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Analysis on Programme Educational Objectives: Alumni Survey

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Abstract*— This paper evaluates the Programme Educational Objectives (PEOs) of the Diploma in Electronic Engineering (Communication) programme for the 2019 cohort graduates at Politeknik Kota Kinabalu. In four key areas: practicing as technicians in the electrical and electronic fields (PEO1), contributing to society with professional ethics (PEO2), engaging in enterprising activities (PEO3), and advancing their careers through continuous learning (PEO4). The study used both quantitative data from graduate surveys and qualitative feedback from the Industrial Advisory Panel (IAP). The findings show that 51.5% of graduates meet PEO1, 93% fulfill PEO2, 37.6% achieve PEO3, and 97% attain PEO4. All PEOs surpassed the set targets, reflecting the program's effectiveness in preparing graduates. However, areas for improvement include technical adaptability and ethics. The report emphasizes continuous quality improvement to align with industry needs.

***Index Terms*— Graduate Assessment, Outcome-Based Education, Programme Educational Objectives.**

I. INTRODUCTION

Programme Educational Objective (PEO) is a statement about the characteristics and achievements of graduates after three (3) to five (5) years of graduation [1], [2], [6], [7]. The PEO for the Diploma in Electronic Engineering (Communication) programme (DEP) offered in Malaysian Polytechnic will produce balanced TVET graduates as follows [3]:

PEO 1:	practicing technician in electrical engineering related field
PEO 2:	contributing to society with professional ethic and responsibilities
PEO 3:	engaging in enterprising activities that apply engineering knowledge and technical skills
PEO 4:	engaging in activities to enhance knowledge for successful career advancement

Generally, PEOs are assessed to evaluate the expected outcomes of graduates three to five years after graduation, as well as the programme's effectiveness as measured by the number of graduates [2]. A PEO survey is carried out from 6 to 24 November, 2023 to get feedback from stakeholders, namely polytechnic alumni through the PEO survey link that has been distributed by The Polytechnic and College Community Education Department (JPPKK), Ministry of Education Malaysia (KPM) to the Department of Electrical Engineering (JKE), Politeknik Kota Kinabalu (PKK).

The selection of data is only in the graduating year 2019. For DEP programme, there are 98 respondents or 97 % respondents from total graduates of 101, of which 75 respondents (74.6%) are employed/self-employed, 20 respondents (19.8%) are in further study and three (3) respondents (2.9%) are unemployed. Despite the respondents being only 97 % of the total graduates, the PEO measurement analysis included all 101 graduates, accounting for 100% of the population.

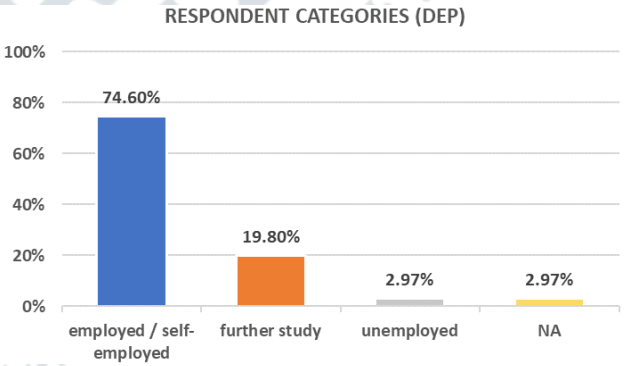

Fig. 1: Respondent Categories

The employed/self-employed graduates comes from various employment sectors as depicted in Table I below.

Table I: Employment Sector

Employment Sector	Percentage
Engineering	17.3 %
Manufacturing	13.5 %
Education	0 %
Information technology (Computing)	5.8 %
Sales & Marketing	3.8 %
Transportation (Logistic)	0 %
Security (Defense)	0 %
Services	11.5 %
Telecommunication	11.5 %
Training (Consultation)	0 %
Other	36.5 %
TOTAL	**100**

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II. DATA COLLECTION METHOD

The process of analyzing findings are using quantitative methods based on raw data (Graduates' data) obtained while qualitative methods are used based on feedback from the Industrial Advisory Panel (IAP).

