

OUTCOME-BASED EDUCATION IMPLEMENTATION IN MALAYSIAN POLYTECHNIC

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ABSTRACT

Outcome Based Education (OBE) implementation is relatively new in Malaysian Polytechnics and it has been made compulsory by the accreditation body (MQA) through the Malaysian Qualification Framework (MQF) (MQA, 2008). To ascertain the quality of graduates, OBE requires a lot of coordination in terms of planning and implementation and thereafter the assessment. Establishing an OBE system for education is supposed to be the best way for students to reach the desired outcomes.

KEYWORDS

Outcome based education, learning outcomes, graduate student attributes.

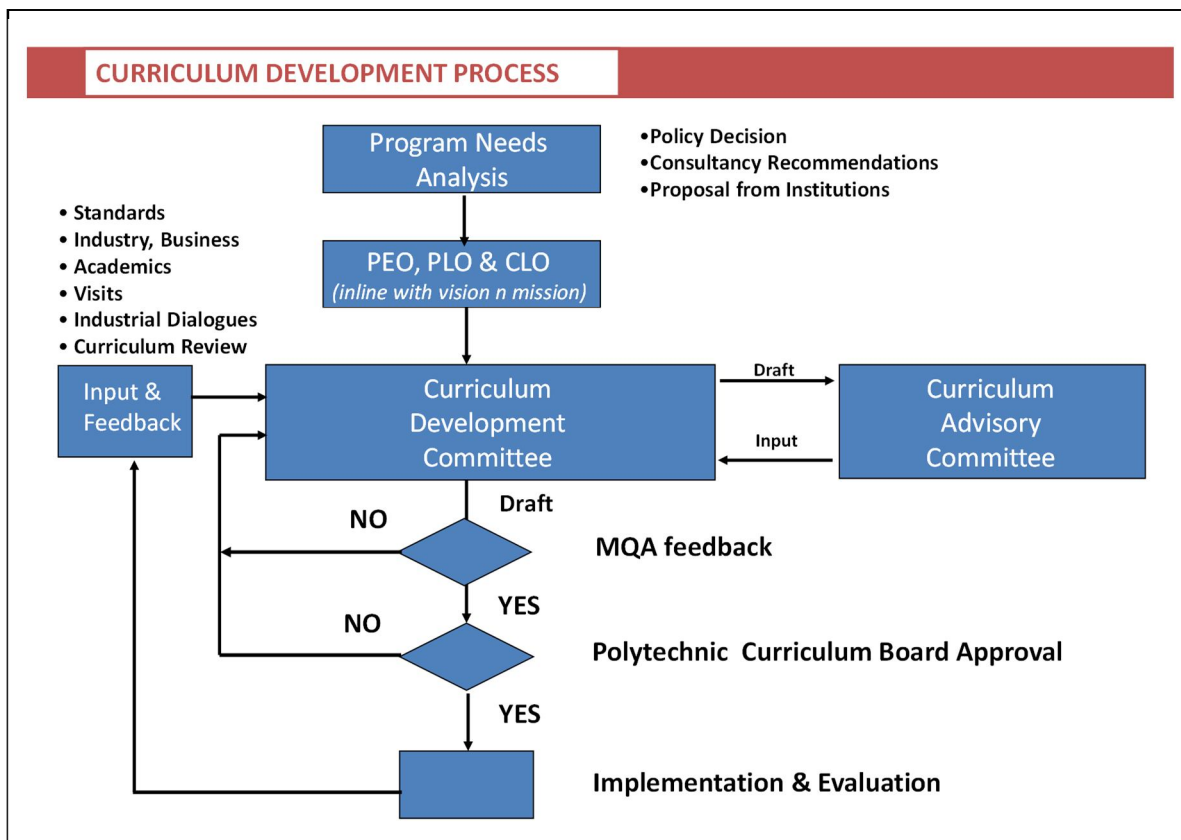
1. Outcome-Based Education (OBE) Curriculum Of Polytechnic Malaysia

An OBE curricula means clearly focusing and organizing everything in an educational system about what is essential for all students to be able to do successfully at the end of their learning experiences. It also goes on to define and propose the best methodology to help students to learn most effectively within their educational environment. It is clearly stated in the curriculum of the intended teaching outcome and standard. An OBE curriculum is a product model dependent on what learning outcomes are set. The successful implementation of a curriculum depends on the successful interaction of lecturers, students and the knowledge they share. Curriculum is therefore what is actually happening in the lecture room, in addition it is a set of documents for implementation by lecturers.

