

## **Planning and Implementation of the Bachelor of Education (Engineering) - The Open University Malaysia Experiences**

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### **ABSTRACT**

This paper describes the process of designing and developing the curriculum of Bachelor of Education (Engineering) program at Open University Malaysia (OUM). This program was initiated by OUM and Ministry of Education Malaysia to ensure that all technical teachers in Malaysian secondary schools possess a bachelor degree by the year 2010. It was designed to train in-service teachers on three aspects; (i) development of learner's pedagogical knowledge, (ii) enhancement of teaching and assessment method, (iii) improvement of knowledge in general engineering and specialized engineering (civil/electrical/mechanical) fields. This integrated approach of curriculum design provides a platform for teachers to enhance their technical knowledge and teaching skills.

**KEYWORDS:** Curriculum Development, Open and Distance Learning (ODL)

## **A. Introduction**

The establishment of Malaysia's first open university on the 10<sup>th</sup> August 2000 marks a dynamic development in the Malaysian education industry, particularly in Open and Distance Learning (ODL). It was incorporated as the country's seventh private university under the Private Higher Education Institutions Act 1996. OUM is owned by a consortium of the first eleven Malaysian public universities. Since its first intake in August 2001, the number of student in OUM has risen from 753 to over 42,000 and the number of academic programs increases from 4 to 47.

OUM currently has five faculties, offering programmes in various disciplines that are relevant to the current and emerging trends in the industry. Each programme undergoes a process of quality checks in curriculum design, content and assessment methods. Apart from the faculties, OUM has established five centres and an institute to complement and support the delivery of its academic programmes. To provide the lifelong learning opportunities, the School of Lifelong Learning (SoLL) was established on November 1<sup>st</sup>, 2004.

The Faculty of Engineering and Technical Studies (FETS) at OUM was established with the objective of providing tertiary education and life-long learning opportunities in engineering and technical fields. It currently offers three undergraduate degree programs delivered through ODL, namely;

- i) Bachelor of Education (Civil Engineering) with Honours;
- ii) Bachelor of Education (Electrical Engineering) with Honours; and
- iii) Bachelor of Education (Mechanical Engineering) with Honours.

Currently, the faculty has added new programmes such as the Diploma in Technology Management, Bachelor of Technology Management, Diploma in Civil Engineering, Diploma in Mechanical Engineering and Diploma in Electrical Engineering. These programmes are tailor made for working adults in the field of technology and engineering.

## B. Curriculum Design

There are three main factors which influence the design of curriculum in an Open Distance Learning (ODL) environment. They are: (i) target group of students, (ii) the expectation of its students upon graduation and (iii) pre-defined structure of the program's academic calendar, (Fadzil, 2002). Two key components that are being focused on the curriculum are the student centered approach and customized requirements to meet the needs of Ministry of Education (MOE). The development model is shown schematically in Figure 1 (Muthusamy, 2005). Student centered approach is a crucial component in OUM. Referring to Table 1, self managed learning plays a major role in the learning process, in which 50 per cent of study time is allocated for self study for each course.

