SERIES 2

Proceedings: ***International Invention, Innovative & Creative (InIIC) Conference, Series 2/2021***
eISBN: 978-967-18412-7-3 *(Publication Date: 9 November 2021)* *MNNF Publisher*

Analysis of Performance based on Programme Educational Objective's Achievement for Civil Engineering Diploma Graduates

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ABSTRACT

Outcome-Based Education is a learning approach adopted by higher institutions in Malaysia which specifies the intended learning outcomes that emphasises not only on knowledge acquisition but essential skills to be acquired by graduates. OBE emphasize the need to accordingly align all aspects of educational processes and systems to the expected outcomes. Civil Engineering Diploma programme in Politeknik Kuching Sarawak has implemented OBE in the curriculum and includes three levels of assessment which are course outcome (CO), programme outcome (PO) and programme educational objectives (PEO). This paper presents the findings of graduate's performance on PEO for December 2013 cohort. PEO are broad statements representing the expected achievements graduates from a programme are supposed to attain and need to be continually reviewed. It is normally measured within 3-5 years after graduation as part of continual quality improvement (CQI). For DCE programme, PEOs are aligned with the mission and vision of PKS which is to become the leading-edge TVET institution. Questionnaires were used as research instrument in this paper to collect data from 40 graduates of DCE programme and descriptive data was computed using SPSS software. Reliability analysis has been conducted and reported Cronbach's alpha (α) of 0.898. In this method, attainment of PEOs is evaluated based on the five-level of Likert scale. Through data analysis, finding indicates that graduates are able to attain the specified PEOs and achievement of PEOs met the performance indicator. Regardless of the positive feedback from graduates, it is recommended to enhance the attainment of PEO 1 in developing critical thinking to solve problem in design works and technically competent in engineering fields. This measure is important to ensure that graduates are adequately prepared to enter the engineering technician profession.

Key Words: Outcome Based Education, Programme Education Objectives, Continual Quality Improvement, stakeholder input

1. INTRODUCTION

Outcome based education (OBE) has taken a shift for Malaysia education system where programme outcomes, objectives and learning experience are the main focus in higher learning institution (IHL). In 2016, Engineering Technology Accreditation Council (ETAC) led by the Board of Engineers, Malaysia (BEM) has instructed engineering programmes in Malaysia to adopt OBE based curriculum to ensure that the quality of engineering, engineering technology, and engineering technician education programmes attain the minimum standard comparable to global practice (ETAC, 2016). The higher education institutions started to respond to a growing concern for the adequacy of students' professional and career preparation by specifying the outcomes or abilities that were demanded in the market. Such outcomes are programmed to focus on assessing performance as well as knowledge, bridging the gap between IHL and career world. Politeknik Kuching Sarawak (PKS) is a tertiary institution under Ministry of Higher Education that focus on producing holistic graduates in technical and vocational (TVET) field. TVET equips learners not only with technical and vocational skills and competencies, but also with a broad range of knowledge, skills, attitudes and abilities that are indispensable for meaningful participation in the workplace and

society (DPE, 2015). Hence, this study will focus on graduate's performance based on the achievement of Programme Educational Objectives (PEO) for Civil Engineering Diploma (DCE) programme. DCE programme has attained accreditation from ETAC in 2018 and needed to obtain feedback from stakeholder (alumni) as part of continual quality improvement (CQI) measures. The findings presented in this study involved feedbacks from 40 graduates of December 2013 cohort since implementation of OBE in DCE programme has started in 2013.