2. Curriculum Development Process

The curriculum development process (Figure 1) systematically organizes what will be taught, who will be taught, and how it will be taught. Each component affects and interacts with other components. For example, what will be taught is affected by who is being taught (e.g., their stage of development in age, maturity, and education). In the past, curriculum development committee was typically consisted of lecturers with expertise in the content area and they were asked to create scope and sequence documents and also to suggest texts and other resources for adaptation by the institutions. Nevertheless, our understanding of curriculum development has changed. The process is now viewed as an opportunity to develop understanding and ownership by the participants, and hence, curriculum development committee includes members of all parties with interests in the educational system.

Figure 1: Curriculum Development Process



Needs Analysis

Needs analysis is to determine whether a programme is needed and, if it is needed, it is to specify that programme should be accomplished. Needs analysis data is obtained from various levels of stakeholders such as Ministry of Higher Education, related industries, higher learning institutions, parents and students and other relevant parties. Results obtained from the need analysis would assist curriculum developers to understand and draw the profile of the future graduates, the market situations in the area of study and thus would provide input for the development of programme educational objective (PEO) and programme learning outcomes (PLOs).

Input and Feedback

Input and feedback are obtained from various sources such as professional bodies, related higher learning institutions, benchmarking visits, recommendations from academicians and industries and Malaysian Qualification Agency (MQA).

Curriculum Development Committee

Curriculum development committee includes experts from polytechnics, university, relevant industries and professional bodies. Curriculum development committee must do research on effective practices in order to support institutional environments that offer rich and varied learning experiences. The committee must review policies and behaviours that foster community involvement and equal opportunities for all. Furthermore, the committee should consider professional development activities to support the content, instruction, and assessment expectations. The expectations of curriculum development committee cross some boundaries into what were previously defined as administrative roles. There are series of curriculum development workshops being held to develop the curriculum of a program.

Courses Advisory Committee

Members of the Curriculum Advisory Committee are experts in related fields of study. The committee members are elected from various parties such as industries, professional bodies and university lecturers. The committee should assist in generating new course contents and directions, shape current curriculum, and provide information on the future employment opportunities.

Curriculum Board

Curriculum will be approved by the Curriculum Board. Board members are appointed by the Minister in the Ministry of Education and they serve two (2) year tenure in the board. The curriculum board plays a central role in the Polytechnic curriculum approval. This role has expanded tremendously with the expanding role of polytechnics' governance and with the expanding demand for a curriculum which is flexible and responsive to the needs of stakeholders.

Curriculum Implementation

Implementation of the curriculum is conducted by the lecturers at the institutions using suitable teaching and learning strategy that is recommended in curriculum document supported by lectures' creativities.

Recognition by Public Service Department (JPA) and Malaysian Qualifications Agency (MQA)

In ensuring the program of study conducted at the institutions meet the quality standard, each program of study must be accredited and recognised by Malaysian Qualifications Agency and Public Service Department, respectively.

Vision and Mission

Each outcome must fit into the larger scope of fulfilling the vision and mission of the Department of Polytechnic Education. The vision of the Polytechnic Education Department is to be Malaysia's number one provider of innovative human capital through transformational education and training for the global workforce by 2015 whereas the mission is to break boundaries for the creation of transformative and creative learning environment for an innovation-led company.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) is an expression of a long-term purpose which describes the career and professional accomplishments that the program is preparing students to achieve within 3 to 5 years after graduation.

Programme Learning Outcomes (PLO)

Program Learning Outcomes (PLO) describes what graduates of a program should be able to do as a result of learning experiences within that program. Learning outcomes are concerned with the achievements of the learner rather than the intentions of the lecturer (expressed in the aims of a module or course). They can take many forms and can be broad or narrow in nature (Adam, 2004). Learning Outcome is a statement on what students should know, understand and can do upon the completion of a period of study (MQA, 2009).

4. Elements Of OBE Curriculum

Elements of OBE curriculum consists of Programme Learning Outcomes (PLO) and Course Learning Outcomes (CLO).