A. Quantitative Method

Dichotomous instruments consisted of 14 questions, each of which is directly mapped to measure a specific PEO [8]. The answer obtained for each question can provide a quantitative measure on the achievement of a PEO by the respondent.

B. Qualitative Method

On the other hand, feedback from Industrial Advisory Panel (IAP) was obtained as the qualitative method to assess the PEO achievement of DEP graduates.

Next, results from both methods are compared and discussed before being concluded. Fig. 2 below shows a summary of the above process which is also called the triangulation process [4].

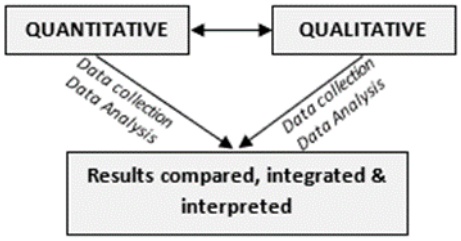

Fig. 2: Triangulation process

III. DATA FINDINGS AND ANALYSIS

Data analysis for each PEOs is linked to the Programme Learning Outcomes (PLO) which were obtained by students during their study period at the polytechnic, to see if the PLOs were successfully applied by the graduates in the industrial field. Table II below shows the relationship between PLO and PEO for DEP programme at Malaysian Polytechnic [3].

Table II: PLO vs PEO Relationship

PROGRAMME LEARNING OUTCOME (PLO)		PEO
PLO1	apply knowledge of applied mathematics, applied science, engineering fundamentals & an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures & practices;	PEO 1
PLO2	identify & analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (DK1 to DK4);	PEO 1
PLO3	design solutions for well-defined technical problems & assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health & safety, cultural, societal, & environmental considerations (DK5);	PEO 1
PLO4	conduct investigations of well-defined problems; locate & search relevant codes & catalogues, conduct standard tests & measurements;	PEO 1
PLO5	apply appropriate techniques, resources, & modern engineering & IT tools to well-defined engineering problems, with an awareness of the limitations (DK6);	PEO 1
PLO6	demonstrate knowledge of the societal, health, safety, legal & cultural issues & the consequent responsibilities relevant to engineering technician practice & solutions to well-defined engineering problems (DK7);	PEO 2
PLO7	understand & evaluate the sustainability & impact of engineering technician work in the solution of well-defined engineering problems in societal & environmental contexts (DK7);	PEO 2
PLO8	understand & commit to professional ethics & responsibilities & norms of technician practice;	PEO 2
PLO9	function effectively as an individual, & as a member in diverse technical teams;	PEO 3
PLO10	communicate effectively on well-defined engineering activities with the engineering community & with society at large, by being able to comprehend the work of others, document their own work, & give & receive clear instructions;	PEO 3
PLO11	demonstrate knowledge & understanding of engineering management principles & apply these to one's own work, as a member or leader in a technical team & to manage projects in multidisciplinary environments;	PEO 3
PLO12	recognise the need for, & have the ability to engage in independent updating in the context of specialised technical knowledge;	PEO 4

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A. PEO 1 Achievement Analysis

From Fig. 3.1, 51.5 % of graduates are working or have ever worked in electrical or electronic related field. The achievement of PEO 1 also includes responses from graduates who applied or practiced any electrical or electronic knowledge in their job scope. While 48.5 % of graduates do not work in the related field, are in further study or are unemployed.

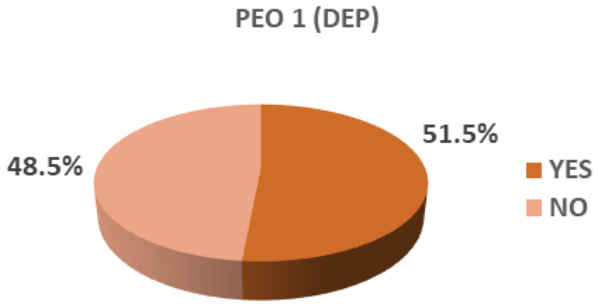

Fig. 3.1: PEO 1 Achievement Percentage

B. PEO 2 Achievement Analysis

From Fig 3.2, 96 % of graduates play roles to contribute to society with professional ethics and responsibilities. While 4 % of graduates do not participate in any social activities.