2. LITERATURE REVIEW

2.1 OBE in polytechnic curriculum

OBE approach in design and development process of curriculum in polytechnic outlined four core principles which are clarity of focus, design down, high expectation and expanded opportunity (DPE, 2013). The principle of clarity of focus assists the teachers to ascertain a clear picture of intended learning so that learners are able to display and demonstrate those outcomes through their performance (Saima Shaheen, 2019). In the other hand, Jonathan V. Macayan (2017) stated that design down principle is like a top-down approach of formulating and stating outcomes. OBE emphasize the need to accordingly align all aspects of educational processes and systems to the expected outcomes that all students should be able to proficiently exhibit at the end of the curriculum and that outcomes should not be viewed with grades, but rather demonstrations of expected competencies as a result of significant learning experiences. At DCE programme, assessments in OBE includes the assessment of course outcomes (CO), which are assessed at the end of the course, program outcomes (PO) which are assessed upon graduation and PEO which are assessed after three to five years of graduation. Nur Irfah Mohd Pauzi et al. (2010) reported that to close the loop (CDL), three levels of assessment (PEO, PO and CLO) need to be completed. K.Y. Tshai et al. (2014) concluded that determining students' satisfaction level in their attainment of PEO is an essential part in CDL of the continual quality improvement process within the context of OBE.

2.2 Programme Educational Objectives

According to Abadeni et al. (2013), programme educational objectives are broad statements representing the expected graduate's achievements from a program are supposed to attain few years after graduation (usually 3 to 5 years). Similar study by Sheikh Rahimullah et al. (2020) described PEOs as the expected achievements of the graduates in their career and professional accomplishment after graduation. In addition, Noreen Kamarudin (2016) studied on polytechnic curriculum's feedback and reported that review of curriculum is a way to ensure that the curriculum offered by educational institutions is up-to-date and relevant to the stakeholders' needs.

For DCE programme, Programme Educational Objectives (PEOs) are specific goals aligned with the mission and vision of IHL. PKS's vision is to become the leading-edge TVET institution by providing wider access to quality and recognized TVET programmes in order to produce holistic, entrepreneurial, balance as well as to empower communities through lifelong learning by capitalism smart partnership with stakeholders. Table 1 shows clear linkage between PEOs and PKS's mission. For the periodic review and revision of these PEOs, performance indicators defined for all PEOs in DCE programme is at minimum attainment of 50%.

Table 1 PKS mission to PEO linkage

	PKS Mission			
	Holistic	Entrepreneurial	Competitive human capital	Industrial needs
PEO 1 Integrate civil engineering principles and develop critical thinking to solve problem in design works and technically competent in engineering fields	√		√	
PEO 2 Display practical skills and communicate effectively in global work environment			√	√
PEO 3 Possess in lifelong learning, social responsibilities, entrepreneurship		√	√	
PEO 4 Build leadership and teamwork skills, right attitude and professional ethics	√		√	

3. METHODOLOGY

3.1 Research Design

The instrument used to gather feedbacks from respondents regarding PEO achievement is through questionnaire. Questionnaires were distributed to 40 graduates of DCE programme particularly from December 2013 cohort by email and shared link that was generated using Google form. The questionnaire is divided into two (2) sections. Section A requires the demographic profile of the respondents such as age, employment status, position, year of working experience etc. Section B consists of the statements on PEO achievement. The measurement on statements related to the PEO achievement use Likert Scale from scale 1(very low) to 5 (very high) for respondents to choose indicating their opinions.

3.2 Reliability Test

Reliability is concerned with the ability of an instrument to measure consistently. Pilot study has been conducted with small sampling of 20 samples (presented in Table 2) and result from reliability test shows that Cronbach's alpha value of 0.898 for 9 items under Section B exceeds the minimum standard of 0.70 ($\alpha>0.70$) as recommended by Nunnally JC (1978). This indicates that the value is acceptable and reliable for measuring the variable under study.

