DESIGNING BLENDED LEARNING FOR SKILL-BASED COURSE:
INTRODUCING DeLCAD MODEL FOR COURSE DESIGN

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ABSTRACT

A blended learning approach (BLA) to teaching interactive multimedia project development to distance learning students is proposed. The learning outcome pertinent to the project includes animation features using authoring tools. There are three learning issues affecting the traditional teaching method that the proposed BLA attempted to address. Firstly, students do not have the time and location flexibility in learning the skills for multimedia development. Secondly, students have insufficient time to complete the given task. Lastly, students often need extra time in understanding difficult topics. The design of the proposed BLA comprises teaching delivery (De), learning activities (L), course content (C), assessment (A) and discussion (D) using the ideals of a flipped classroom. A DeLCAD model is thus introduced in this paper. The proposed BLA is implemented using a proprietary Learning Management System. The lecturer delivers the required skills online via virtual class and personal video conferencing. Tools for teaching including Padlet, Zoom, 5hp, ClassTools, Kahoot!, TOGlic, Trello, Qizziz, Minnit and Powtoon are used in creating an engaging learning experience for the students. The learning is made to be fun by using gamification and virtual learning. The proposed approach provides online learning support time to complete the multimedia application development task. Assessment tools namely, quiz, test and assignment are used with rubrics to assess students’ understanding and quality of their project. Students also use online discussion tools to discuss project development matters with other students and the lecturer. Three cohorts of part-time distance learning students at Universiti Teknologi MARA Malaysia comprising two control groups (DeLCAD not applied; \( N_1 = 15 \) and \( N_2 = 11 \)) and one treatment group (DeLCAD applied; \( N_3 = 25 \)) were studied. It was found that the overall grade performance of the \( N_3 \) cohort was generally superior by 30% on average compared to that of the \( N_1 \) and \( N_2 \) cohorts. Students were able to demonstrate their grasp of the knowledge and skills of the project online using Zoom. The DeLCAD model of the proposed BLA thus helped provide the students the control over learning pace and space to attain their learning outcomes and thereby improving their course grades.

Keywords: Blended Learning; Skill-Based Learning; Teaching Application
INTRODUCTION

Students taking interactive multimedia course require a wide range of multimedia development skills and high-level ability to use multimedia application to develop an interactive multimedia project development. There are three issues identified in current learning for interactive multimedia project development. Firstly, students do not have the flexibility in learning the skills for multimedia development. The current teaching method imposes restricted learning time and location. They do not have any control in their multimedia development skill learning. Secondly, students do not have sufficient time on the development task given. Face-to-face learning is limited to 10 hours of classroom learning and task time. Thirdly, students are less interested in learning development skills. Students either master the multimedia development skills or do not understand the topics because it is too complex. Students are not able to pause and go back to the topics that they do not master yet using the current learning method. This is challenging for those needing extra time and learning aid in understanding the difficult topics optimally.

Understanding the learning difficulty of students in the skill-based course, this study aims to propose a suitable approach to ease the learning difficulty and improving learning achievement of the students. Interactive multimedia is skill-based course that teaches skills required to develop an interactive multimedia application. Creating learning instructions that concern with multimedia skill development is the responsibility of the instructor [1]. The selection of suitable model to design the learning instructions must be based on learning theory that is suitable for the goal of learning process.

Technology plays a major role in developing students’ skills to ensure the success of learning. Educational technologies generally use the concept of blended learning. The word blended means mixture or combination while learning means the acquisition of knowledge or skills through study, experience, or being taught. Blended learning is defined as any formal education course or program in which a student learns at least in part through online learning, with some element of control over time, place, path, and/or pace [2]. Blended learning combines online and face-to-face teaching with 30% to 79% of its content and activities were conducted online using blended learning approach [3].

Characteristics of blended learning approach are (1) blended learning is a way of delivering education online, (2) blended learning does not replace the face-to-face learning in the classroom but strengthens the learning using educational technologies and (3) the use of learning materials are independent where students and instructors can access it from anywhere at any time [4]. The approach of blended learning is to utilize the use of educational technology in classrooms to optimize student learning through face-to-face and online interaction. The use of blended learning in education allows student-centered learning.
Unfortunately, mixing face-to-face and online learning method alone does not promise a noticeable student understands enhancement. It requires suitable model to be carefully applied to learning task to see inevitably lead in student learning [5]. There are few different models used to design student learning activities with the use of technology to support both inside and outside classroom learning. The majority of blended-learning models resemble one of four models: Rotation, Flex, Self-Blend, and Enriched Virtual [6]. The Rotation model includes four sub-models: Station Rotation, Lab Rotation, Flipped Classroom, and Individual Rotation.

