



## A STRATEGY TO DEVELOP THE COMPUTERIZED FRAMEWORK FOR IMPLEMENTATION OF OBE IN UNIVERSITI KUALA LUMPUR

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### ABSTRACT

Implementation of Outcomes Based Education (OBE) on Higher Education is a requirement by Malaysian Qualification Agency (MQA), one important aspect of the approach is measurement of learning outcomes attainment which is called Course Learning Outcomes (CLO) and Program Learning Outcomes (PLO). CLO measurement is key to analyzing student and course attainment in each semester, further it will be an essential component to assess and evaluate the attainment of a programme. Implementation of OBE providing a more complicated way to measure learning outcomes. Since the curriculum changes to the OBE approach which is required by the education authorities of Malaysia has made campuses develop an OBE framework. The framework is a model which is used to assist in a comprehensive implementation of OBE according to the principles contained in the approach. The framework covers not only theoretical aspects but also includes aspects of IT, to build a computerized framework that can be applied, it needs the right strategy which is should be validation by experts. This paper discuss about authors experiences of implementing the strategy to be used to develop the computerized framework in order to provide suitable ways for Higher Education to implement OBE approach. Strategy used involves several phases and more detailed description, each phase giving a certain contribution to the development of computerized framework. Explanation equipped with some figures that are conceptually clearer and easier to understand.

**Keywords:** OBE, measurement, CLO and PLO, framework.

### INTRODUCTION

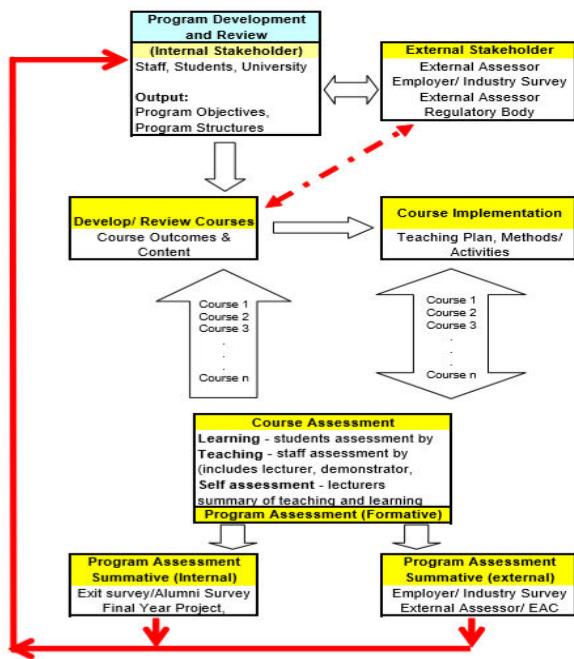
Implementation of OBE in universities in Malaysia has started since 2005 [1], also in Universiti Kuala Lumpur (UniKL). The implementation one of compulsory criteria assessed by the accreditation agency to obtain accreditation [2]. OBE focuses analyze the attainment of learning outcomes of each course for continual quality improvement, but that does not mean the input and planning is not important [3]. An objective of OBE is to make sure students are able to achieve the outcomes to a high standard, and also expected an increase in the ability to systematically and continuously [4]. Adoption of OBE involves two important phases such as mapping and measurement, mapping is an activity to connect the PLO with related CLO, and one CLO linked to several different assessments. As for the measurement, it is an activity to analyze attainment of CLO based on the attainment of assessment associated with it. Likewise with the PLO, he analyzed by calculating the attainment of CLOs connected to it.

UniKL is a private university that has 14 campuses throughout Malaysia. UniKL's 14 branch institutes offer various foundation, diploma, undergraduate and postgraduate programmes, and boasts a total of 26,388 students [5]. Currently, the campus does not have automatic analysis system for analyzing and measuring student achievement, so that the processes carried out by semi-manual measurements using Microsoft Excel. The absence of a framework and measurement system on the campus make difficulty in implementing OBE approach particularly in the field of analysis and measurement of a wide range of various outcomes on

many subjects and students. While the implementation of the concept of OBE need to focus on some important areas one of which is the analysis and measurement of outcomes achievement by students in greater detail individually. So that the development framework is a necessity that must be provided by the campus to assist the implementation of OBE in line with expectations. Not only UnikL, there have been several campuses adopting OBE approach, they developed a framework according to the needs of each campus, but roughly it is still a theoretical framework and the absence of clear technical elements as a guide. Here is the implementation of the existing framework on OBE in Universities in Malaysia.