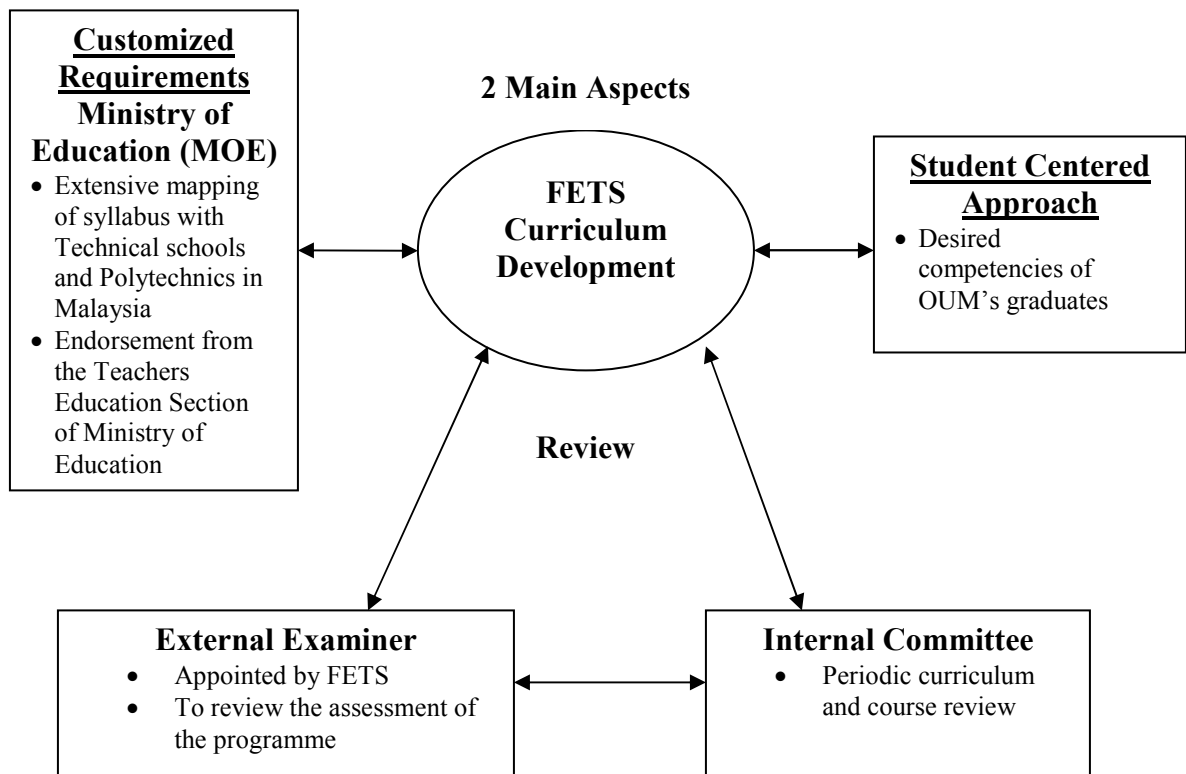


Figure 1: Curriculum Development of FETS for Bachelor of Education (Engineering) Model

Table 1: Time allocation for a three credit hour course

Item	Hours
Understanding the course content and initial discussions	5
Reading all topics in module and completing the suggested exercises	60
Attending 3 or 5 tutorial sessions	10
Online learning	10
Completing 1 assignment	20
Revision	15
<b>Total</b>	<b>120</b>

Figure 2 shows the model of the collaboration of OUM programme and the Ministry of Education (MOE) Malaysia. Students taking this programme are mostly secondary school teachers. They have an extensive experience in teaching and educational training. Some of them are equipped with diploma or certificate in teaching. The core of the model representing the student profiles. The outer layer is the expectation of the MOE for the student upon their graduation. OUM play the role of an educational provider to upgrade the knowledge and skill shown in the model.

