DESIGN AND DEVELOPMENT OF FLIPPED LEARNING ENGAGEMENT MODEL TO ENHANCE STUDENT ACHIEVEMENT

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A thesis submitted
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DECLARATION

I declare that this thesis entitled "Design and Development of Flipped Learning Engagement Model to Enhance Student Achievement" is the result of my own research except as cited in the references. The thesis has not been for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

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Date : 1/10/2021

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

Signature : .....

Supervisor Name : Associate Professor Dr. Norasiken Bakar

Date : 1/10/2021

DEDICATION

This thesis is specially dedicated to:

My beloved wife, Maslita binti Abd Aziz and all my sons, Ahmad Afif,

Ahmad Lutfi, Ahmad Fahmi and Mas Afzal.

ABSTRACT

Online learning education at higher learning institutions has change over the years as technology evolves. The main purpose of this research is to proposed a new model called Flipped Learning Engagement (FLE) model and conduct a study based on this new proposed model. Based on preliminary analysis, students obtain low grades for programming course at degree level especially for Information and Communication Technology (ICT) as well as for Computer Science fields of study. Since this course is also taken by engineering students, this research involves students from both fields. In order to proposed a new FLE model, this study has conduct a user-friendly test on five constructs namely effectiveness of students' achievements, learnability, ease of use, flexibility and students' attitude towards using online learning materials was developed and tested based on Programming Technique course. Usability testing on Programming Technique course was conducted based on quasi-experimental approaches, using interview and observation techniques for Universiti Teknikal Malaysia Melaka (UTeM) students as samples. The experiment test for this study consists of 24 students from Faculty of Information and Communication Technology (FTMK) as well as 48 students from the Faculty of Electrical Engineering (FKE) at UTeM. Various instruments such as questionnaires, explanations on students' progresses, interview schedule as well as pre and post-test were conducted to collect research data. Usability test was carried out in four separate groups which are Control Technology group (CT) group, Experiment Technology (ET) group, Control Engineering (CE) group and Experiment Engineering group (EE) using t-test. The result of this research founds that the experimental group (ET and EE) who undergo learning and teaching process using proposed FLE model obtain higher result or level of achievements as compare to control group (CT and CE) who followed the conventional approach of teaching and learning. The main contribution of this research is the design and development of FLE model. In addition, this research also contributes to the aspects such as the design and development of Programming Technique MOOC, the design of flipped learning activity and the outcomes of the usability test based on FLE model as well as users experienced which was tested using Programming Technique MOOC based on five constructs. FLE model that have been designed and developed in this research can be used as guidance not only for programming related educations but also for all educators that use flipped learning approach in their learning and teaching process. In the future, researchers can conduct in depth study based on this proposed model and make any improvements by adding new entities that enables the model to be used in any related courses at any level of education.