### University Putra Malaysia

The Faculty of Engineering of Universiti Putra Malaysia (UPM) had taken initiatives to revise its 2000-2005 curriculums. The revised curriculum (based on 2006-2010 programs) was first implemented in the 2006 academic year, since that year UPM seeks to develop a framework as a strategy for the implementation of the campus OBE [6]. The Framework by UPM illustrated by Figure 1, which consists of several blocks such as program development and review, review courses, course implementation, course assessment, and program assessment, strategy to develop the framework is focus on the three blocks of "develop-implement-review" in programme level and course level [6].

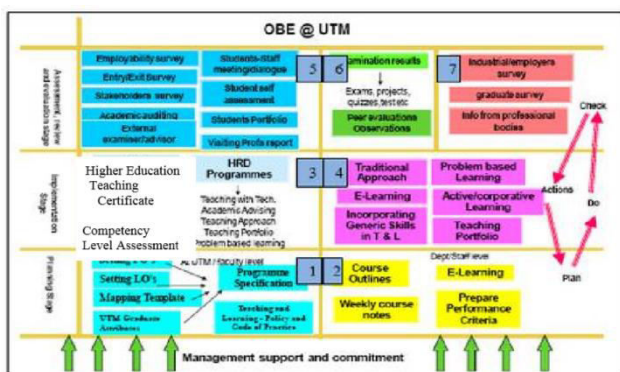


**Figure-1.** Overall flow for the program development, implementation and monitoring the OBE.

Figure-1 shows that the framework is more to the theoretical side, not much technical side raised so of course it will be difficult to implement, especially in terms of achievement assessment. Measurement methods appear unchanged and there is not anything new.

#### Universiti Teknologi Malaysia

Universiti Teknologi Malaysia (UTM) first embarked on the development and implementation of a model of Outcome-Based Education from as early as 2002 to programmes offered in the university [7]. The framework is based on three main groupings of work that are planning stage of OBE, implementation of OBE, and Assessment of OBE. In addition, to realize continuous quality improvement, so they also adopted the concept of Plan-Do-Check-Action (PDCA), the framework shown in Figure-2 [7].

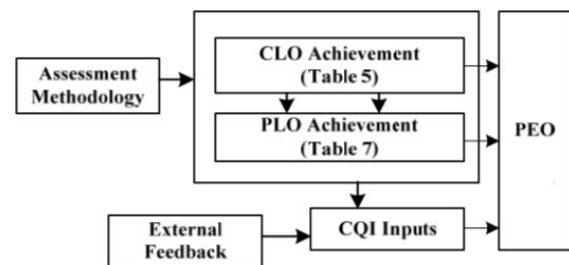


**Figure-2.** Conceptual framework of University Teknologi Malaysia's outcome-based education.

In the author's view, although it is already rather detailed framework by grouping into three main groups of work, but not in detail and comprehensively describe how the measurement of the achievement of the components of OBE is done according to the principles in OBE approach. IT technical side has not accommodated so that the framework still needs development and additions.

#### University College Sedaya International

However, the difficulty faced by University College Sedaya International (UCSI) in adopting OBE lay not in the curriculum development and program assessment methods but rather in evaluation of the result for the changes required. Not like previous models, which rely on quantitative results, most of the data gathered in OBE implementation are inherently qualitative, hence making assessment of OBE a task of utmost difficulty [8]. Therefore UCSI developed a dynamic model for the implementation of OBE in particular in terms of assessment and evaluation of various outcomes, the model developed based on the needs of the campus. OBE measurement model is illustrated by Figure-3 [8].



**Figure-3.** OBE measurement model of UCSI.

Just as the framework in the preceding discussion, the model is not applicable and have not been comprehensively touched the technical side. So it seemed too simple and yet provides a clear direction on how the different outcomes should be measured according to the OBE approach.