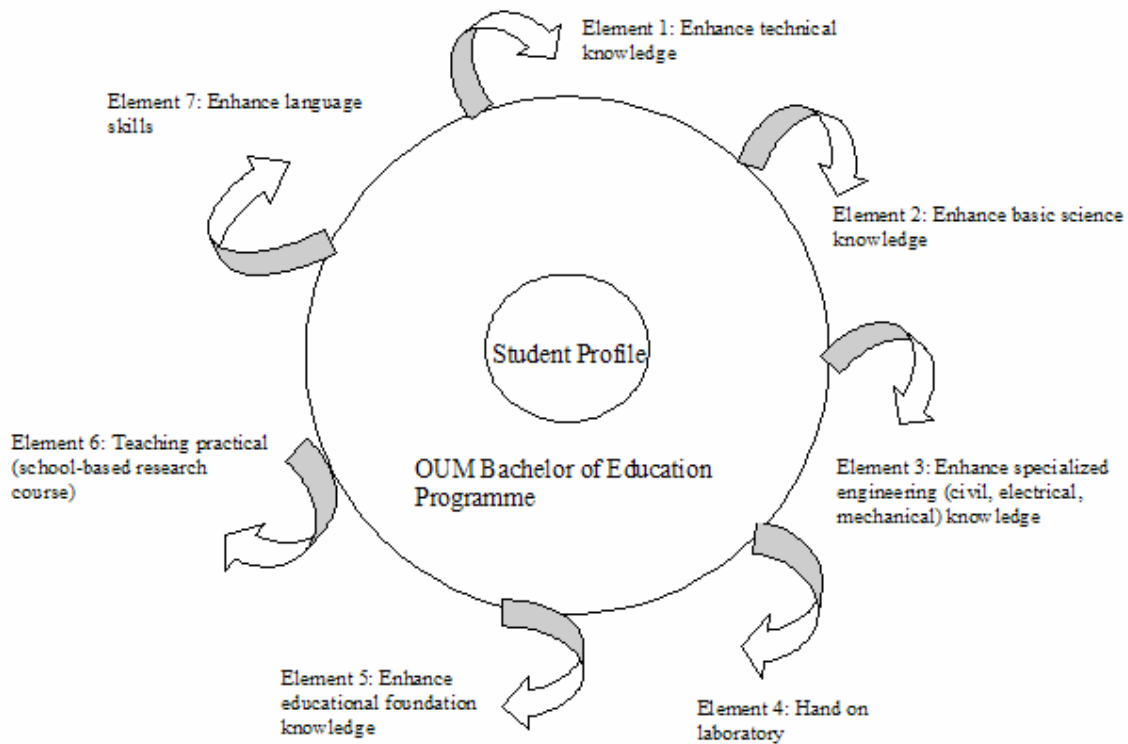


Figure 2: Model of Desired Competencies of OUM’s Bachelor of Education Programme

(Engineering) Graduates.

The governing philosophy of the engineering curriculum at OUM is to produce graduates that meet the market demands or the ‘fit-for-the-purpose’ graduates. This model will also ensure that the graduates will not require extensive training or retooling at the start of their career (Hamir, 2005).

The syllabus of university course is prepared by Subject Matter Experts (SMEs) comprising of members of the academia as well as professionals from the industry. In ensuring the quality of each programme, the faculty has appointed external examiner which consists of experienced and established academician and industry experts to review the examination paper.

The courses for each programme are divided into five main categories, namely, the compulsory LAN courses, compulsory OUM courses, educational foundation courses, basic science courses and specialized engineering courses. Generally, a student could accumulate a total of 24 credits in an academic year. Figure 3 shows the pie chart of credit loading percentage according to the category of courses. The category shows a balance percentage of the educational foundation courses (27%), basic science courses (27%) and specialized engineering courses (23%). This design is very unique as the main objective of the programme is to fulfill the technical knowledge gap of the in-service teachers. OUM curriculum focuses on upgrading the engineering education theory as well as their teaching skills.

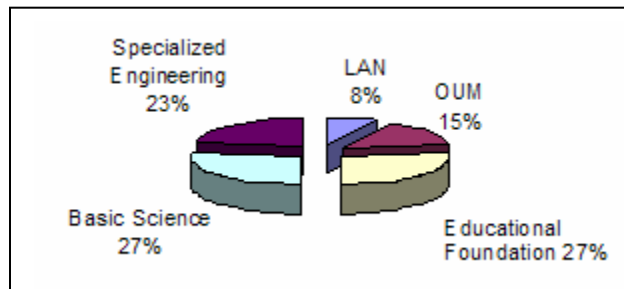


Figure 3: Percentage of credit loading according to the category of courses for Bachelor Education Programme

### C. Planning of the Program

Table 2 shows the cohort and intake of student numbers according to the three disciplines of Bachelor of Education (Engineering) programmes. The enrollment of students is 1913 for this programme. The first cohort of this programme will be graduating in December 2006.

Table 2: Details of intake of students of FETS according to programme

<b>Programme</b>	<b>Cohort</b>	<b>Intake</b>	<b>Total of students</b>
<b>BECE</b>	Cohort 1	Mac 2002	179
	Cohort 2	Jan 2003	135
	Cohort 3	Sept 2003	65
		Jan 2004	39
		May 2004	32
Cohort 4	Jan 2005	70	
Cohort 5	Jan 2006	55	
<b>Total for BECE</b>			<b>575</b>
<b>BEEE</b>	Cohort 1	Mac 2002	236
	Cohort 2	Jan 2003	104
	Cohort 3	Jan 2004	63
	Cohort 4	Sept 2004	22
		Jan 2005	70
Cohort 5	Jan 2006	40	
<b>Total for BEEE</b>			<b>535</b>
<b>BEME</b>	Cohort 1	Mac 2002	329
	Cohort 2	Jan 2003	183
	Cohort 3	Sept 2003	25
		Jan 2004	30
		May 2004	17
Cohort 4	Jan 2005	38	
Cohort 5	Jan 2006	181	
<b>Total for BEME</b>			<b>803</b>
<b>Grand Total</b>			<b>1913</b>

### D. Implementation of the Program

OUM practices blended pedagogy, namely: (i) self-managed learning, (ii) online learning, and (iii) face-to-face interaction in all programmes. For the FETS programmes, laboratory session is also an important component of the pedagogy.

