and CG group performance has show equal in Lab Test but not in Test 1 which the EG score minimum marks compare to the CG. However, in Test 2 assessment, the score for EG in minimum marks score higher compare to the CG.

Unfortunately, from the Total Ongoing Assessments (TOA) marks for both maximum and minimum, it has show the positive significance performance of EG while compared to the CG. The minimum and maximum marks for EG was more than 25 mark and 38 mark respectively has shown that learners in EG with MOOC platform score significantly higher while compare to the CG as in overall marks in the assessment.

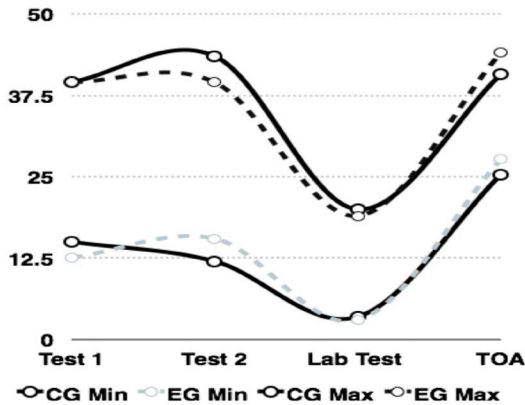


Figure 5: Learners Performance in Continuous Assessment

## Learners Perception Towards Learning Using MOOC Platform

At the end of the semester, we had conduct a simple survey to discover the satisfaction level of learners towards the development and implementation of MOOC platform in their learning. For this purpose, we used secondary data provided by the University regarding the learners satisfaction towards the course implementation. The satisfaction was measured regarding the learners impressions towards learning using MOOC platform and learning activities provided in the MOOC platform. Most of the dimension of satisfaction of learners towards MOOC platform had shown positive significance as in average percentage. With MOOC platform, the learners agree on enhance learning ability, increase their knowledge, increase confidence level and also positive in using MOOC as learners platform in conducting and prepared their learning. Hence, the confidence of learners of using MOOC platform has increased positively as the learners agree to use MOOC platform as their new learning platform that will benefits their learning as well their knowledge and transferring of knowledge in their course.

Similar findings sighted in learning activities, learners are agreed to the questions and satisfied with the learning activities provided in MOOC platform for the particular course. The average of percentage score is more

than 90 for all three questions, had show the positive feedback provided by the learners towards the use of MOOC platform in their formal and individual learning. The most interesting findings of all, regarding the outcome satisfaction which the learners positively relate the activities provided in MOOC with their outcome as positive significance as the learning using MOOC platform had penetrate good vibration in achieving outcome of the course.

**Table 1: Average of Percentage of Learners Impression and Activities in MOOC Platform**

Dimension	Items	Average (%)
<b>Impressions (LI)</b>	LI1: The learning method using MOOC platform this course has enhanced my learning ability.	95.75
	LI2: My knowledge is increase from the resources provided in this course.	90.25
	LI3: My confidence level in this course has increased.	94.75
	LI4: I am confidence to use MOOC platform in this course.	91.5
	LI5: I felt anxious to use MOOC platform for this course.	67.5
<b>Learning Activities (LA)</b>	LA1: I am satisfied with the activities provided in MOOC platform for this course.	91.5
	LA2: I am satisfied with my outcome for the course.	96.75
	LA3: I am satisfied with feedback given for each online assessment activities.	91.75

## CONCLUSION

Technology adoption in learning practices has given new opportunities for the learners and practitioners to improvise various learning resources as well as accessing learning easily by the connectivity of wireless and Internet connection. Therefore, the use of various new online learning platform has to be introduce to variety the learning paradigm by the instructors to the learners. This research has proven the positive significance of implementing MOOC platform in technical programming course for the undergraduate students. According to the learners' performance result and learners' satisfaction in using MOOC platform, the variety of learning with technology is able to support the success of knowledge delivery and penetrate outcome achievements for the particular course. The satisfaction include learning impression and activities which had shown positive significant as well as the students performances in continous and final assessments.

However, improvement and consideration on the learners anxious on using the MOOC platform shall be consider during the early process of learning using the MOOC platform. Brief introduction of MOOC platform as well as the significant of new learning platform being used shall be explain to the learners before purseu the lesson using the MOOC platform. This will give confident to the learners to use the MOOC platform in learning. It will also provide research opportunities for the researchers to investigate further regarding the factors on anxious towards the MOOC platform use and suggest relevant methods that will attract learners to use the MOOC platform in learning. As for another research opportunities regarding the research in the similar area of MOOC platform implementation, we suggest the investigation on MOOC platform use for other level of study which include the postgraduates and disctance learning. It also should consider the enviorment of learning which include the technical as well as non-technical course that use MOOC platform as their learning platform. The future findings for the suggest area may benefits the practitioners as well as learning institutions to observed different view of MOOC platform implementation as well as the improvement needed to further strengthen the requirements and research opportunities regarding the MOOC platform use in learning implementation that will empower learning and knowledge for higher education.

## REFERENCES

- Abdul Fatah Abd. Ghani., Aeimi Ruzanna Abu Hassim., Eliyas S. Mohandas. (2015). Students' Perception of New Web 2.0 Tools Usage in Classroom Instruction, in *Envisioning the future of Online Learning*, Johan Eddy Luaran et.al, Ed. Springer, pp. 247 - 258
- Embi, M. A., & Nordin, N.M. (2013). *Mobile learning: Malaysian Initiatives and Research findings*. (pp. 1- 131). Malaysia: Centre for Academic Advancement, Universiti Kebangsaan Malaysia.
- Masters, K. (2011). A brief guide to understanding MOOCs. *The Internet Journal of Medical Education*, 1(2).
- Ministry of Education Malaysia. (2012). *Malaysia Education Blueprint*

2013-2025: Preliminary Report. Putrajaya: Ministry of Education.

- Norazah Nordin, Mohamed Amin Embi, Helmi Norman. (2016). Towards Envisioning the Future of Learning in Malaysia: Development of Malaysia MOOC Based on the Iterative ADDIE Instructional Design Framework, in *Envisioning the future of Online Learning*, Johan Eddy Luaran et.al, Ed. Springer, pp. 269 - 280
- Nordin. N., Norman. H., Embi, M.A., Mansor, A.Z., & Idris. F. (2016). Factors for Development of Learning Content and Task for MOOC in an Asian Context. *International Education Studies*, 9(5), 48-61.
- Norman, H., Din, R., Nordin, N., & Ryberg, T. (2014). A review on the use and perceived effects of mobile blogs on learning in higher education settings. *Asian Social Science*, 10(1), 209-222
- Ryberg, T., & Christiansen, E. (2008). Community and social network sites as technology enhanced learning environments. *Technology, pedagogy and Education*, 17(3), 207-219
- Saidatul M. Sahimi, Farah M. Zain, Abd Karim Alias. (2016). MOOC at Universiti Sains Malaysia: Factors Impacting the Teaching and Learning Outcomes of TITAS Course, in *Envisioning the future of Online Learning*, Johan Eddy Luaran et.al, Ed. Springer, pp. 183 – 192
- Shahriman, T.P.N.T., Razak, N.A., & Noor, N.F.M. (2012) Digital Literacy Competence for Academic Needs: An Analysis of Malaysian Students in Three Universities. *Procedia-Social and Behavioral Science*, 69, 1489-1496.
- Stephen, C. & Jan,P.S. (2012). The Massive Open Online Professor: Academic Matters. *The Journal of Higher Education*