#### Universiti Tenaga Nasional (UNITEN)

Department of Mechanical Engineering (DME) of UNITEN has implemented OBE approach in its Bachelor of Mechanical Engineering (BME) programme since 2006, framework on UNITEN shown in the Figure-4 [9].

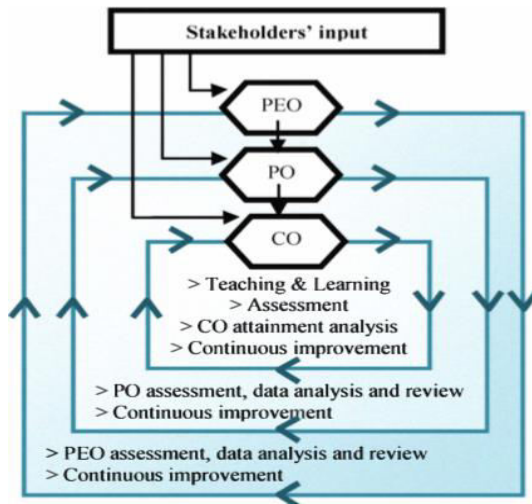


Figure-4. OBE model in UNITEN.

The framework is still common and has not discussed the details of steps that must be taken to measure the achievement of outcomes, ranging from mapping, distribution, until tabulation and calculation of attainment. In addition, the department is still using conventional semi-computer system, which is a computerized spreadsheet system (CO-PO Attainment System) based on MS Excel for analysis and measurement [9]. This of course will affect the processes occurring in the implementation of OBE especially in the field of measurement and analysis are supposed to be less human error and not a hassle, problems will arise when data is managed by a diverse and large. While the implementation of OBE require better IT side so that mapping, calculation, distribution of weightage more accurate, and easy to do.

## METHODOLOGY

The development of computerized framework for assisting the implementation of OBE need to have a clear strategy [10]. The computerized framework is a fundamental part generated by this study, it is a significant contribution to solving the measurement problems in UniKL. Researchers using action research methods to develop the framework, it involves several steps, start from identification the problem, deepening of issues and topics, and validation of the framework (see Figure-5).

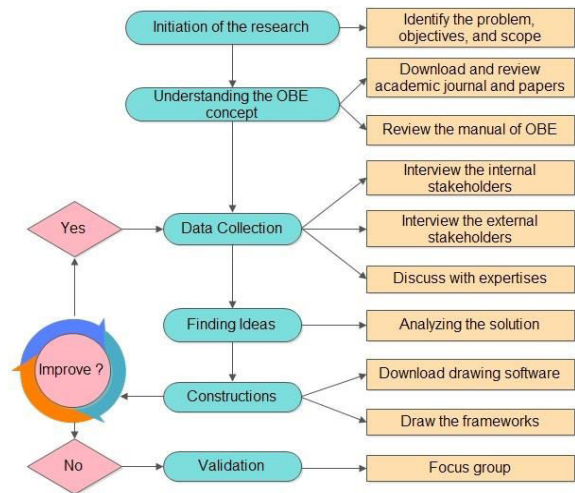


Figure-5. Methods for develop the framework.

### Initiation of the research

The first stage focused on the identification of problems, objectives, and scope. This activity is an early stage to understand what the constraint by the campus to implement OBE especially in mapping and measurement of learning outcomes. The understanding gained from various activities, such as discussions with stakeholders, observations and analysis.

### Understanding the OBE concept

The second stage derived from a few activities, such as reviewing academic journals and papers related to the OBE, and reviewing manuals OBE obtained from internal stakeholders. All activities were carried out to look for a credible reference for understanding the overall concept of OBE.

### Data collection

Then the next is an activity to collect necessary data. The necessary data generated from a few ways such as interviews with internal and external stakeholders. Internal stakeholders are from UniKL, external stakeholders come from other campuses in Malaysia. The data collected consisted of two major aspects of education and technology. Educational aspect is collecting data related to the academic activity, especially in terms of the measurement of learning outcomes such as flowcharts authority and academic management. Aspects of the technology is to analyze the existed measurement system, the constraint to measure the learning outcomes, and the overall abilities of existed measurement system. In addition, discussions with experts also carried out in order to ask for some views and suggestions.