Programme Learning Outcomes

PLO are often derived from the vision and mission of the Department of Polytechnic Education after consultation with employers, field experts, and, if appropriate, accrediting and professional bodies. PLO are developed based on the eight Learning Domains (LD) established by Malaysian Qualifications Agency (MQA) and the seven Generic Student Attributes set by the Ministry of Higher Education (MOHE). Department of Polytechnic Education (DPE) produced Program learning Outcomes (PLO) based on Eight (8) Learning Domains by MQA and Seven (7) Generic Student Attributes (GSA) by MOHE.

- a. Eight (8) Learning Domains by MQA are listed below:
 - Knowledge of Discipline Area
 - Technical Skills (Practical Skills)
 - Values, Attitudes and Professionalism
 - Social Skills and Responsibilities
 - Communication, Leadership and Team Skills
 - Problem solving and scientific skills
 - Information Management and Lifelong Learning Skills
 - Managerial and Entrepreneurial Skills

- b. Seven (7) Generic Student Attributes (GSA) by MOHE is listed below:
 - Communications Skills
 - Critical Thinking and Problem Solving Skills
 - Teamwork Skills
 - Moral and Professional Skills
 - Leadership Skills
 - Information Management Skills and Continuous Skills
 - Entrepreneurship skills

Course Learning Outcomes (CLO) Development

Course Learning Outcomes describe what the student is able to perform as a result of their learning experiences within a course. These are determined by the course lecturer, or by a team of lecturers who teach the same course.

5. Implementation of Outcome Based Education in Malaysian Polytechnics

Outcome- based Assessment moves around the idea that educators want to teach some ideas, skills or concepts explicitly. The educators:

- i. will be checking in from time to time to ensure these concepts are indeed being absorbed by students.
- ii. when checking, will look for evidence of the assimilation of knowledge in a variety of ways.
- iii. will look for evidence of skill development.
- iv. will test using styles that reflect the students access information in a variety of ways
- v. will allow students to be able to display and be able to talk about this knowledge acquisition in a variety of forms

Outcome- based Assessment formalizes the idea that the students will always know what to expect and they will be ‘clued up’ to where they are within this system (Murphy. J, 2007).

6. Relationship Between PEO, PLO, CLO And Learning Domains

PLOs are related to PEO to describe what students are expected to know and able to perform or attain a few years after graduation (3 to 5 years). PLOs are distributed across the courses in the programme. Students are expected to be able to perform or attain the programme learning outcomes in terms of skills, knowledge and behaviour / attitude at the end of the programme.

At course level, the CLOs are related to certain PLOs to describe the learning outcomes that the students should attain and achieve. Students are expected to be able to perform or attain the course learning outcomes in terms of skills, knowledge and behaviour / attitude after going through the course (refer to Figure 3).

PEO		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
		LD1	LD4	LD1	LD1	LD2	LD3	LD5	LD6	LD7	LD8	LD9
1	<i>knowledgeable and technically competent in electrical and electronics discipline with capability to solve electrical and electronic problems.</i>	0	0	0	0	0						
2	<i>effective in communication and contribute effectively as a team member with the capability of being a leader.</i>						0					0
3.	<i>ethically and socially responsible towards developing the country and the community.</i>							0			0	
4	<i>able to demonstrate</i>											

entrepreneurship skills and recognize the need of lifelong learning for a successful career advancement and able to adapt themselves with new technological challenges in electrical and electronics fields.									O	O		
Program Name: Diploma in Electronic Engineering (Computer) Learning Domains LD1 Knowledge LD2 Practical Skills LD3 Communication Skills LD4 Critical Thinking and Problem Solving Skills LD5 Social Skills and Responsibilities LD6 Continuous Learning and Information Management Skills LD7 Management and Entrepreneurial Skills LD8 Professionalism, Ethics and Moral LD9 Leadership and Teamwork Skills		PROGRAMME LEARNING OUTCOMES (PLO) 1.apply technical knowledge and social science / humanities knowledge to well defined electrical and electronic engineering problem and to the personality development of individual respectively. 2.solve well-defined electrical and electronic engineering related problems systematically by applying critical thinking skill and using appropriate tools and techniques. 3.analyze and investigate well-defined electrical and electronic engineering problems. 4.assist in designing well defined engineering solutions for electrical and electronic engineering systems. 5.demonstrate practical skill in utilizing modern electrical and electronic engineering tools and design packages. 6.communicate effectively with the engineering community and the society at large. 7.demonstrate awareness and consideration for societal, health, safety, legal and cultural issues and the consequent responsibilities, taking into account the need for sustainable development. 8.engage in independent acquisition of new knowledge and skill, and recognize the need for professional development and information management; 9.demonstrate an awareness for entrepreneurship; 10.demonstrate an understanding of professional ethics, responsibilities and norms of electrical and electronic engineering practices. 11.function individually or in teams, effectively, with a capability to be a leader.										

