DEVELOPING A WEB APPLICATION DEVELOPMENT MOOC

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Received: 10 April 2018 / Accepted: 15 May 2018/ Published online: 1 June 2018

ABSTRACT

Web programming course has been a core courses for students major in computer science. In order to improve the teaching efficiency, a new form of educational delivery referred to as Massive Open Online Courses (MOOC) may represent a promising solution to facilitate better teaching-learning method for improving learning outcomes. In this paper, we proposed a methodology involved in developing the team-based development process of a Web Application Development MOOC, which describes, explains and discusses the basic concept of Internet Technologies, Mark-up Language, Client-Side scripting and Server-Side scripting. This online course consists of 10 modules, corresponding to the 14 weeks of effort in the course taught at the faculty. In addition, we developed various web-based interactive learning and activities modules, which combine the elements of animation, video, audio and graphics to enable the learners to experiment and interact directly with the presented concepts. This online course has been developed using ADDIE methodology, which includes the analysis, design, development, implementation and testing phases.

Keywords:MOOC; ADDIE Model; Web programming; Internet; HTML; JavaScript; PHP; Scripting.

1. INTRODUCTION

With the swift development of World Wide Web based applications, the skill of developing web-based applications has become one of the most needed professional's skillsfor students major in computer science. In this new era, web programming courses are one of the requirements in computer science studies in many universities. In UniversitiTeknologi

MARA (UiTM), web programming course were offered at the fifth semester. Some students are lack of interests on web programming because they have forgotten the related knowledge about database design and homepage design courses that were held in previous semester. Hence, they find that the programming codes are very difficult to master. Slowly they lose the interest on web design and programming. Therefore, to improve the students' web programming ability, stimulating their interest is the primary key.

The growth and development of MOOCs have been one of the most amazing innovations in online learning over the past few years. The integration of web-based learning via MOOC has completely changed teaching and learning in the 21st century. MOOC allows students to learn anywhere and anytime and is believed to increase student engagement and learning outcomes [1]. Thus, in this paper have provideduseful attempts with developing the students' programming ability and improving their self-study initiative and interest via MOOC.

We designed a MOOC that provides a gentle introduction to the Internet concepts before the programming part to avoid too much cognitive load. In addition to the common quizzes giving direct feedback to the students, we included interactive activities for every learning step. The target group of the course is students of computer science that are due to attend Web Application Development in their fifth semester. This project's goal is designed as a tool in a blended learning program, where students can access additional information than what is provided in the class.Furthermore, the students' performance can be observed easily using the data captured during the start of the course. This paper emphasizes the instructional design of the MOOC by providing a case study of a web application development MOOC.

2. RELATED COURSES

Throughout the past few years, there has been an emergent interest in promoting and teaching computer programming to a worldwide audience through MOOCs [2]. There are literally dozens of courses available on both the undergraduate and graduate levels across the breadth of computer-related topics. In the following, we provide a short overview of some introductory MOOCs for computer programming that are available for several languages and provide an introduction to the fundamentals of programming.

The Harvard University has offered a 12 weeks MOOC course, "CS50x: Introduction to Computer Science" that teaches students how to think algorithmically and solve problem efficiently [3]. The topics areincluding algorithms, data structures, encapsulation, resource management, security, software engineering and web development. Different programming languages are covered in the course, such as C, Python, SQL and JavaScript. CS50x is an interesting course and reflecting the breadth of computer science. However, it does not include sufficient coverage of web programming practices, which is central to successful web development.

The University of Reading's first MOOC "Begin Programming: Build your first mobile game" is a programming course that used elements of the game to create visual appeal to learners [4]. The course offered the opportunity for the learners to develop their own game over the duration of the MOOC. The university reports on a good community experience, but they note that the challenges for the learners to install and setup several software components on their machines can lead to lose learners on the first week itself.

Hermans et al. [5] designed and ran a MOOC of introductory Scratch programming course that teach elementary programming concepts and software engineering concepts simultaneously to students between the age of 7 and 11. They found that there is no difference in students' scores between the programming concepts and the engineering concepts, suggesting that it is indeed possible to teach these concepts to this age group.

