Analysis of Blended Learning Strategies for Technical Course in the Open and Distance Learning Environment

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Abstract

This paper provides an overview on the blended learning approach at Open University Malaysia (OUM) focusing on the engineering and science courses. The blended learning mode at OUM consists of three primary components: a) Self-Managed Learning; b) Face- to-Face Tutorial; and c) Collaborative Online Learning (COL). The current practice along with issues and challenges pertaining to technical courses is underlined. A pedagogical model is proposed based on the constructivism theory. Constructivism requires active involvement of the learner. Two constructivism approaches; inquiry-based learning and problem based learning are incorporated in this model. Inquiry-based learning involve development of learners with ability to recognise problems, ask questions, apply investigational procedures (could be mathematical) to provide consistent description and explanation. Functional problem-based learning requires problems with meaningful context which stimulates a learner to be actively involved. The model integrates the three primary components; the self instructional module, the face-to-face tutorial sessions and the online asynchronous forum. Technical courses require more skills than just memorizing facts. It requires learners to be able to construct knowledge, reason, solve problems and extend the knowledge to real-life applications. Efforts to incorporate continuous improvement strategies in the existing learning platforms for technical courses in response to the changing needs of a borderless world are included.

Keywords: Technical courses, blended learning, open university, pedagogy, self-managed learning, face-to-face tutorial, collaborative online learning

I. INTRODUCTION

The Open University Malaysia (OUM) uses blended pedagogical approach of learning to deliver its open and distance education programmes. This paper provides an overview on the blended learning approach at focusing on the engineering and science courses. The blended learning mode at OUM consists of three primary components:

a. Self-managed learning (SML)
b. Face-to-face tutoring (F2F Tutorial)
c. Collaborative Online Learning (COL)

Learners in OUM are guided in their SML through self-instructional modules (SIM). At OUM, one of the first courses learners must register for is the "Learning skills for Open and Distance Learners" course. Upon registration for this course, learners are provided with "The Learning Skills for Open and Distance Learners" module (OUMH1103 Module) which is the primary learning material for them to manage their learning. This course will ensure that they will be ICT savvy and learn the basic learning skills and search strategies for information retrieval.

Every module includes a course guide section which introduces learners to a recommended SML plan, course synopsis along recommended reading materials and the assessment method for the course. SML involves individual learning. Table 1 shows the breakdown of actual hours for the learning skills for open and distance learners module, a three credit hours course. It is based on the blended pedagogical approach, where 79% of a total of 120 hours is recommended for SML purpose. Learners ought to construct their knowledge using SML activities.

Table 1: Blended Learning Mode

Blended Learning Mode	**Hours**
Reading the module and completing exercises	60
Attending F2F tutorial session	10
Engage in online discussion	15
Completing (1) assignment	20
Revision	15
Total	**120**

Source: OUMH1103 module

After two weeks of self-study, a learner can attend the F2F Tutorial sessions along with other learners to discuss the course content with their tutor. It involves group learning facilitated by the tutor. This guided classroom session is an option offered to mediate the learners who are accustomed to traditional classroom interactions. The tutor would initiate discussion of concepts and conduct activities involving problem-solving. Learners work together with the learners to resolve any unclear concepts introduced in the course. Learners also engage in group activities to enhance their problem-solving skills.

Throughout the entire semester, a learner is supported by myLMS (my Learning Management System), which is OUM's internally-developed web-based e-learning platform. It supports asynchronous online forum where COL takes place facilitated by the F2F tutor. Collaboration, in simple definition, means work jointly to achieve a common goal. This session is similar to the F2F session, except it is asynchronous and is online. It can be accessed from anywhere and at anytime. Learners and facilitators contribute to the process of knowledge construction by providing ideas and opinions, sharing experiences and simultaneously engaging in deep learning activities (Kaur, K. & Zoraini, 2004). Through COL, learners can test their understanding and problem-solving skills they have acquired through discussions and solving problems in their respective groups. In distance education, discussion and sharing experience have been identified as two of the most effective means by which adults learn (Williams, B., 2004).