Figure 2: Example OF Matrix of PEO vs PLO and Learning Domains
 (Source: Diploma in Electronics Engineering (Computer),
 Version: 101013_1.0_Effective: December 2013, DPE, 2013)

Course Learning Outcomes (CLO)	Compliance to PLO											Recommended Delivery Method	Assessment
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11		
	LD1	LD4	LD1	LD1	LD2	LD3	LD5	LD6	LD7	LD8	LD9		
1. Apply suitable software and hardware development on PIC16F/PIC18F microcontroller system to interface with external devices using suitable internal chip features.	O											Interactive Lecture and Discussion	Test Quiz

2.Design embedded system application based on PIC16F/PIC18F microcontroller effectively.					o							Interactive Lecture and Laboratory Activity	Project
3.Construct and simulate real-time embedded system application based on PIC16F/PIC18F microcontroller effectively.						o						Demonstration and Laboratory Activity	Practical Work
4.Demonstrate the ability to lead a team to complete assigned project / practical work within a stipulated time frame.											o	Laboratory Activity and Project	Practical Work and Project
Program Name: Diploma in Electronics Engineering (Computer) Course Name: DEC 5012 Embedded System Application Learning Domains LD1 Knowledge LD2 Practical Skills LD3 Communication Skills LD4 Critical Thinking and Problem Solving Skills LD5 Social Skills and Responsibilities LD6 Continuous Learning and Information Management Skills LD7 Management and Entrepreneurial Skills LD8 Professionalism, Ethics and Moral LD9 Leadership and Teamwork Skills		PROGRAMME LEARNING OUTCOMES (PLO) 1.apply technical knowledge and social science / humanities knowledge to well defined electrical and electronic engineering problem and to the personality development of individual respectively. 2.solve well-defined electrical and electronic engineering related problems systematically by applying critical thinking skill and using appropriate tools and techniques. 3.analyze and investigate well-defined electrical and electronic engineering problems. 4.assist in designing well defined engineering solutions for electrical and electronic engineering systems. 5.demonstrate practical skill in utilizing modern electrical and electronic engineering tools and design packages. 6.communicate effectively with the engineering community and the society at large. 7.demonstrate awareness and consideration for societal, health, safety, legal and cultural issues and the consequent responsibilities, taking into account the need for sustainable development. 8.engage in independent acquisition of new knowledge and skill, and recognize the need for professional development and information management; 9.demonstrate an awareness for entrepreneurship; 10.demonstrate an understanding of professional ethics, responsibilities and norms of electrical and electronic engineering practices. 11.function individually or in teams, effectively, with a capability to be a leader.											

Figure 3: Example of Matrix of Course Learning Outcomes vs PLO and Learning Domains (Source: Diploma in Electronics Engineering (Computer), Version: 101013_1.0_Effective: December 2013, DPE, 2013)

7. Assessment For PEO, PLO and CLO

Assessment For PEO

The goal is to keep the current PEOs by having a process which identifies the needs of the programme’s various constituencies, critically assess the attainment of graduates, and reassesses and updates of the objectives. This is a cyclical process. Although elements of this process are continuous in nature and will vary among programmes, each institution has the responsibility to ensure a documented cycle of activity such that PEOs, as well as their linkage to PLOs, are re-

evaluated at least every three years. Recognizing that different constituents may have competing needs and expectations, each program will have a process in place to resolve potential conflicts while fulfilling as many of the needs as practically as possible. The PEOs can be assessed by using the following assessment tools:

- i. Reports and minutes of meeting with Industrial Advisors Panel (IAP)
- ii. Reports and minutes of meeting with External Examiner
- iii. Alumni survey
- iv. Employer survey
- v. Parents survey
- vi. Academic Staff Perception Survey

Data gathered through these surveys will be accumulated and used as a key input to the PEOs as well as the PLOs. The PEOs assessment process and methods can be viewed in Figure 4.