3. METHODOLOGY

The ADDIE model has been used for the creation of a MOOC entitled "Web Application Development". It is necessary to have procedures in the content development based on Instructional System Design (ISD), such as ADDIE rather than encouraging learners to become dependent to MOOC's presentation content style (such as text, graphics, sound, video or links).

The ADDIE model has been chosen for this project because it is an ideal framework that can be utilized in MOOC design that can help to make courses more applicable and meaningful for learners [6].ADDIE was introduced in 1975 by the Centre for Educational Technology of Florida State University. Dick and Cary (1978) developed ADDIE model, and then revised by Watson, R. (1981) in 1981. The model was considered essential in the educational and training programs development ever since [7].

In this model, there are five main phases, which are analysis, design, development, implementation and evaluation as shown in Fig. 1. This model was chosen because it is suitable to explain generic process in building MOOC.

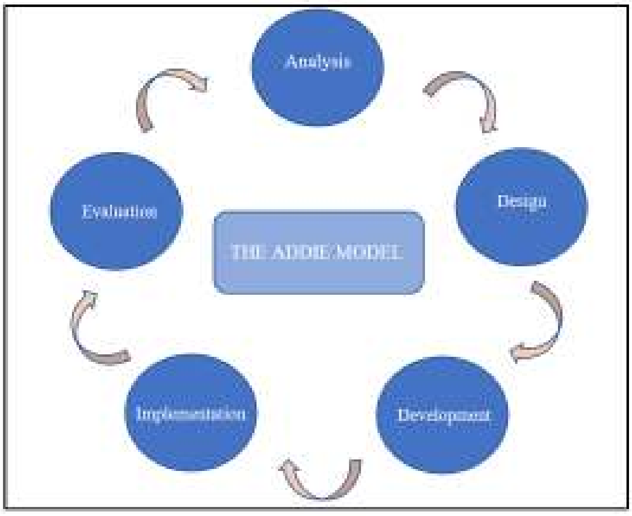


Fig. 1. The ADDIE methodology

3.1 Analysis Phase

In the analysis phase, the main concern is the target audience and the determination of what they know and what they need to know by the end of the course [8]. During this phase, the topic of the course is analyzed to specify the purpose of learning, the knowledge domain and the main learning outcomes. The content of the course was selected based on the syllabus of CSC318: Web Application Development subject offered by the UiTM.

Web programming is different from other programming language. It is much comprehensive subject in the implementation which is always cooperate with basic web technologies such as HTML and CSS, client-side language such as JavaScript, server-side script language and database technology together. Therefore, the course trains in basic concept in the web technologies and examines their practical application through the development of web application. The aim is to understand the fundamentals of web technologies so that the learners will be able without difficulty to move to writing a web programming.

3.2 Design Phase

During the design phase, lesson contents, learning activities and assessment are designed to demonstrate the way that the knowledge will be offered to the learners. Content selection is related to selecting the main contents of the course, which is the main component of MOOC. The design is include the motivational and edutainment components in order to maintain student's interest and motivation throughout the course.