Table 2 Reliability Statistics

Cronbach's Alpha	Sample, N	Quantity of Items
0.898	20	9

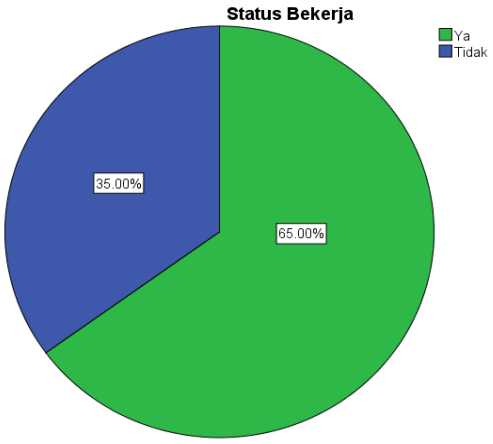
4. RESULT AND DISCUSSION

Findings from the questionnaire were analysed using Statistical Package for the Social Science software. Gathered data was computed in a form of percentage and weighted mean of responses to interpret the feedbacks from the respondents.

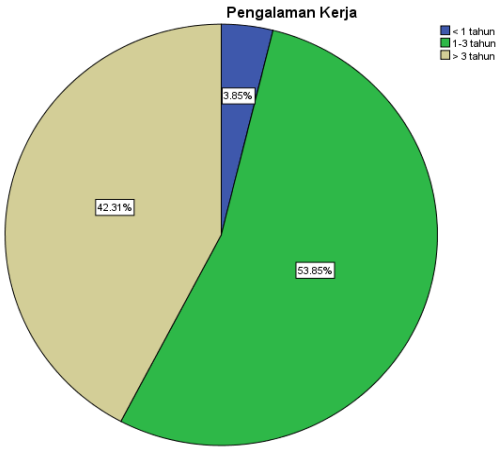
4.1 Demographic Information

Data analysis on Section A shows that majority of respondents 62.5% is female graduates and aged between 26-30 years old. 65% of respondents are employed while 35% is currently unemployed. Findings also showed that majority of respondent have working experience of 1 until 3 years. Employment status and years of working experience of these respondents is as presented in Figure 1. In addition to that, 30% of the respondents are working in government sector, 35% working in private sector while the rest is

unemployed. Feedback from the graduates have also identified 2 most common job positions which are assistant engineer and site supervisor.



(a) Employment status



(b) Years of working experience

Figure 1: Employment profiles

4.2 Program Educational Objectives Achievement

Section B comprises of 11 items that are developed to measure all of the PEOs. Likert Scale from scale 1(very low) to 5 (very high) is used to indicate respondent's feedback on PEO achievement and Table 3 shows the verbal interpretation of the mean ratings as recommended by Josephine D. German et al. (2021).

Table 3 Likert Scale (Skills and Competencies, and Work-related Values)

Scale	Scale Range	Degree of Achievement	Verbal Interpretation
5	4.01-5	Excellent	Excellent achievement of the outcome
4	3.01-4	Good	Good achievement of the outcome
3	2.01-3	Average	Average achievement of the outcome
2	1.01-2	Poor	Poor achievement of the outcome
1	0-1	Very poor	Very poor achievement of the outcome

(a) PEO 1 Integrate civil engineering principles and develop critical thinking to solve problem in design works and technically competent in engineering fields.

According to chart as in Figure 2, finding indicates that majority of graduates have expressed good achievement for PEO 1 with value of 55% and 47.5% for item 1 and 2 respectively. Most ratings were accumulated at scale 4 and 5. This is an indication that the specified objective is generally achieved. Mean score for item 1 and 2 is respectively 3.65 and 3.50 that indicate good achievement of the outcome.