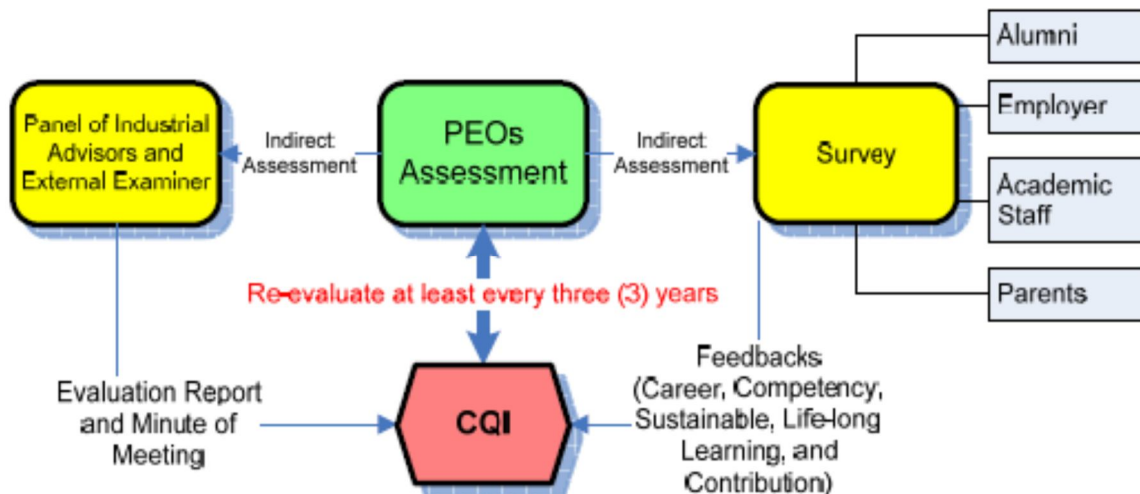


Figure 4: Programme Educational Objectives (PEO) Assessment Methods
(Source: OBE Implementation Guidebook-1st Draft, FKEE, UTHM, 2010)

Assessment for PLO

Establishing and monitoring progress towards PLOs is a process which are taking place at two primary levels: Curriculum and Course. Although the success of students in accomplishing the PEOs is an indicator of success in achieving the PLOs, progress towards PLOs can be most directly evaluated during, at or near the time of completion of the formal instructional or the learning process.

Results may imply that changes are needed in contents, the curriculum or the PLOs. Figure 5 shows the suggestions for the appropriate inputs.