### Finding ideas

This stage focus on finding the new idea, by considering the various constraints and capabilities of existing measurement system. Analyzing the permanent and sustainable solution to be applied. The output of this stage is initial computerized framework.





## CONSTRUCTIONS

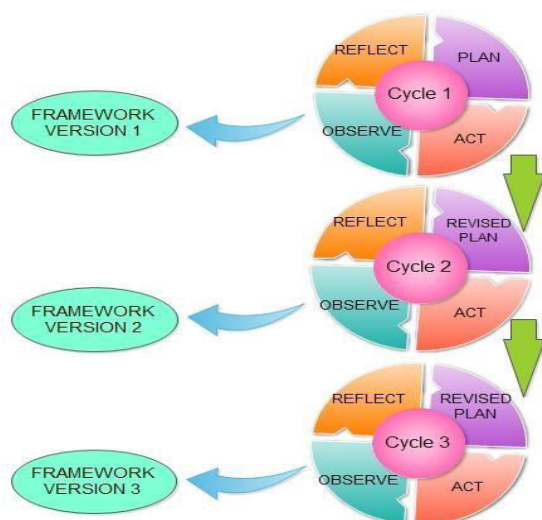
This stage is realization of the previous stage, design ideas and innovations in the form of a framework, activity at this stage is download a modeling drawing software then began to design the framework. Researchers build the framework gradually: after a preliminary computerized framework is completed, researchers are trying to develop and improvisation, when decided to improvise the researchers re-do the data collection and finding new ideas, then develop next layer of the framework. There are also have cycles for improvisation which has been produces three-layer framework continually (to be described later), each layer has its own meaning.

## Validation

This is the final step, focus on validation of the computerized framework that has been produced in three layers, it involve focus group method to get justification from expertise.

## SUSTAINABILITY CYCLES TO DEVELOP THE FRAMEWORK

The activity of development of the computerized framework involves three continuous circles; the circle is adopted from Kemmis and McTaggart models. However, the process of construction and development of new ideas using requires a continuously re-evaluation, Kemmis and McTaggart model is one model that is able to realize it [11]. In practice, the construction and development of computerized framework using model Kemmis and McTaggart illustrated as follows:



**Figure-6.** Improvisation cycles for develop the framework.

### A. Cycle 1: Initiation of the framework

- Plan: identifying all academic process in general.
- Action: construction of the preliminary framework.
- Observe: analyzing and classify processes.

- Reflect: take suggestion and validation from stakeholders.

### B. Cycle: Detailing the preliminary framework and develop second framework

- Revised Plan:
  - Elimination and simplify the process.
  - The addition of a new process initiatives associated with the principles of OBE.
  - Identify the processes that need to be aspects of IT
  - Importation of IT elements in certain processes.
- Action: design second framework.
- Observe: analyzing and explore the blocks in the second framework.
- Reflect: get validation for second framework.

### C. Cycle 3: Produce the third framework.

- Revised Plan:
  - Detailing the process blocks related OBE concept from second framework.
  - Detailing the IT flow process.
- Action: design and produce next layer of the framework.
- Observe: communicate and get validation from stakeholders.
- Reflect: get validation from experts.

To validation process of the suggested strategy, the authors conducted a focus group method to get feedback from experts, the discussion not only about method and strategy, but also touched on the measurement method and the whole OBE system developed based framework. In addition, discussion Also on the models of the PLO and CLO calculation, monitoring and reporting is implemented.

The experts involved in the focus group is internal and external expertise, internal expertise are some of the various sciences and professor in the department who are experts in their field which is related to the issues discussed in the forum. As for the outside experts, there are Prof. Ramesh which is a representation of the Engineering Accreditation Council Malaysia (EAC). In addition, he is also an expert of the University of Malaya which had previously succeeded in developing a framework and system at the campus. So the discussion at the forum is constructive because it is not only discussed in terms of theory but also look at the extent to which the requirement was achieved, suitability of methods and strategy used, lastly is comparison the framework and system developed with the framework and OBE measurement systems from other campus, especially from University Malaya. Results of the focus group are some recommendations that have been implemented by the author.