Technical courses are defined as courses connected with the practical use of machinery, methods, etc., in science and industry. These include science, engineering and programming courses. Considering the high percentage of hour requirement for SML, an Open and Distance Learning (ODL) learner must have a high level of self-directed learning competence in these courses.

Issues and Challenges for Technical Courses

The open and distance education experience in OUM is a success story in Malaysia. Nevertheless, it is not without of issues and challenges. Among the prevailing issues for technical course are highlighted below:

- Lack of interest and prior knowledge, especially mathematical skills required for technical course. This is a world-wide problem which has resulted in courses such as non-calculus physics.

- Module writers, despite being trained, find it hard to change their writing styles to suit ODL pedagogical approaches.

- There is also a lack of manpower (tutors) for technical courses in the rural areas.

- COL quality for technical courses does not fare as well as for non-technical courses. Most learners learn science and mathematics through rote memory. They do not participate in active learning involving discussions, presentations and free writing. A paradigm shift is needed for a change to occur.

- ODL technical programmes are often not well perceived due to the constraints in the fulfilment of laboratory work or field-work components.

II. THEORETICAL BACKGROUND

The pedagogical method practiced in OUM is a combination of behaviourism and cognitivism. SIM is written based on behaviourism pedagogy and enriched using instructional design strategies. Continues improvement of the SIM is geared in two different path; pedagogical framework and ICT driven delivery mode/approaches (Kaur, A. & Othman, W., 2006)

Learning is a process. Behaviourism approach views learning as a process to change behaviour in a desired direction. This differs from the objective of technical courses, which focuses on developing capacity and skills to learn better, i.e. cognitive ability such as information processing (Smith, 1999). As such the pedagogy model for technical courses would be best based on a cognitive orientation. Much cognitive science research has been used to support constructivist learning model (Yager, 1991).

Constructivism Theory

Constructivism requires active involvement of learners whereby they construct knowledge for themselves. Constructivism is a psychological theory involving mainly the active learners interacting with the physical and social world (Fosnot, 1996). This theory is based on two types of constructivism: cognitive constructivism and social constructivism. Cognitive constructivism theory is based on the work developed by Jean Piaget. His theory states that individual must construct their own knowledge in order to understand and build their knowledge through experience. Piaget's theory also suggests that the role of teacher/tutor in the classroom/F2F environment is important to the learning process. It emphasizes that learners should be given the opportunity to construct knowledge through their own experience. The second type of constructivism is social constructivism developed by psychologist Lev Vygotsky. In his theory, he supports the argument by Piaget but emphasizes more on the social context of learning. Like Piaget, Vygotsky also states that the teacher/tutor plays a major role to guide the learners in approaching problems and encourage the learners to work in groups to resolve issues and answer questions. Another prominent psychologist, John Dewey states that education depends on action. He adds that the actions that take place will transform, recognize and reshape the accepted meaning and values while attending to lived situations (Epstein, 2002).

Dewey's theory provides activities which engage the mind as well as hand incorporating two approaches in learning: problem-based learning and inquiry-based learning. Another approach in the constructivism theory is the discovery-based learning introduced by Jerome Bruner (Dettrick, n.d.).

Problem-Based Learning

Functional problem-based learning (PBL) requires problems with meaningful context which stimulates a learner to be actively involved. PBL refers to constructivist approach to learning (Berkel & Dolmans, 2006).

PBL was invented by McMaster University medical school 30 years ago. It is a total integration approach to the learning system where the learning process moves towards learner-centred learning to produce competent graduates. Typical essential characteristics of PBL methodology are described as follows (WS Wei, 2005):

a. Problems are designed to emulate real-world problems.
b. Problems used are complex and cover multiple objectives.
c. The problems are introduced first, before any learning occurs.
d. Student work in collaborative groups to gain multiple perspectives on possible solutions.
e. Student must have the responsibility of SML.
f. What student learned during their SML must be applied to the problem with reanalysis and resolution.
g. Analysis of what has been learned with the problem and a discussion of what concepts and principles have been learned is essential.
h. Self and peer assessment should be carried out at the completion of each problem.
i. Examinations must measure learner progress towards the goals of PBL.