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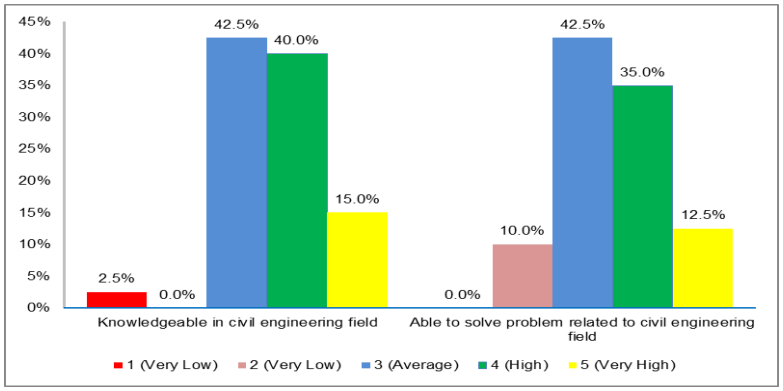
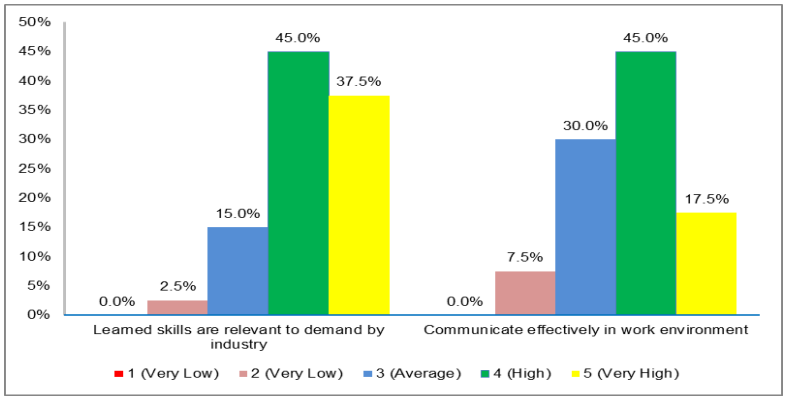


	Item 1 Knowledgeable	Item 2 Solve problem
Mean	3.65	3.50
Mode	3.00	3.00

Figure 2: Achievement for PEO 1

(b) PEO 2 Display practical skills and communicate effectively in global work environment

From the result in Figure 3, feedback for PEO 2 shows a higher value compared to PEO 1. Mean score for item 3 is 4.18 that indicate excellent achievement which means DCE programme has developed graduate with skills that is relevant to industry needs. In the aspect of communication, 62.5% of respondent felt that they are able to communicate effectively with mean score of 3.72. Although that mean score is still interpreted as good achievement but further action should be taken to address the 30% of graduates with average skills in communication.



	Item 3 Learned skills	Item 4 Communicate
Mean	4.18	3.72
Mode	4.00	4.00

Figure 3: Achievement for PEO 2

(c) PEO 3 Possess in lifelong learning, social responsibilities, entrepreneurship

Achievement of PEO 3 is obtained from 3 items in Section B to measure achievement on lifelong learning (Item 5), social responsibilities (Item 6) and entrepreneurship (Item 7) aspect among the graduates. Data shows that majority of graduate gave positive feedback for all of the items as presented in Figure 4 with mean score of 4.23, 3.48 and 3.60 respectively. In recognition of professional development through lifelong learning, 80% of the graduates participate in course/ training relevant to their career development as construction technology changes rapidly and requires for skill to be renewed.