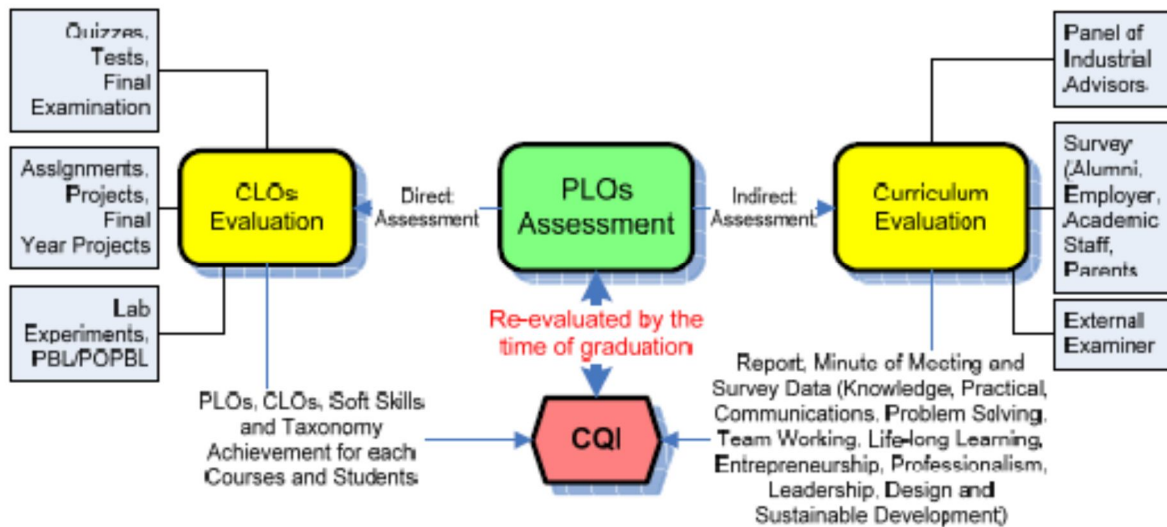


Figure 5: Programme Learning Outcomes (PLO) Assessment Methods (Source: OBE Implementation Guidebook-1st Draft, FKEE, UTHM, 2010)

Assessment for CLO

On-going CLO assessment, with a balance of direct and indirect assessment techniques will be the responsibility of the lecturers and programmes coordinators. It is the responsibility of the lecturers for each course to maintain a detailed course syllabus which describes both the content and PLOs of the course. The syllabus should also contain course objectives, taxonomy levels, instructional techniques and evaluation methods. The CLO assessment is continuous starting from the first

week until the last week of lecture. Lecturers must evaluate and analyse students' achievement for CLO and PLO. Figure 6 shows some suggestions for the appropriate inputs.

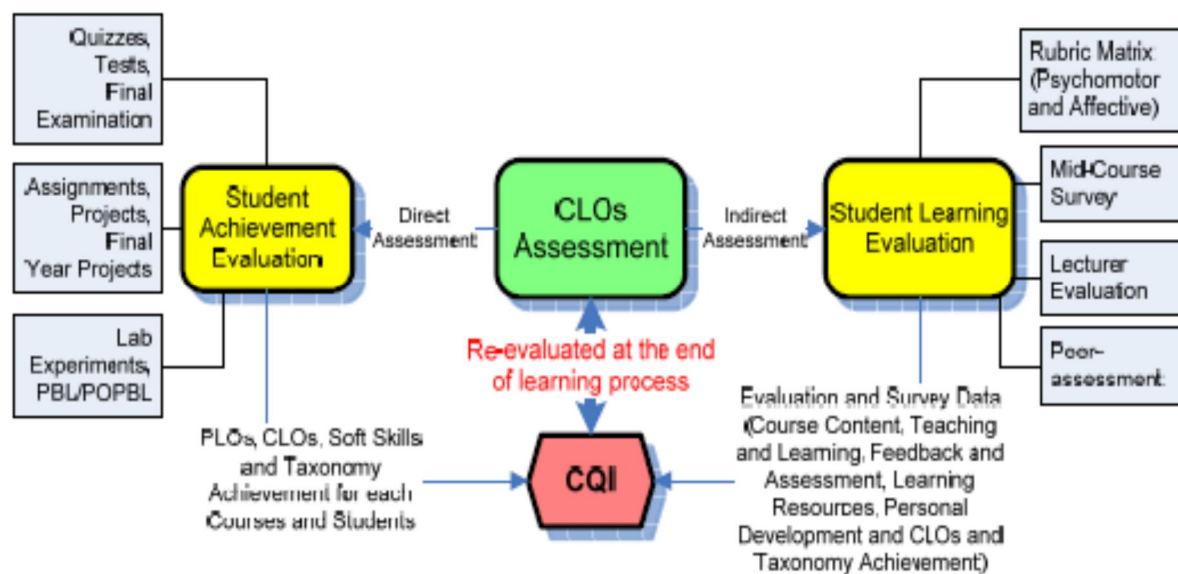


Figure 6: Course Learning Outcomes (CLOs) Assessment Methods
(Source: OBE Implementation Guidebook-1st Draft, FKEE, UTHM, 2010)

8. Continuous Quality Improvement (CQI)

CQI focuses on closing the loop of an assessment process. CQI provides suitable actions in improving the quality of CLOs, PLOs, and PAIs according to targeted KPI. Assessment and evaluation processes provide critical information to the institutions, lecturers and administrators on the effectiveness of the design, delivery, assessment and direction of an educational programme. Improvement based on feedback from the assessment will close the system loop and the process will continue year after year.