It is recommended that instructors to use the flipped classroom model to teach hands-on techniques using lecture tutorials [7]. Using the flipped classroom model, the students gain first exposure to new learning outside the classroom via reading or watching lecture videos, and then focus on processing part of learning in classroom via learning activities like problem-solving and discussion [8]. There are two major components in flipped classroom; (1) online learning using digital content or teaching video and; (2) in-class activities [9].

The flipped classroom blended learning model was implemented with a range of teaching methods to teach interactive multimedia course for part time students. The students learned the multimedia project development skills using content upload in a Learning Management System proprietary to Universiti Teknologi MARA (UiTM LMS) or through live lecture. After viewing content and live lecture, students discussed each other through online discussion or online chat room on any questions they had on the lecture. The multimedia project development was conducted in face-to-face session with collaborative team hands-on work in a computer lab. The instructor was available throughout the face-to-face session to interact and guide the students for the project development. Students understanding of the multimedia project development were tested using quiz, test and assignment. All these assessments were conducted and assessed 100% online using UiTM LMS. Once the students completed the multimedia project development, they presented their work online using video conferencing. The assessment of student work was also evaluated online using the rubrics created in UiTM LMS. The students’ performances were able to be obtained through the rubric analysis and from the progress report generated in UiTM LMS.

**METHOD**

This study was conducted to design a flipped classroom model for teaching skill-based course for part-time students and then later compare their learning performances in flipped and non-flipped classroom. The research was conducted using experimental approach, whereby data were gathered and analyzed using quantitative method. Data were collected through course post-tests scores. The participants for this study comprised 51 part-time undergraduate students selected from the first semester of three consecutive academic years. These cohorts
were called post-test 1 and 2 control groups (semesters 1 of the 2016/2017 and 2017/2018 academic years), respectively, and experimental / treatment post-test 3 group (semester 1 of the 2018/2019 academic year) in the discussion below. The class population of the post-test 1 and 2 groups was $N_1 = 15$ and $N_2 = 11$, in order while, that of the post-test 3 group was $N_3 = 25$. All the three cohorts were exposed to the same classroom settings, i.e. LCD projectors, computers and internet access. The students and instructors were able to use the internet for their teaching and learning throughout the face-to-face session.

**Course Design**

Both flipped and non-flipped classes were conducted five times over a 14-week semester with the same instructor. The group receiving the flipped classroom learning was the experimental group (treatment group); and the one receiving the non-flipped classroom learning was the control group. Students learning in flipped classroom were via watching teaching videos via home and later learning was reinforced using in-class activities (individual and group class activities, group discussion, individual and group presentations).

The flipped classroom instructions were designed to include both online and face-to-face classroom activities. The online activities included student self-learning content uploaded on to the UiTM LMS prior to class and then use class time to conduct group discussions to reinforce their learning. The face-to-face classroom activities included a 15 minutes interactive current learning understanding (feedback) session by students, 15 minutes restate evolved students’ understanding by the instructor, 45 minutes conventional activities and 45 minutes individual or group activities.

The non-flipped class was handled in the traditional way of teaching and learning style. Students were required to do all their assigned learning activities at home, while lecture was conducted during face-to-face session in the classroom. Class activities for this control group were 90 minutes of lecture by the instructor and 30 minutes of conversational activity based on the lecture conducted by the instructor. For their online activities, students were expected to participate in their learning activities (read content, do assignments, take quiz/test and etc.). The online session focused on internalize the knowledge gained in the classroom and completed their assigned learning activities online before coming to the face-to-face session.

**Course Design using DeLCAD Model**

The blended learning approach will be explained by teaching delivery (De), learning activities (L), course content (C), assessment (A) and discussion (D) using the flipped classroom model. The teaching delivery methods used were face-to-face and online. Learning activities was designed in facilitated and self-paced fun mode so that the students would be motivated to participate. The course content that used
was in the form of textbooks and visually attractive e-content. Assessment tools like quiz, test and assignment rubric were used to assess students’ understanding and quality of their project. Students also used the online discussion tools to discuss project development matters either synchronous or asynchronous between other students and lecturer. Table I shows the proposed five components (Teaching Delivery, Learning Activities, Course Content, Assessment and Discussion) in DeLAD model for designing flipped classroom model using BL approach for teaching and learning.