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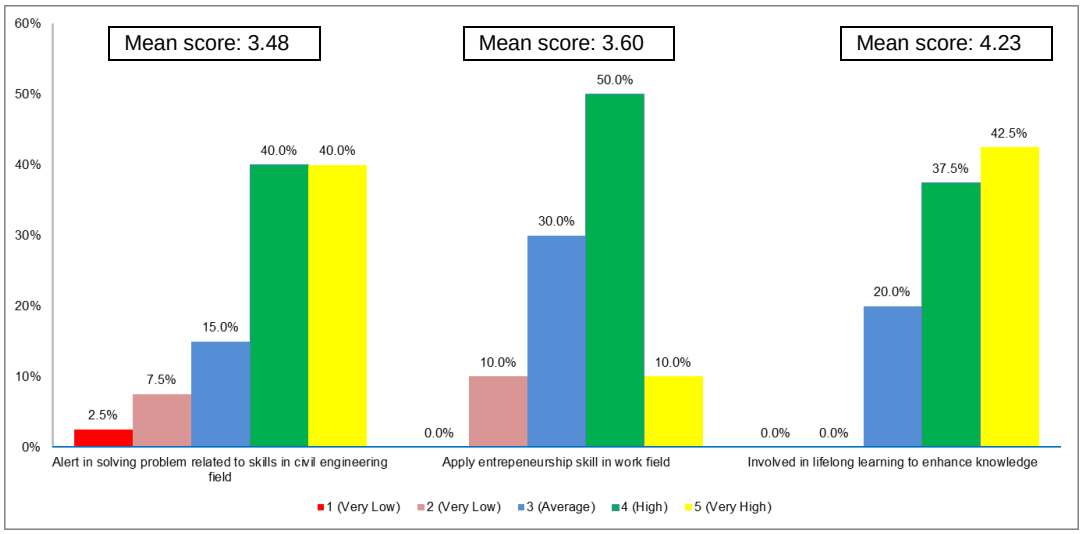

Figure 4: Achievement for PEO 3

(d) PEO 4 Build leadership and teamwork skills, right attitude and professional ethics

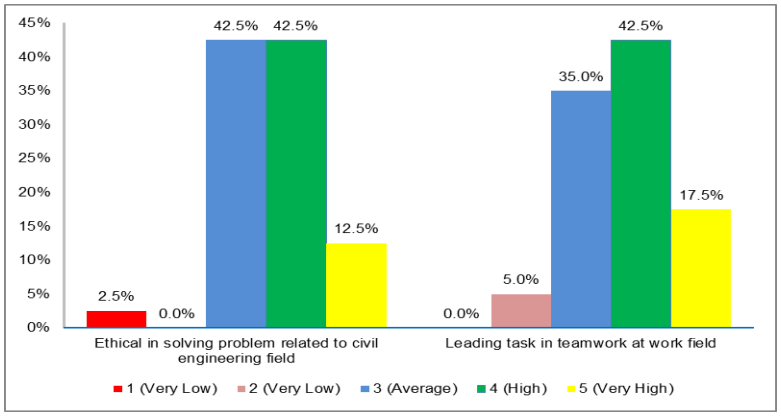

Figure 5: Achievement for PEO 4

	Item 8 Ethical	Item 9 Teamwork
Mean	3.63	3.73
Mode	3.00	4.00

From the result in Figure 5, finding indicates that 42.5% graduates have split feedback between average and high in implementing professional ethics in solving problem related to civil engineering field. Completing a task in civil engineering project can be challenging and requires experience to become an expert. On the other hand, 60% graduates have expressed good achievement for leadership and teamwork skill with mean score of 3.73.

Table 4 Overall Performance of the PEOs

PEO Indicator	Key Performance Indicator	% of PEO Achievement	Status
PEO 1 Integrate civil engineering principles and develop critical thinking to solve problem in design works and technically competent in engineering fields	50%	51.25%	ACHIEVED
PEO 2 Display practical skills and communicate effectively in global work environment	50%	72.5%	ACHIEVED
PEO 3 Possess in lifelong learning, social responsibilities, entrepreneurship	50%	73.33%	ACHIEVED
PEO 4 Build leadership and teamwork skills, right attitude and professional ethics	50%	57.55%	ACHIEVED

5. CONCLUSION AND RECOMMENDATION

This study shows that graduates are able to attain the specified PEOs for Civil Engineering Diploma programme. Findings indicate that achievement of PEOs met the performance indicator but the results of these evaluations must be systematically utilised as input for the continual improvement of the programme. Activities should be planned to improve the attainment of PEO 1 in developing critical thinking to solve problem in design works and technically competent in engineering fields. This measure is important to ensure that graduates are adequately prepared to enter the engineering technician profession. As for recommendation, feedback from other stakeholder such as employer is required to map the self-evaluation made by graduate with input from employer.

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