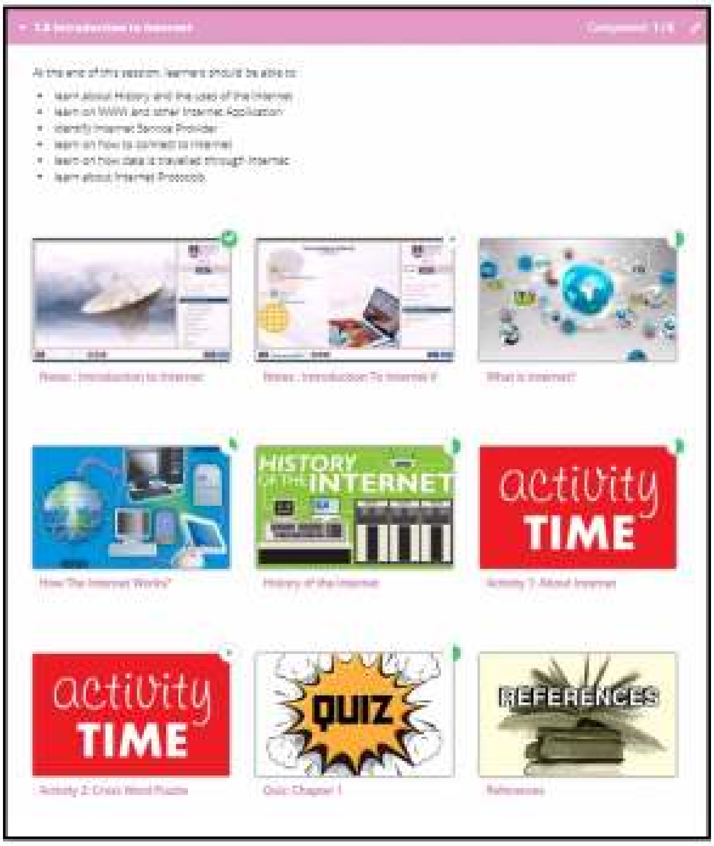
This online course consists of 10 modules. Each module begins with a video lecture, which guides students to the subject of the module. In this phase, the time length of each video lecture is decided and is adjusted considering the characteristics of the topic and the types or number of learning activities that are presented in the course [9].

Various learning materials and activities are design for students from basic to advanced level so that they can have access to basic or advanced materials based on their level of understanding. Each module contains at least two activities. For the evaluation questions, the selection of task types and the evaluation ratio of quiz or assignments related to accessing the learning outcomes of students. The design of each module is as shown in Fig. 2.

3.3 Development Phase

The outputs of the Design phase will be expanded in this development phase. All the learning contents and activities are developed based on the learning objectives of the course as shown in Fig. 2.The lecture video creation and shooting take place considering the time length, which reflects the characteristics of the topic and the types and number of learning activities. During this phase, it needs a proactive development with hardware and software supports.

The learning materials that were designed in the previous phase are developed. In this phase, the specific questions for evaluation are developed. Then, all the educational materials are integrated into the platform.



1.0 Introduction to Internet

Completed: 1/9

At the end of this session, learners should be able to:

- learn about History and the uses of the Internet
- learn on WWW and other Internet Application
- identify Internet Service Provider
- learn on how to connect to Internet
- learn on how data is travelled through Internet
- learn about Internet Protocols

Notes : Introduction to Internet

Notes : Introduction To Internet II

What is Internet?

How The Internet Works?

History of the Internet

Activity 1: About Internet

Activity 2: Cross Word Puzzle

Quiz Chapter 1

References

Fig. 2. The display screen of each learning activities design

3.4 Implementation Phase

The implementation phase is to identify whether the developed MOOC meet the objectives of that has been determined.It refers to the content delivery in the online mode.This MOOC will be launched at OpenLearning platform. This phase starts with the first course opening. Learning and video materials are uploaded based on the syllabus of the course.

3.5 Evaluation Phase

Before the course is implemented at OpenLearning platform, the methodology phases are evaluated in each step. In this phase, a pilot test will be conducted to troubleshoot and evaluate the course and the MOOC platform. This process will be evaluated by the participant of an expert of the course (experienced academic staff).

There are three levels of evaluationinvolve; contents evaluation, language evaluation and design evaluation. The purpose of the evaluation is to review and analyze learner engagement. Besides, it is to consider any improvements needed before the final implementation take place.

4. CONCLUSION AND FUTURE WORK

This paper describes the design and development of “Web Application Development” MOOC. It was an effort to introduce web technologies and web programming concepts to computer science students. The design process aims at evaluation of students’ mastery of web programming, which are again confirmed by taking this online course. So far, this paper is focused mostly on the design and creation of the learning materials and the activities.

In the future, we are planningto lay focus more on the practical web programming exercises and to solve actual web programming tasks. The next phase is to run a pilot test to a group of students of computer science who will enroll the course next semester of study. This final assessment aims to provide some feedbacks from the users to improve the contents of the course. Besides, the findings are also expected to provide some useful feedbacks for establishment of MOOC in the UiTM.

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