The attainment of all outcomes (PEO, PLO and CLO) must be measured and utilised as a gauge for its effectiveness. The measurement methods vary from self-survey of the students, external survey and formal assessments. Following the checking stage, the results are analysed. Any shortcomings on the level of attainment for the outcomes can be addressed and further improvements can be devised in the 're-Planning' stage. The P-D-C-A (Plan-Do-Check-Act) cycle then continues until a sufficient level of attainment is met for all outcomes. The overall P-D-C-A activities can be summarized in the context of the CLO and PLO attainment, as shown in Figure 7. The figure shows

the various activities that are being carried out in using the OBE approach as the basis for CQI for the programme.

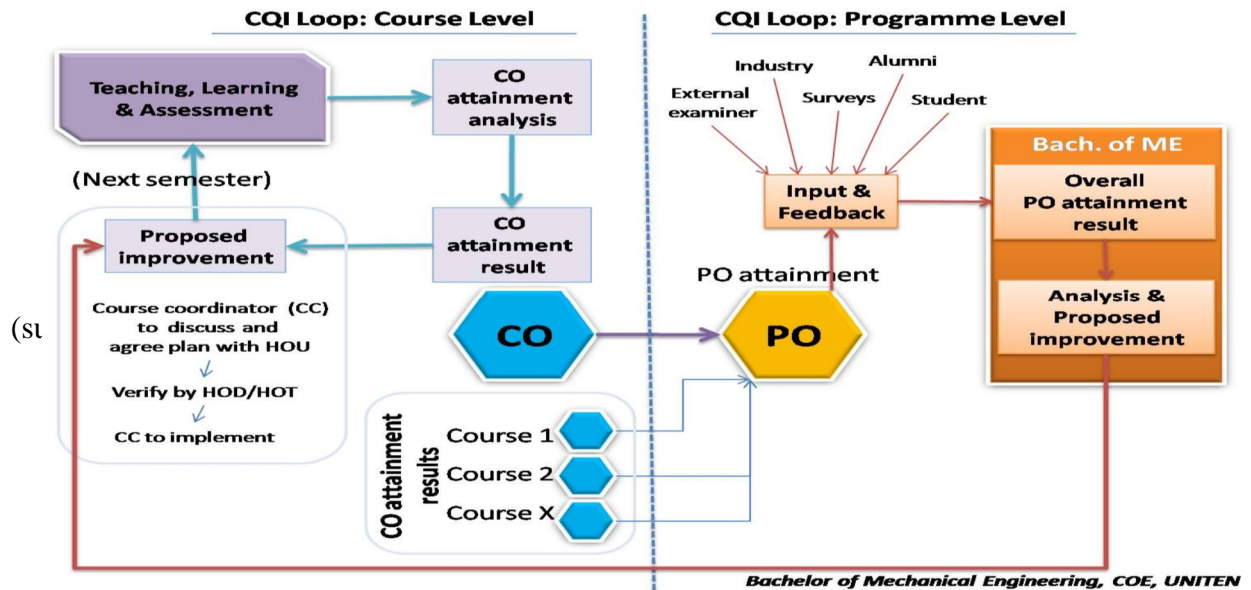


Figure 7: Quality Continuous Improvement Framework

Conclusion

OBE is a process that involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than the accumulation of course credits. Thus the primary aim of OBE is to facilitate desired changes within the students, by increasing knowledge, developing soft skills and/or positively influencing attitudes, values and judgment within the context.

References

- Abdul-Samad, Z., Abdul-Rahman, H., Hassan, F., Darus, Z. M., Zaharim, A., & Mohammad, M. F. (2010). Enhancing Employability Of Graduates Through Educational Collaborations With Professional Institutions: The Experience Of The Faculty Of Built Environment, University Of Malaya. *Advanced Educational Technologies (Edute 10)*, 36-41.