The PBL characteristics are aimed at developing learner problems solving skills, self-managed skills, teamwork skills and effective communication skills during online interaction and face-to-face tutoring. The objective of incorporating PBL into the OUM learning system is to inculcate pro-active SML among the learners via myLMS platform.

Inquiry-Based Learning

The inquiry-based learning (IBL) has strong support from the constructionist psychology primarily emphasizing on hands-on and problem-centred approach. IBL involves the development of learners with the ability to recognise problems, ask questions, apply investigational procedures (could be mathematical) to provide consistent description and explanation. It requires the learners to handle situations on the above encounters and it is an open-ended and ongoing process of learning (Dettrick, n.d.).

Discovery-Based learning

Discovery-based learning (DBL) states that motivation of an individual to learn science will be increased if the individual experiences the feelings scientists acquire from 'discovering' scientific knowledge. This theory also supports that an individual would learn about the nature of science, the construction of scientific knowledge through the process of 'discovery'(Dettrick, n.d.).

Education research in science for example, focuses more on learners then teachers. The learner must be self-directed and must be actively involved in the learning process. Learning is successful if the learner achieves a full understanding of the subject matter. This cannot be achieved through rote memory. Restating a fact does not reflect understanding. Understanding of the subject matter can be gauged by the learners' ability to reconstruct, solve problems, analyze, synthesize and evaluate. Modern science does not give us truth, it offers a way for us to interpret events of nature and cope with the world (Yager, 1991).

The pedagogy of technical courses must change to suit the changing needs of the modern world. A new pedagogy model for technical courses is suggested based on the constructivism strategies in the next section.

III. PROPOSED MODEL

The new pedagogical model for technical courses is based on the constructivism theory. Three constructivism approaches; discovery-based learning, inquiry-based learning and problem-based learning are incorporated in this model. The model integrates the three primary components: the self instructional module, the face-to-face tutorial sessions and the online asynchronous forum. Technical courses require learners to be able to construct knowledge, reason, solve problems and extend the knowledge they acquire to real-life applications.

The Framework for the Proposed Model

The framework for the proposed model is built based on the SIM layout, as it is the main component of the ODL programme in OUM. The framework outlines the objectives of each section. It is structured using six of the nine Gagne Events (G.E.) (Gagne, 1985). The pedagogy model is built based on this framework.

