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Research paper



Perception of Industries on Student Performance of Bachelor of Engineering (Hons.) Electrical Engineering Program

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Abstract

This paper presents a study on the perception of industries to the performance of Bachelor of Engineering (Hons.) Electrical Engineering students of Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM), Malaysia. This study was carried out based on the industrial training course whereby, during this period, the students are attached with the industry under supervision from their qualified personnel. After the students complete this course, they are evaluated by their industrial training supervisors using rubric measures provided by the faculty. The supervisors' perception on the performance of all students in the degree programme (155 students) was evaluated based on the marks given to the students according to their communication skills, professionalism and work performance after completion of the industrial training. The results from the rubrics form was analysed to identify the strengths and the weaknesses of the students. The study revealed several weaknesses of students, which can be improved upon by conducting special training or courses for them to enhance their performance before graduation.

Keywords: *Industries perception, Industrial training, Engineering program, Engineering accreditation*

1. Introduction

In 2015, the Ministry of Higher Education (MOHE) Malaysia has aligned its priorities through the Malaysia Education Blueprint 2015-2025 (Higher Education) [1] in order make sure that all of the education curriculums are relevant in the era of technology convergence and to be in line with the fourth industrial revolution (IR4.0). In Malaysia, there is approximately 350,000 students in technical studies (from certificate to postgraduate level) from 1.25 million students in Institutions of Higher Learning (IHL) [2].

Due to the large number of students in technical studies, several professional bodies such as the Board of Engineers Malaysia (BEM) and the Malaysia Qualifications Agency (MQA) have been appointed by the Malaysian Government to conduct accreditation of engineering and technology programmes to enhance the engineering education standard in Malaysia. The MQA is empowered to accredit higher education programmes and qualifications in Malaysia except programmes that fall under the ambit of professional bodies such as engineering programmes [3]. The role of BEM in maintaining engineering education standard through its accreditation bodies namely the Engineering Accreditation Council (EAC) and Engineering Technology Accreditation Council (ETAC). The EAC accredits engineering programmes are mutually recognised by 18 countries that include Australia, Canada, Ireland, New Zealand, United Kingdom, United States, China, South Africa, Japan, Singapore, Korea, Chinese Taipei, Malaysia, Turkey, Russia etc [4].

In Malaysia, it is paramount for the IHLs that provide engineering programmes to receive accreditation from BEM. This is because only graduates from accredited programmes may register themselves with BEM, thus allowing them (by law) to work in various engineering careers. Registration is compulsory for persons who want to take up employment that requires him to perform professional engineering services. In the case of graduate engineers and engineering technologists to take up employment that requires them to assist the Professional Engineer, or in the supervision and inspection of engineering works [5].

According to the EAC Engineering Programme Accreditation Manual 2017 [4], the IHLs plays an important role in producing quality engineering graduates that possess the right attributes or outcomes that enable them to become problem solvers and innovation creators that is in line with the level of engineering profession requiring the highest responsibility in an engineering team, safety, environment, public interest, social impact and others. To fulfil the accreditation requirements for engineering programmes, they must follow seven criterions that include programme educational Objectives (PEOs), Programme Outcomes (POs), Academic Curriculum, Students, Academic and Support Staff, Facilities and Quality Management Systems. The assessment process involves two parts, namely initial assessment of qualifying requirements and detailed assessment of the programme based on the accreditation criteria. Each programme is expected to qualify in eight components. Failure to meet any one of the qualifying requirements will disqualify the programme from further assessment. One of these components is industrial training [4], where students must undergo a minimum of continuous eight weeks industrial training before their final semester. The main objective of industrial training is to expose the student to professional engineering practice and to familiarize student with all common engineering process which is essential to the young professional [6]-[15].