## RESULT AND DISCUSSIONS

This sub title discuss about three layer framework which produced continuously to measure the attainment of



learning outcomes in Higher Education.

### Preliminary framework

This is the framework at early stage, this framework is generated for mapping processes and academic activities as a whole, preliminary framework is shown in Figure-7.

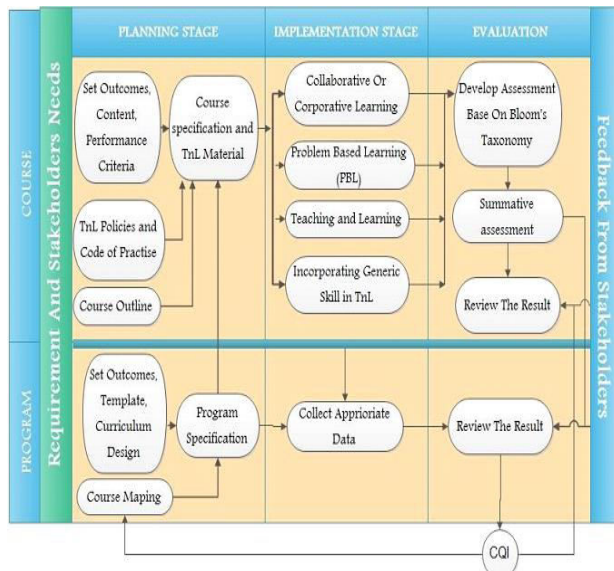


Figure-7. First layer.

Preliminary framework more focuses on educational aspects, understanding existing workflow and measurements process on the campus. All academics activities are grouped into three clusters stages; namely planning, implementation, and evaluation. This framework is generated by the first cycle, and involves several academic activities in course and program level.

### Second framework

The second framework is a continuation of the first framework (see Figure-8), in this framework researchers eliminated processes unnecessary, researchers deepen framework to accommodate processes that have relevance to the measurement of attainment of learning outcomes. In addition, the researchers incorporate elements of IT in the flow of activities and processes. This framework is more pressing in the process of identifying blocks that must be accommodated by IT elements.

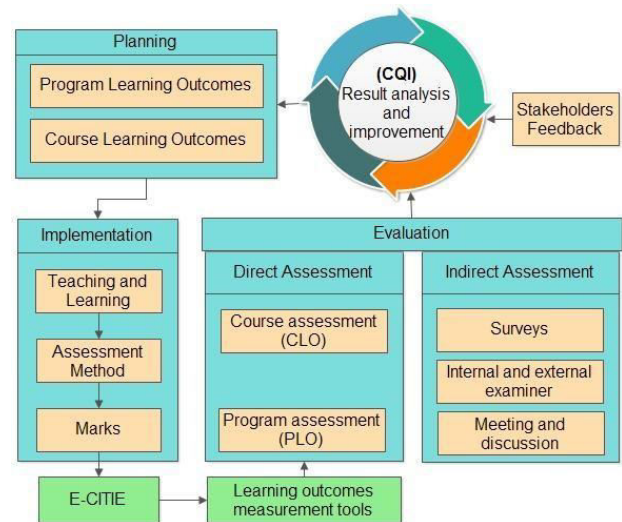


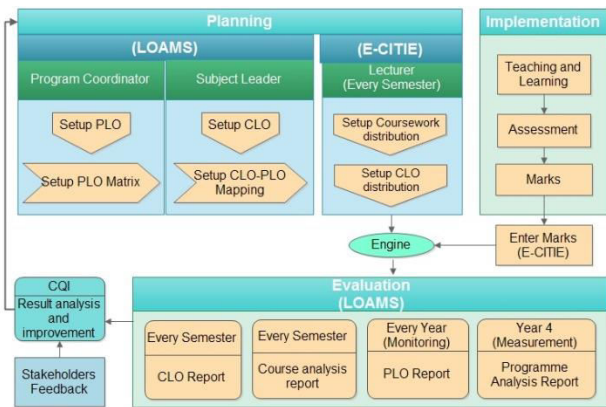
Figure-8. Second layer of the framework.

