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## Supporting Tool for Composing Examination Paper

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### ABSTRACT

Outcome-based education (OBE) in teaching and learning is now being implemented at all levels of education especially at higher education institutions. For implementing OBE, the design of curriculum and courses should be based on specified outcomes. Thus, the challenge for the assessment is that it should be capable of measuring whether intended outcomes have been achieved or not. Likely, by assisting lecturer in preparing examination paper that aligns with the planned outcomes is something that can help to ensure the implementation of OBE. Hence, this paper describes a tool for composing question examination paper based on the outcomes. The tool, called learning outcomes-based question examination paper (LoQET), would be beneficial not only for lecturer but also to university in improving the quality of examination paper, thus, making the exam as one of the better assessment instrument for OBE implementation.

*Keyword:* Outcome-based education, learning outcome, programme outcome

### 1. Introduction

In outcome-based education (OBE), each course in the particular programme must contribute to the achievement of the programme outcome (PO). Each course should determine the learning outcomes (LO) that can be measured by each of the students. In order to recognize the degree to which the students meet those outcomes are via assessments. Assessments can be done in many ways such as tests, final examination, quizzes, assignments, projects, presentations, and peer-assessment. The important information that should be concerned in doing any of the assessments is the relationship between question and its PO, LO, taxonomy level and allocated mark. It is a challenge and tedious job for a lecturer to map each question with its POs and LOs as designed for a particular course.

Hence, we were motivated to present a tool, called LO-based Question Examination Tool (LoQET), which aims to help lecturer to compose examination paper that align with course's POs and LOs. Universiti Putra Malaysia (UPM) is one of the universities that implementing OBE. Therefore, UPM has been chosen as the development domain and LoQET is developed based on UPM's business process and data.

This paper presents the properties of LoQET with the aim to guide other universities to develop such tool. The remainder of the paper is organized as follows: In the following section, we provide a brief background and motivation. Section 3, describes the LoQET tool and finally, we draw a conclusion in Section 4.

### 2. Background and Motivation

OBE is an approach to education in which decisions about the curriculum are driven by the exit LOs that the students should display at the end of the course (Davis, 2003). LO as 'being something that student can do now that they could not do previously' are changes in people as a result of learning experience (Watson, 2002). In contrast to traditional education, this approach particularly concerns on preparing students

for life and work after graduate. OBE focuses on what the students can actually learn from the course, how to help students learn and then reproduce what was taught. For assessing the OBE, the chosen methods should be able to assess how much and how well the students have learnt from the course. Therefore, the curriculum, course teaching plan and course assessments are attentively designed to support the intended learning outcomes that are designed for the particular course.

As for lecturer, preparing examination paper is not only a repetitive and time consuming process but also strenuous. The lecturer is required to create and assign each question in the examination paper with suitable POs and LOs that being designed earlier. Therefore, a supporting tool is crucial to assist and guide lecturer in preparing examination paper effectively and efficiently. Even though there are many tools for generating questions and examination paper available in the market, such as Test Generator (Testshop, 2014), QuizFaber (Quizfaber, 2014), Examgen Test Generator (Examgen, 2013), and Wondershare QuizCreator (Quizcreator, 2012). However, these tools are not specifically designed to suit with OBE requirements.

### 3. OBE Supporting Tool

LoQET is developed specifically for paper-based assessment type. The description is divided into three subsections that describe the tool in term of the input, features, and output.

#### 3.1 LoQET Repository

The LoQET repository store basic information regarding course, course outcomes, course assessment, and learning outcome taxonomy. This information will be used to instruct lecturer when she/he wants to compose an examination paper for a particular course. The basic information and data stored in this repository are as listed below:

##### 1) Learning outcome taxonomy

The taxonomy is a classification of the different objectives that educators set for their students. For example, Malaysia Ministry of Education (MOE) has embodies three categories of LOs which is Cognitive, Psychomotor, and Affective domain. These LOs comprise information about the LO's competency level, and its related keywords. The keywords are useful as a reference to guide lecturer in composing examination questions. Table 1 is an example of schema for LO Taxonomy that indicates the domains, levels and related keywords that should be stored in a repository.