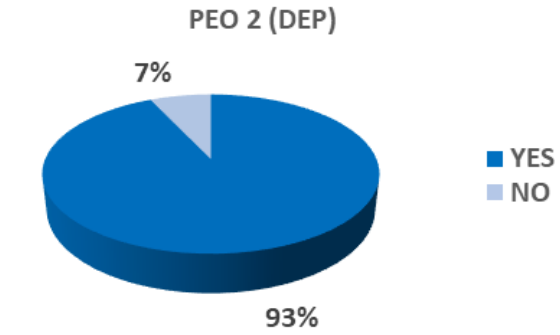

Fig. 3.2: PEO 2 Achievement Percentage

C. PEO 3 Achievement Analysis

From Fig 3.3, 37.6 % of graduates engage in enterprising activities that apply engineering knowledge and technical skills. While 62.4 % of graduates do not participate in any enterprising activities or only involve in non-engineering enterprising activities.

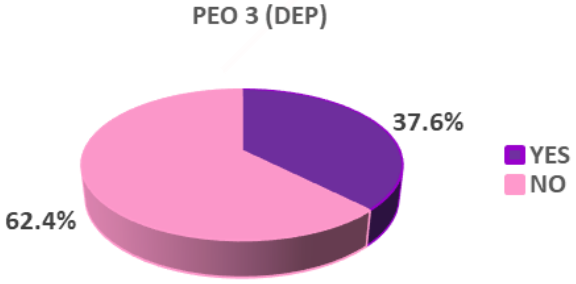

Fig. 3.3: PEO 3 Achievement Percentage

D. PEO 4 Achievement Analysis

From Fig 3.4, 97 % of graduates engage in activities to enhance knowledge for successful career advancement. While 3 % of graduates do not participate in any career advancement activities or do not respond to the survey.

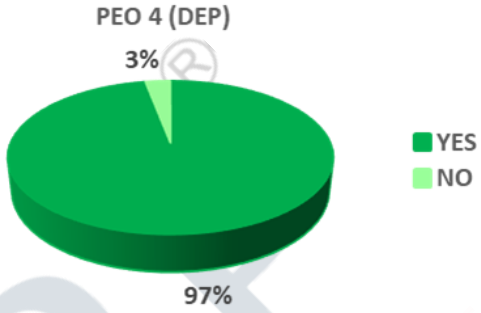

Fig. 3.4: PEO 4 Achievement Percentage

IV. DISCUSSION

PEOs achievement targets which has been periodically reviewed for DEP programmes are as in Table III [8]. From the table, when the PEOs' achievements are compared to the PEOs' targets, it can be observed that PEO 1's achievement of 51.5% is above its target of 40% , PEO 2's achievement of 93% is higher than its target of 40% , PEO 3's achievement of 37.6% exceeds its target of 10% and PEO 4's achievement of 97% is greater than its target of 50%. In conclusion, all PEOs' achievements successfully exceed the PEOs' targets.

Table III: PEO Targets vs PEO Achievement

PEO		PEO Target (%)	PEO Achievement (%)
PEO 1	practicing technician in electrical engineering related field	40	51.5
PEO 2	contributing to society with professional ethic and responsibilities	40	93
PEO 3	engaging in enterprising activities that apply engineering knowledge and technical skills	10	37.6
PEO 4	engaging in activities to enhance knowledge for successful career advancement	50	97

In terms of the relationship between PEOs and related PLOs, in general, PLO achievement for graduates of the 2019 cohort is above the PLOs' target of 60%. Overall, the PLOs' achievement has been reflected in the PEOs' achievement where all PEOs' achievements meet the PEOs' targets despite only 97% of graduates have been involved.

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IAP feedback was gathered via an online survey that was formally distributed by email. From the IAP feedback for PEO1, the IAP believes that while many graduates are well-prepared, there is room for improvement in technical proficiency and adaptability to changing industry demands. The adaptability of graduates varies based on factors such as industry exposure and commitment to continuous learning. The achievement of PEO1 is slightly above its target of 40%, indicating that more than half of the graduates are meeting this objective. However, there is a need to focus on enhancing adaptability and technical skills to better align with industry demands.