- Alston, A. J., Cromartie, D., Wakefield, D., & English, C.W. (2009). The importance of employability skills as perceived by the employers of united states' land-Grant College and university graduates. *Journal of Southern Agricultural Education Research*.59. 56-69.
- Amara, M. E., Baumann, M., Pelt, V., Guillaume, J. F., & Ionescu, I. (2010). Student's Quality Of Life And Employability Skills: Sqales A Device And A Tool For Universities. Example Of Use In Luxembourg, Belgium And Romania. *Revista De Cercetare Si Interventie Sociala*, 28, 97-114.
- Arrowsmith, C., Bagoly-Simo, P., Finchum, A., Oda, K., & Pawson, E. (2011). Student Employability And Its Implications For Geography Curricula And Learning Practices. *Journal Of Geography In Higher Education*, 35(3), 365-377.
Doi 10.1080/03098265.2011.563379
- Burgaz, B. (2008). Employability Competences Of Vocational Secondary School Students. *Egitim Arastirmalari-Eurasian Journal Of Educational Research*, 8(31), 17-34.
- Chan, A & Chan, C. H. (2009). *A new outcome-based curriculum: its impact on student core competence*. [Journal of Applied Research in Higher Education](#) . 1 (2). 24-32.
- Department of Polytechnic Education (DPE), (2013) Diploma in Electronics Engineering (Computer), Version: 101013_1.0_Effective:December 2013
- Department of Polytechnic Education. (2011). Dialogue with Industries. PWTC, Putrajaya, Malaysia.
- Field, L. (2001). Skill Requirements of Leading Australian Workplaces. Employability Skills for the Future Project 2002 Supporting Case Study Research, Field Learning Pty Ltd.
- Fitriyehara, K., Ramlah, H., and Rahim, A. B., (2009). Employability Skills Among the Students of Technical and Vocational Training Centers in Malaysia. *European Journal of Social Sciences*, 9(1),147-160.

- Husain, M. Y., Mokhtar, S. B., Ahmad, A. A., & Mustapha, R. (2010). Importance of GSA from Employers' Perspective. *Procedia - Social and Behavioral Sciences*, 7, 430-438.
Doi:10.1016/j.sbspro.2010.10.059
- Malaysian Qualification Agency (MQA). (2008). Code of Practice for Programme Accreditation. Kuala Lumpur.
- Marilee J. B. (2010). Implementing Outcomes-Based Assessment of Student Learning. Institutional Assessment Texas A&M University.
- McLeish, A., (2002). GSA for Australian Small and Medium Sized Enterprises: Commonwealth of Australia.
- Mohamed R. and Mohd, R. (2005). The Year 2004 Polytechnic Convocation Survey. Proceedings of National Seminar "The development of Technology And Technical-Vocational Education And Training In An Era of Globalization: Trend and Issues". Kuala Lumpur.
- Ministry of Higher Education (MOHE). (2006). *Modul Pembangunan Kemahiran Insaniah (Soft Skills) untuk Institusi Pengajian Tinggi Malaysia*. Universiti Putra Malaysia. Selangor.
- Ministry of Higher Education (MOHE). (2009). Seminar on Employability: An Overview of Graduate Employability of Recent Graduates: Some Facts and Figures. Putrajaya, Malaysia.
- Murphy, J. (2007). What is outcomes Based Assessment?
- McLarty, R. (2000), "Evaluating graduate skills in SMEs: the value chain impact", *Journal of Management Development*, 19(7). 615 – 628. Doi:10.1108/02621710010373287
- Norshah, H., S., Adzly, A., Ramesh, S., and Mohd, Z. Y. (2009). Implementing Continual Quality Improvement (CQI) Process in an Outcome-Based Education (OBE) Approach. Proceedings of the 2nd International Conference of Teaching and Learning (ICTL) 2009) INTI University College, Malaysia.

Simon, B. C. (2012). [A Research-Based Approach To Generic Graduate Attributes Policy](#). Higher Education Research & Development. 31(1), 79- 92. Doi:10.1080/07294360.2012.642842

Velasco, M.S. (2012). [More than just good grades: candidates' perceptions about the skills and attributes employers seek in new graduates](#). *Journal Of Business Economics And Management*. 13 (3), 499-517.

DOI:10.3846/16111699.2011.620150

Universiti Tun Hussain Onn Malaysia (UTHM), (2010). OBE Implementation Guidebook-1st Draft, FKEE, UTHM, 2010

Zaharim, A. (2009). Engineering Employability Skills Required By Employers In Asia. *Recent Advances In Engineering Education*, 21-21.