The Faculty of Electrical Engineering, UiTM, is currently offering three undergraduate engineering programmes, namely the Bachelor of Engineering (Hons.) Electrical Engineering and Bachelor of Engineering (Hons.) Electronics Engineering at Shah Alam Cam-

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pus, whilst, Bachelor of Engineering (Hons.) Electrical Electronic Engineering at Branch Campus (Penang). All programmes consist of eight semesters. Students of these programmes are required to undergo industrial training during semester six after completion their final examination. During this period, students are supervised by some qualified personnel such as engineers (or equivalent) for at least eight weeks training. At the end of industrial training period, students will be assessed by their industrial supervisor based on the rubrics form provided by the faculty, which measures achievement in terms of communication skills, professionalism and work performance. This data can be used for improvement purposes to design appropriate programs before these students graduate. This improvement can help students to prepare themselves to face real work environments. This is because employers are looking for employees who possess not only academic excellence, but also soft skills such as communication, ethics, good attitude, team work, etc [2].

2. Research Methodology

The method to analyse the industries perception on student achievement for this program is done by using rubrics evaluation form (as shown in Appendix 1). Student achievement is assessed based on their communication ability, professionalism and their ability to do the given work. The total marks is 40, and the indicators for the achievement are as follows:

Table 1: Performance Indicator

Marks	Indicator
35 - 40	Excellent
30 - 34	Good
20 - 29	Satisfactory
10 - 19	Poor
< 10	Very Poor

Based on Appendix 1, the communication skill is access based on the ability of students to express their ideas and communication effectiveness. For professionalism, students will be judged based on their punctuality and attitude and also their awareness towards safety. The performance of students in terms of work performance evaluation are access based on their co-operation, quality of work, learning capability and application of knowledge.

3. Types of Industries Involved and Geographical Locations

The industries involved in this study include government organizations such as government-link companies (PETRONAS, Tenaga Nasional Berhad (TNB) and Telekom Malaysia (TM)), private companies and multinationals (such as Vishay Semiconductor Malaysia Sdn. Bhd., PERODUA Manufacturing Sdn. Bhd., Independent Power Producer (IPPs), AGILENT and etc). The placement of industrial training student is as shown in Figure 1. Based on Figure 1, more than 50% students undergo their industrial training at Selangor and Kuala Lumpur. This is because such areas are the major industrial focus areas in Malaysia and Kuala Lumpur as the capital of Malaysia. In addition to that, the university campus location in Klang Valley is also one of the factors as it may be easier for them to commute.