Regarding PEO2 feedback, the IAP noted that graduates generally demonstrate strong communication skills and awareness of social norms like corruption and data privacy. However, there are areas where improvement is needed, such as ethical decision-making and environmental responsibility. PEO2 is highly achieved, with graduates showing strong involvement in community activities. The focus should be on further improving specific aspects of professional ethics and social responsibility.

The IAP's comments on PEO3 suggest that graduates often start in entry-level roles in business or R&D projects, with some progressing to higher levels of responsibility. The IAP also highlighted the importance of project management, stakeholder communication, and technical analysis as key areas of involvement. The attainment of PEO3 is strong, indicating that a significant portion of graduates are engaging in relevant enterprising activities. The feedback suggests that continuous improvement in competencies related to project management and communication is necessary.

For PEO 4 feedback, the IAP observed that graduates demonstrate adaptability and proficiency in new tools and technologies, with continuous learning being a significant factor in their career advancement. The IAP also noted that exposure to modern tools during their education contributes positively to their career growth. PEO4 is highly achieved, with nearly all graduates engaging in continuous learning and career advancement activities. The feedback emphasizes the importance of maintaining and enhancing exposure to modern tools and technologies in the curriculum.

To summarize qualitatively, the data suggests that the PEOs are generally well-achieved, with PEO2 and PEO4 being particularly successful. However, continuous improvement is needed, especially in areas like technical proficiency, adaptability, and professional ethics, to ensure graduates remain competitive and aligned with industry needs.

A. Continuous Quality Improvement (CQI)

Politeknik Kota Kinabalu (PKK), particularly the Department of Electrical Engineering (JKE), remains dedicated to delivering high-quality education to its students. Feedback from stakeholders, gathered through meetings and surveys, is crucial for identifying areas for enhancement. Consequently, in alignment with the accreditation goals [1], PKK actively incorporates these insights to improve the DEP programme.

Table IV below addresses the issues encountered during the PEO survey process that require improvement by the respective parties. These improvements aim to refine the assessment process, ensuring more accurate measurement of PEO achievements and better alignment with industry expectations and educational goals.

Table IV: Issues

No	Issues
1	**Revision of PEO Measurement Instruments**: The instruments for assessing PEO3 need to be revised to better support the accurate measurement of graduates' engagement in enterprising activities that apply engineering knowledge and technical skills.
2	**Refinement of PEO Measurement Instruments**: The instruments for PEO4 require skipping steps adjustments to ensure accurate data collection.

In addition to these issues, it is important to continue previous CQI efforts, such as maintaining a high response rate close to 100% of the population, to ensure that PEO achievement results accurately reflect actual performance. Furthermore, PEO achievement targets should be regularly reviewed in both academic and IAP meetings to ensure they remain achievable. Additionally, as recommended by the IAP, providing an explanation for each PEO instrument will facilitate a better understanding before distributing the PEO survey link to the graduates.

V. CONCLUSION

The Educational Goal at Malaysian Polytechnics is to produce TVET graduates who are holistic and competitive as well as capable to contribute to national development [5]. In line with the learning objectives of the polytechnics, the Programme Aims of the DEP programme believe that every individual has the potential to become a competent and adaptive technician to support national aspirations in producing engineering talents [3]. The assessment of PEOs through the 2019 survey demonstrates that the polytechnic's educational goals are being realized, with all PEO targets successfully exceeded. Notably, PEO2 and PEO4 have been particularly successful, reflecting strong graduate involvement in community activities and continuous learning for career advancement. However, the survey also highlights areas for continuous improvement, particularly in enhancing technical proficiency, adaptability, and professional ethics. These insights will be forwarded to JPPKK for further development and integration into future educational strategies. Through ongoing refinement and stakeholder engagement, PKK is committed to maintaining the relevance

and quality of DEP programme, ensuring graduates are well-prepared to meet the evolving demands of the industry.

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