**TABLE I: DELAD MODEL FOR DESIGNING FLIPPED CLASSROOM MODEL USING BLA**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>METHOD(S) / FORMAT(S)</th>
<th>TOOL(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Delivery</td>
<td>Face-to-face</td>
<td>Classroom / lab</td>
</tr>
<tr>
<td></td>
<td>Online</td>
<td>UTM LMS, Web 2.0 Tools</td>
</tr>
<tr>
<td>Learning Activities</td>
<td>Assigned reading material</td>
<td>UTM LMS</td>
</tr>
<tr>
<td></td>
<td>Facilitated synchronous discussion and</td>
<td>UTM LMS / Classroom</td>
</tr>
<tr>
<td></td>
<td>collaborative task</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-assessment – multiple choice, multiple</td>
<td>UTM LMS, TOGlic, h5p,</td>
</tr>
<tr>
<td></td>
<td>answer, fill in the blanks, drag-drop, short</td>
<td>classstools, Quizzes</td>
</tr>
<tr>
<td></td>
<td>answer, hotspot, crossword, true false.</td>
<td></td>
</tr>
<tr>
<td>Course Content</td>
<td>Entrance and exit survey</td>
<td>UTM LMS</td>
</tr>
<tr>
<td></td>
<td>Digital materials</td>
<td>PowerPoint, Powtoon</td>
</tr>
<tr>
<td></td>
<td>Printed material</td>
<td>Textbook</td>
</tr>
<tr>
<td>Assessment</td>
<td>Formative</td>
<td>UTM LMS</td>
</tr>
<tr>
<td></td>
<td>(quiz, test, assignment, discussion,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>presentation)</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td>Synchronous</td>
<td>Classroom, Zoom</td>
</tr>
<tr>
<td></td>
<td>Asynchronous</td>
<td>UTM LMS</td>
</tr>
</tbody>
</table>

*Tool(s) stated are used in this study. There are many more other tools available and the usage may vary for different courses.

**RESULTS AND DISCUSSIONS**

The experimental post-tests were compared with three groups from three different semesters. This is to examine the competence of part-time students of three groups (two groups of non-flipped classroom and one group of flipped classroom). The post-tests were based on continuous formative assessments of tests (40%), quizzes (10%), individual assignment (10%) and group assignment (40%).

In the experimental post-test 3 ($N_3$) group, students were taught the multimedia development skills using virtual class, video conferencing and traditional methods. Instructor’s role was as facilitator for the experimental group. In the control post-test 1 and 2 groups ($N_1$ and $N_2$), students were taught using the regular educational materials (i.e. textbooks, PowerPoint slides) and traditional methods (lecture conducted in classroom). Instructor uploaded classroom teaching content and initiated few posting for discussion in UTM LMS only to support the student learning. After the completion of the teaching process, students performed better when flipped classroom (self-learning online and task work in lab) using BLA was employed (Figure 1). It was found that the overall grade performance of the $N_3$ cohort was generally superior by 30% on average compared to that of the $N_1$ and $N_2$
cohort managed to attain Grade A, a performance not achieved by the control groups.

![Figure 1. Student Achievement for Interactive Multimedia Course](image)

**CONCLUSIONS**

This study presents a blended learning approach (BLA) to teaching interactive multimedia project development to distance learning students. The learning outcome intended for the project includes animation features using authoring tools. Three learning issues pertinent to the restrictions of pace and space commonly found in traditional teaching method of a complex subject like multimedia project development are addressed using the proposed BLA. A model to design the proposed BLA called DeLCAD is introduced in this paper. The DeLCAD model comprises teaching delivery (De), learning activities (L), course content (C), assessment (A) and discussion (D) using the ideals of a flipped classroom. The proposed BLA is implemented using a proprietary Learning Management System. The learning process is aimed at facilitating expended or contextual learning via the proposed BLA and making learning more fun and engaged by incorporating gamification and virtual learning. Special need students also can reinforce their classroom learning by variety of attractive content. Students were able to utilize online discussion tools to discuss project development matters with other students and the lecturer. It was found that the overall grade performance of the treatment group to which the DeLCAD is applied, while creating A-grade students, was generally superior by 30% on average compared to that of the control groups.
Students were able to demonstrate their grasp of the knowledge and skills of the project online using Zoom. The DeLCAD model of the proposed BLA thus helped provide the students the control over learning pace and space to attain their learning outcomes and thereby improving their course grades.

REFERENCES