### **Self-Managed Learning**

As an ODL university, the face-to-face contact hours are limited. The students are expected to be proactive in managing time for their learning. To support the self-managed learning, students are provided with customized printed modules as the main source of learning material. In addition, the module is supplemented with many exercises, model questions with guided solutions to enhance the students understanding of the subject.

### **On-Line Learning-Forum**

The e-learning delivery platform plays an integral part of the learning process. OUM has developed an e-learning delivery system called “my Learning Management System” (myLMS). The aim is to facilitate the learning process. Students may access courses registered through myCourse icon in myLMS. This will enable them to access e-learning support materials such as course contents, assignments, references and forum.

The aim of online forum discussion is to facilitate the discussion between students and their tutor. It is an extension of face-to-face tutorial session. In distance education, discussion and sharing experiences have been identified as two of the most effective means by which the adult student learned (Williams, 2004). The students are responsible for one another’s learning as well as their own. This will lead to the success of one student helping other students. Students and tutors contribute to the process of knowledge construction by providing ideas and opinions, sharing experiences and simultaneously engaging in deep learning activities (OUM COL Model, 2004).

A pilot study on collaborative online learning (COL) Model was conducted on Fluid Mechanics for Civil Engineering course. A study by Sh Rosfashida et. al (2005) concluded that using Assignment Task in COL is very effective to enhance the understanding of the subject matter.

### **On-Line Learning-iTutorial**

OUM implemented the iTutorial as support material for student self-learning. iTutorial is a pre-recorded tutorials for web-based delivery incorporating digital learning material such as video, audio, images, slides, web sites and software applications to create media-rich learning material. It is a customized interactive presentation. The development of the iTutorial starts with the content analysis built upon the power point slides. The power point slide consists of objectives, contents, summary and learning activities, where the students can actually solve problems with the lecturer's guided solutions.

### **Laboratory work**

All engineering programme in OUM require laboratory work for certain courses. This is in line with the guidelines of the Engineering Accreditation Council (EAC) of Malaysia. EAC is the body delegated by Board of Engineer, Malaysia (BEM) for accreditation of engineering degree offered in Malaysia.

The early preparation for implementation of laboratory session is very crucial to FETS since OUM, a distance learning university with 53 learning centers in Malaysia, rents the laboratory facilities from local institutions. It requires extensive pre-arrangement of collaboration between FETS and local institutions to ensure that the laboratory sessions can be implemented smoothly. The mode of implementing laboratory sessions must be given a serious thought with regard to the practicality and cost effectiveness.

The laboratory works in two different modes, namely:

1. Hand-on laboratory work
2. Combination of hands-on laboratory work and virtual laboratory

The first mode is the conventional laboratory session. The students complete their laboratory work in the lab without any pre-lab supporting materials. The second mode was implemented for the Civil Engineering Materials coursework. A video laboratory was made on three experiments showing the procedures and results of each experiment.



Students can download from myLMS and understand each of the experiments before doing the hands-on laboratory work.

The overall process of FETS laboratory arrangement is shown in Figure 3. The process starts with the confirmation of the lab center and schedule at every learning center. The lecturers will assist the faculty executive to ensure the lab facilities for each center are in line with the OUM guidelines. After the date is finalized, the executive will upload the schedule, student list and the lab sheet. The administrators of each learning center then will alert the students on their lab schedule and also to ensure the laboratory session will be running smoothly. In addition, the faculty lecturers will monitor the lab progress at selected learning center. The final process of the lab management is the submission of lab report to the lab coordinators in each center. Each of the lab coordinators will key in the report marks in the Online Marking Entry System (OMES). The faculty then will verify the laboratory report marks in the system.