REKA BENTUK DAN PEMBANGUNAN MODEL KETERLIBATAN PEMBELAJARAN BERBALIK BAGI MENINGKATKAN PENCAPAIAN PELAJAR

ABSTRAK

Pembelajaran secara dalam talian di institusi pengajian tinggi telah berubah saban tahun mengikut perkembangan teknologi. Tujuan utama penyelidikan ini adalah bagi mencadangkan sebuah model baru yang dipanggil model Keterlibatan Pembelajaran Berbalik (KPB) dan menjalankan kajian ke atas model baharu yang dicadangkan. Berdasarkan analisa awal, pelajar mendapat gred yang rendah bagi kursus pengaturcaraan pada peringkat ijazah terutamanya bidang Teknologi Maklumat dan Komunikasi (TMK) serta bidang pengajian Sains Komputer. Memandangkan kursus ini juga diambil oleh pelajar kejuruteraan, kajian ini melibatkan pelajar daripada kedua-dua bidang. Bagi mencadangkan model KPB yang baharu, kajian ini telah melaksanakan ujian mesra pengguna ke atas lima konstruk yang dinamakan sebagai keberkesanan pencapaian pelajar, keupayaan pembelajaran, mudah digunakan, fleksibiliti dan sikap pelajar terhadap bahan pembelajaran secara dalam talian telah dibangunkan dan diuji berdasarkan kursus Teknik Pengaturcaraan. Pengujianan kebolehgunaan terhadap kursus Teknik Pengaturcaraan telah dilaksanakan berdasarkan pendekatan kajian kuasi, menggunakan teknik temubual dan pemerhatian terhadap pelajar Universiti Teknikal Malaysia Melaka (UTeM) sebagai sampel. Sampel kajian ini terdiri daripada 24 pelajar dari Fakulti Teknologi Maklumat dan Komunikasi (FTMK) serta 48 pelajar dari Fakulti Kejuruteraan Elektrik (FKE) di UTeM. Pelbagai instrumen seperti soal selidik, penerangan mengenai kemajuan pelajar, jadual temubual serta ujian pra dan pos telah dilaksanakan bagi tujuan pengumpulan data penyelidikan. Ujian kebolehgunaan telah dijalankan terhadap empat kumpulan iaitu kumpulan Kawalan Teknologi (CT), Teknologi Eksperimen (ET), Kawalan Kejuruteraan (CE) dan kumpulan Eksperimen Kejuruteraan (EE) menggunakan ujian-t. Hasil penyelidikan telah mendapati bahawa kumpulan eksperimen (ET dan EE) yang melalui proses pembelajaran dan pengajaran menggunakan model KPB yang dicadangkan memperolehi keputusan yang lebih tinggi atau tahap pencapaian yang lebih baik berbanding dengan kumpulan kawalan (CT dan CE) yang mengikuti pendekatan pengajaran dan pembelajaran secara konvensional. Sumbangan utama kajian ini adalah rekabentuk dan pembangunan model KPB. Sebagai tambahan, kajian ini juga memberi sumbangan terhadap reka bentuk dan pembangunan MOOC bagi Teknik Pengaturcaraan, reka bentuk aktiviti pembelajaran berbalik dan hasil daripada ujian kebolehgunaan berdasarkan model KPB serta pengalaman pengguna yang telah diuji menggunakan MOOC bagi kursus Teknik Pengaturcaraan berdasarkan lima konstruk. Model KPB yang telah direka bentuk dan dibangunkan melalui kajian ini boleh digunakan sebagai panduan bukan sekadar pembelajaran berkaitan pengaturcaraan tetapi juga bagi semua pengajar yang menggunakan pendekatan pembelajaran berbalik di dalam proses pembelajaran dan pengajaran mereka. Pada masa hadapan, penyelidik dapat menjalankan kajian secara lebih terperinci berdasarkan model yang dicadangkan ini dan melakukan sebarang penambahbaikan dengan memasukkan entiti baharu yang membolehkan model ini digunakan di dalam sebarang kursus berkaitan di semua peringkat pengajian.

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LIST OF ABBREVIATIONS

CE	-	Control Group for Engineering Students
CT	-	Control Group for Information Technology Students
DePAN	-	National e-Learning Policy
EE	-	Experiment Group for Engineering Students
ET	-	Experiment Group for Information Technology Students
FLE	-	Flipped Learning Engagement
GOL	-	Globalized Online Learning
ICT	-	Information and Communication Technology
L&T	-	Learning & Teaching
LLL	-	Lifelong Learning
MIT	-	Massachusetts Institute of Technology
MOE	-	Ministry of Education
MOOCs	-	Massive Online Open Courses
MOOCPTCL	-	Programming Technique MOOC Checklist for Lecturers
MOOCPTCS	-	Programming Technique MOOC Checklist for Students
MHE	-	Malaysian Higher Education
MTUN	-	Malaysian Technical University Network
NKEA	-	National Key Economic Area
OCW	-	OpenCourseWare
OER	-	Open Education Resources
PSPTN	-	*Pelan Strategik Pendidikan Tinggi Negara* (National Higher Education Strategic Plan)
T&L	-	Teaching and Learning
TPACK	-	Technological Pedagogical Content Knowledge
TVET	-	Technical and Vocational Education and Training

LIST OF PUBLICATIONS

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