A. Introduction

1. Develop a sense of appreciation of the subject matter among learners. 2. Gain the attention of learners (G.E. 1)

B. Learning Outcomes

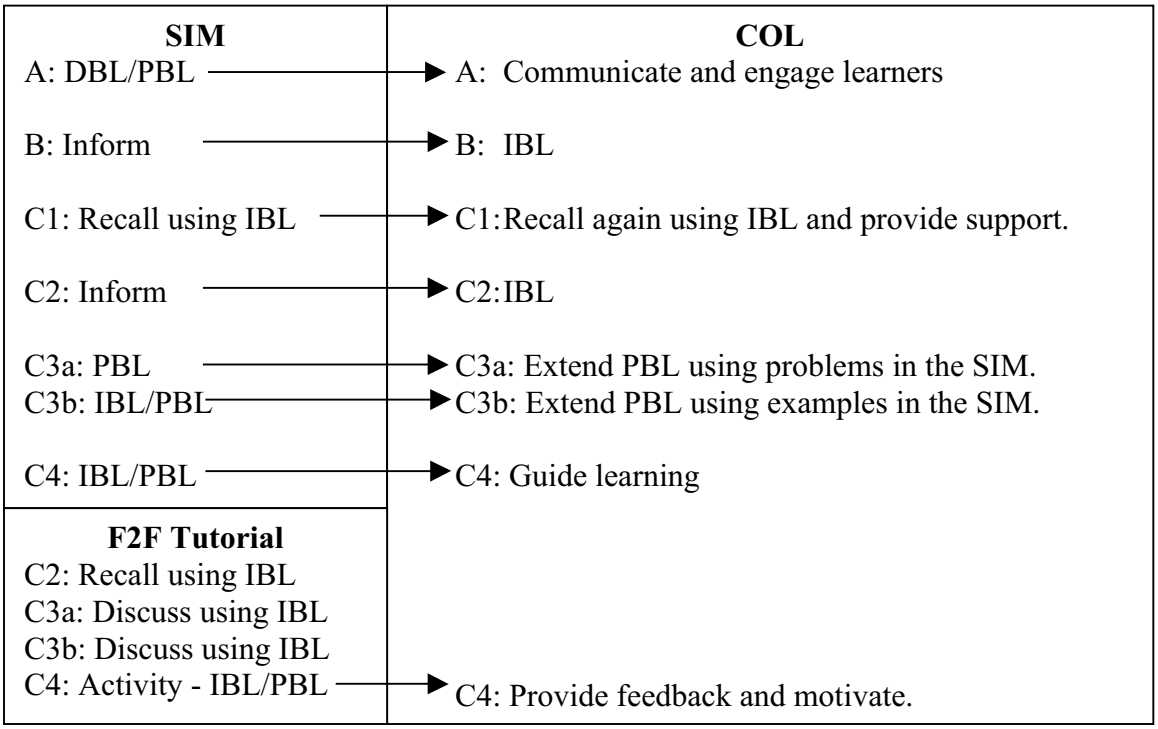
Provide expected learning outcome. (G.E. 2) *Guide: Using the first three levels of Bloom taxonomy.* • *Level 1: Knowledge (Terms and definitions)* • *Level 2: Comprehension (Knowledge models/Concepts)* • *Level 3: Application (Problem Solving)*

C. Content

1. Stimulate recall of prior learning. (G.E. 3) 2. Present Stimulus. (G.E. 4) 3. Guide Learning (G.E. 5) (a) Knowledge model (b) Examples
Elicit (G.E. 6) using Activities and Exercise.

The Proposed Model

The proposed pedagogical model is built using the above framework. It blends F2F tutorial and COL components to form a well-integrated model. The objectives outlined in this model are to be achieved using constructivism strategies described in section II. The choice between IBL and PBL depends on the content of the subject matter.



IV. STRENGTH AND WEAKNESS

The proposed pedagogical model is learner-centred. It offers learners to be actively involve in their learning process. The model enable learner to develop their skills in recall prior learning, fact findings, construct knowledge and solve problems by using constructivism approaches. Learners do not merely compile facts, they learn how to think and interpret events. Thus, enabling them to cope well in real-life situations and making them resourceful manpower.

One of the key weaknesses in the model is that it assumes learner to be self-directed. The assumption is not valid for all learners and at all time. In such instances, learners will not easily engage in the learning and often turn-up for F2F tutorials without any introduction to the subject matter, knowing the learning objectives, do not recall prior knowledge and do not even know the basic terms required. This requires the F2F sessions to be actively adjusted according to the different level of readiness among learners. This leaves very little time for any active learning activities to take place.

V. CONCLUSION AND RECOMMENDATION

A pedagogical model based on constructivism strategy is proposed to engage learners in their learning process. The aim is to enable effective learning and increase learners academic knowledge and performance. Constructivism learning strategies are introduced in the model which integrates the three learning components: self-managed learning; face-to-face tutoring; and collaborative online learning offered in OUM. The strategies used are DBL, IBL and PBL. In order to accommodate the different learner readiness and capabilities, the F2F and COL have to be fixed accordingly. All three approaches, DBL, IBL and PBL must be updated with the changing needs of learning in the context of the current global and borderless education. Such efforts would create a feel of being part of the borderless community among learners and this motivates and encourages learners to be actively involved in their learning.

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