The framework involves several blocks of activities which have their respective functions, and each block has activities that are interrelated with other blocks.

1. The first block is the planning that involves lists of PLO and CLO. On this block, stakeholder conducting preparation and mapping for course and program objectives.
2. The implementation block, provides academic activities such as teaching and learning, assessment methods, marks. This activity will be covered in the main academic information system called ECITIE.
3. Block evaluation consists of two distinct blocks, direct and indirect assessment. Direct assessment is a block that is directly related to the process of measuring the attainment of learning outcomes. Direct assessment carried out by the measurement tool developed with specific modules to analyze the attainment of CLO and PLO. He retrieve the data from the main database that collected by E-CITIE. Whereas indirect assessment contains activities such as surveys, internal and external examiner, as well as meeting and discussion.
4. Block CQI, this block contains activities related to the analysis of results and improvement, the results of direct assessment or indirect assessment will be followed up within this block, depending corrective action by policy makers and stakeholders. This CQI block will be input material for block planning. In addition, if there any feedback from stakeholder will be accommodate in this CQI block.

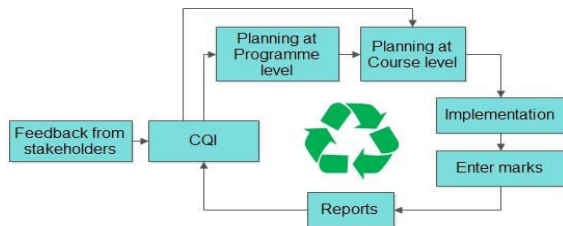
### Third framework

This Framework is the last layer. Basically, the process in this framework is more technically.



**Figure-9.** Third layer of the framework.

This framework involves several processes are grouped into several blocks:



**Figure-10.** Flow of measurement process.

1. First is the planning block, the process in this block separate into two different system; Learning Outcomes Attainment Measurement System (LOAMS) and E-CITIE. In the LOAMS, the process involves some planning and mapping at programme level, such as the setup of the PLO, PLO setup matrix. Users of this process is the program coordinator. While the CLO setup, and CLO-PLO mapping done in course level, user of this process is the subject leader. While planning process in the ECITIE are setup coursework distribution, and setup CLO distribution, user of this process is the lecturer.
2. Implementation block, this block contains academic activities such as teaching and learning, assessment summary, and marks. When lecturer completely the student marks, then they should key in the marks into ECITIE.
3. Execution block, this block contains reports relating to the attainment of learning outcomes, produced by LOAMS, four reports produced: 1) CLO report, produced each semester to assess the individually achievement of CLO, 2) course analysis report produced every semester to see the performance of a course, 3) PLO report contains a record of attainment of individual PLO, produced each year for monitoring, 4) Programme analysis report produced at the end of graduation.
4. CQI block, it is for improvement plan activities.

Figure-10 shows the flow of measurement process based on the third framework. Process flow starting from the planning at programme level, then after that continued planning process at the course level, the process involves work of setup and mapping of learning outcomes and assessment. Once completed, next is activities of implementation which contains learning and teaching activities, and assessment. Then, enter marks into system model and produce a report, the report will be analyzed and carried out the CQI to then be input in the next planning step.

## CONCLUSIONS

Strategy for development of computerized framework described in this paper has been successfully produced three layers of the computerized framework in sustainability process. The method used by researchers using action research by adopting model of Kemmis and McTaggar cycles. On top of that, the computerized framework has been produced able to integrate aspects of education and IT in an implementable computerized framework. At the end of it, the third framework able to accommodate an integrated information system based on the principles of OBE well. However, the computerized framework has provided a better way and not burdensome in helping UniKL to adopt OBE approach. For future research, new layer of the framework needs to be generated which have highest measurement level of learning outcomes which is so called Programme Educational Outcomes (PEO).

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