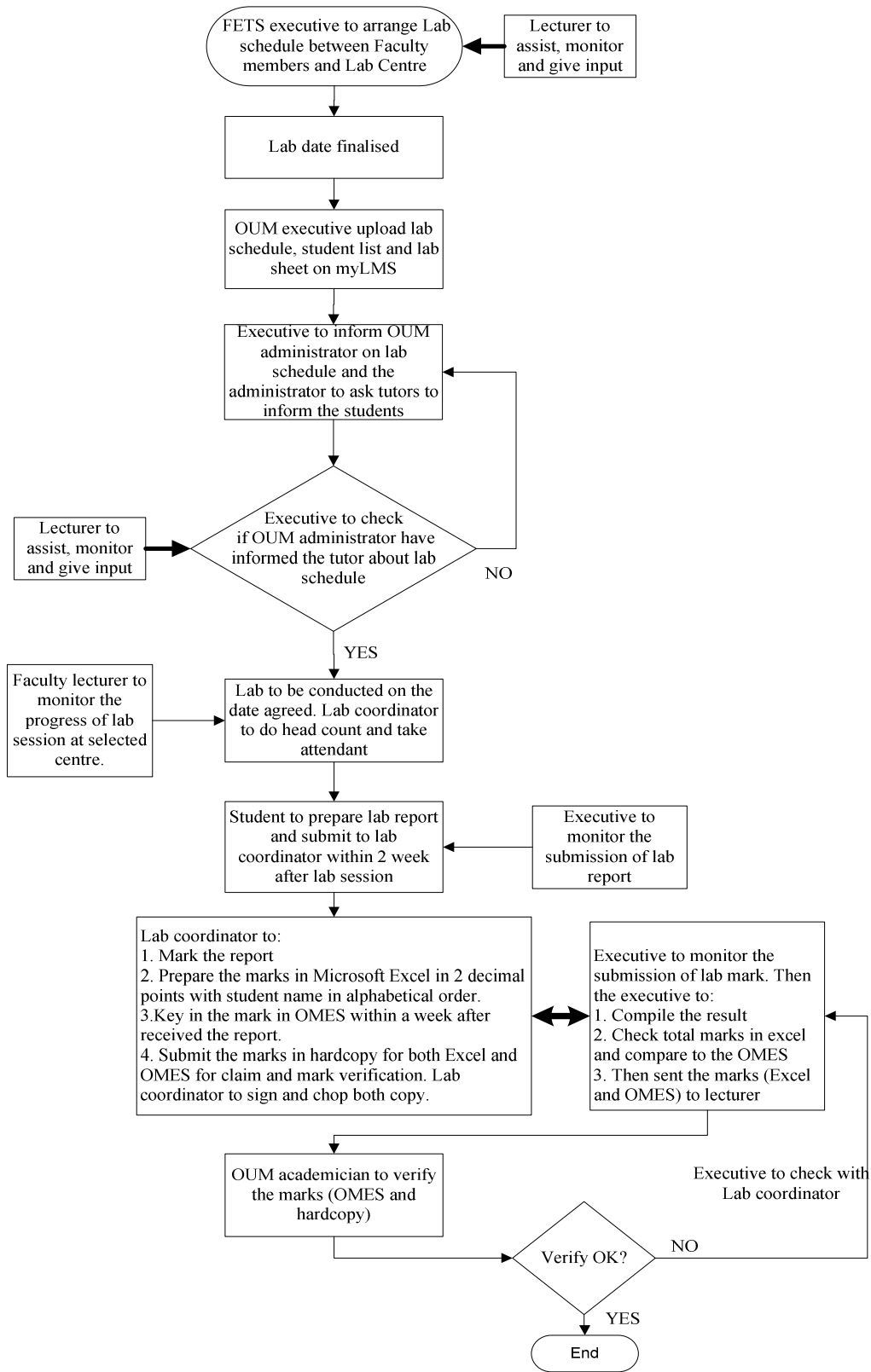


Figure 3: Flow Chart showing the process of lab management in FETS

## E. Conclusion

Generally, all the three programmes have been developed and designed to compliment and enhance the knowledge and skills of the in-service teachers undertaking this programme. This programme will equip them with educational foundation knowledge and specialized engineering knowledge, i.e. civil, electrical or mechanical engineering. Periodic review of the curriculum is being conducted to ensure that the content is up to date and meet the requirements of teacher education curriculum.

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