Table 1  
*LO taxonomy*

Domain	Taxonomy Level		Keywords
Cognitive	C1	Knowledge	Describe, Select, Relate, List, ...
	C2	Comprehension	Explain, Distinguish, Summarize, ...
Psychomotor	P1	Perception	Identify, Detect, Choose, ...
Affective	A1	Receiving Phenomena	Name, Use, Give, ...

##### 2) Course outcomes

Each course should determine the LOs to be achieved that will contribute to the attainment of the POs. Therefore, information about course (e.g., course code, course description) as well as its POs and LOs should be available in the repository. The following table (Table 2) gives an example of POs and LOs set for a course.

Table 2  
*LO-PO mapping*

Course Learning Outcomes (LO)		Program Outcomes (PO)			
		PO1	PO2	PO3	...
Analyse software requirements	C4	/			
Relate concept and approach in software requirements engineering	A4	/			
Develop requirements specification	P4		/	/	

### 3) Course Assessment Distributions

Typically, examination paper is created for certain assessment type and aims to achieve specified PO(s). Table 3 provides an example of assessments and POs distribution for a particular course. Information on allocated mark for the specified PO will be useful for lecturer to plan for number of questions should be created.

Table 3  
*Course assessment distributions*

Course Assessment Type	Program Outcomes (PO)	Allocated Mark
1st Test	PO1	20
2nd Test	PO2	20
	PO3	10
Final Exam	PO1	30
	PO2	10

### 3.2 LoQET Features

LoQET has provided many features to assist lecturer in composing examination paper. Four of the main features are as follows:

#### 1) Compose examination paper

The main feature of LoQET is to compose a set of question, which aligns with LOs and POs. Figure 1 shows a screen layout for composing question. In order to compose an examination paper, the lecturer needs to decide on the assessment type and POs to be assessed before entering the questions.

Course Name : COMPONENT-BASED SOFTWARE DEVELOPMENT      Course Code : SIM4383

Assessment Type : Assessment Week 10-12

Paper Title : Quiz Week 11

PO Mark Distribution :

- PO1 30
- PO2 10
- PO3 0

Total 40

Percentage 20 (%)

Save

PO1 PO2  
(Select PO to compose question)

Learning Outcome (LO) : A3

Keyword : Explain

Question : Explain the ...

Mark : 5

Image : Choose file | royalty-free...-1108765.jpg

Figure 1  
*Screen display for composing question*

All the specified LOs for the selected POs and keywords for the selected LOs will be available in the list boxes. Lecturer need to select LO, keyword, and elaborate the question in the text box. Allocated mark for the question should be given and system will inform if the accumulated mark for the PO is over the limit. Additionally, lecturer can insert image or photo in the question.

## 2) Manage Examination Paper

This feature provides basic functions (as shown in Figure 2) that allow the lecturer to add, delete, and edit question in an examination paper. Besides composing a new examination paper, lecturer can copy and edit examination papers that are available in the repository.

No.	Paper Title	Total Mark	View	Copy	Export	Edit	Delete
1.	Paper 1	10					
2.	Paper 1	12					
3.	Paper 2	10					
4.	Paper 4	4					
5.	Quiz 3	4					
6.	Quiz Week 11	20					

Figure 2  
Screen display for managing paper

## 3) Export Examination Paper

This feature allows lecturer to export examination paper into editable formats (i.e., Microsoft Word). This will allows lecturer to modify structure of the examination paper as well as the questions, if required.

## 4) Generate Paper Summary Report

In addition, lecturer is able to view a summary of the examination paper to ensure the composed paper is aligned with the course's POs and LOs. This feature is useful for the monitoring purposes.

### 3.3 LoQET Output

As an output, a draft of examination paper in editable format will be produced. All the composed questions will be printed in the draft. In addition, general information about the course that is available in the repository will be printed in the draft as well. For example, course code, course name, and title of the examination paper. By including as much information as possible will reduce the amount of effort in preparing the examination paper manually.

## 4. Conclusion

This paper describes a tool, called LoQET, for assisting lecturer in preparing examination paper based on course's POs and LOs. On the other hands, the tool empowers lecturer to generate effective and better quality examination paper that suits with OBE requirements in a short span of time. The input, features, and output of the tool are discussed in this paper and deem useful as a guideline for developing such tool.

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