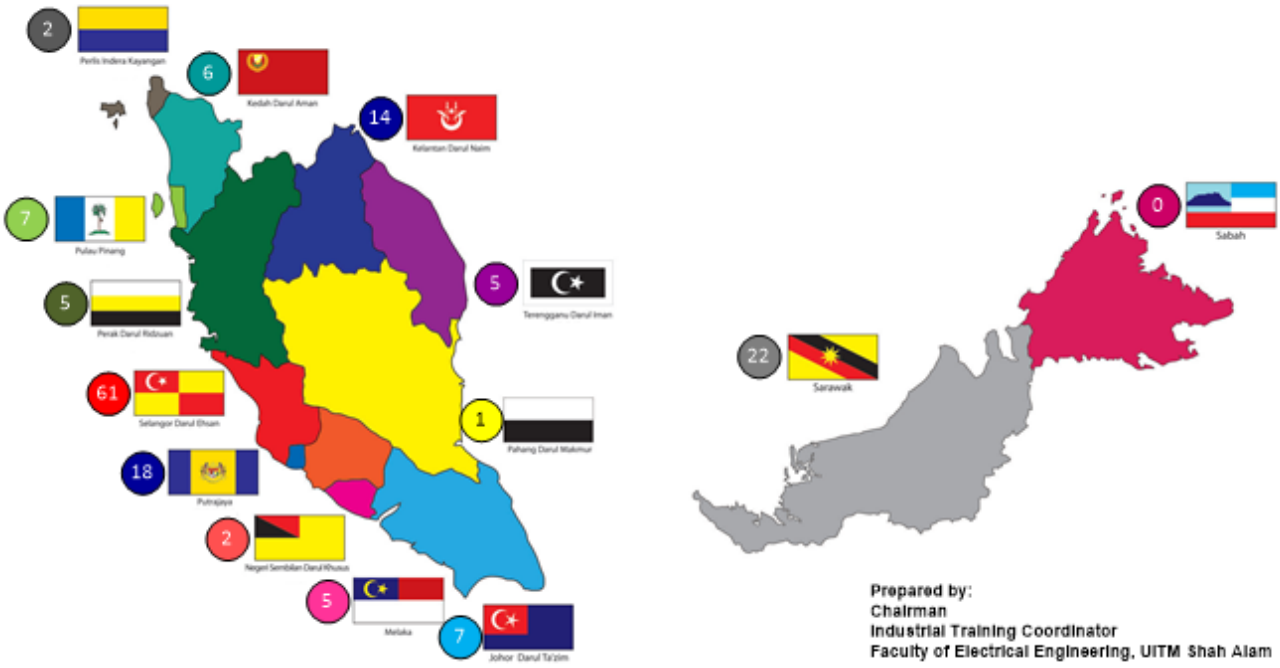

Fig. 1: Placement of industrial training students by states in Malaysia.

4. Student Performance and Discussion

In this study, a total of 155 industrial training students were accessed during industrial training session July 2017 to September 2017. Figure 2 shows the overall summary of students' performance. Based on Figure 2, 65% of students showed an excellent performance during their industrial training course. A total of 30% of students achieve good performance, while, another 5% of students obtained satisfactory achievement for their industrial training course based on the performance indicators tabulated in Table 1.

In order to improve the performance of students that obtained satisfactory level, the analysis of their performance according to the assessment parts such as communication skill, professionalism and work performance (that contributes to 10 marks, 10 marks and 20 marks respectively) was performed to identify the weakness of the students. Figure 3 shows the detailed performance assessment of students who obtained satisfactory level. From Figure 3, the

main weakness of the students was at Part C, which is work performance. The analysis reveals that the students obtained just an average of 12.4 marks out of 20 marks, meaning that the students lost about 7.4 marks for this part of assessment. In this assessment, students were assessed on their co-operation, quality of work, learning capability and ability to apply their knowledge. To enhance student performance in this area, the faculty should give special training to these students on how to improve their cooperation, quality of work, learning capability and application of knowledge. The other parts of assessment show that the students lost 3.6 and 2.9 marks, respectively, at Part A (Communication Skills) and Part B (Professionalism), which is relatively small compared to the loss at Part C.

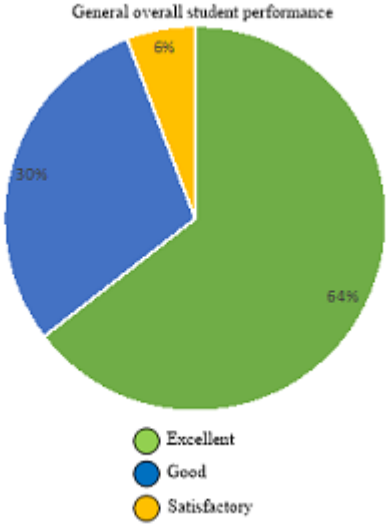

Fig. 2: The overall summary of student performance.

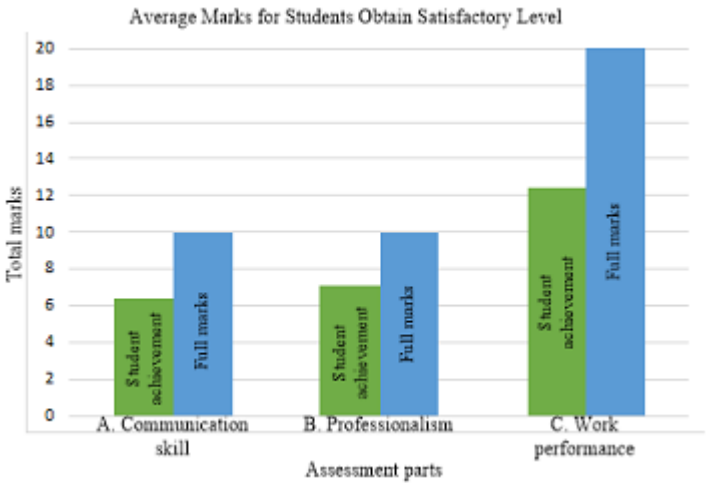

Fig. 3: Student performance obtaining satisfactory level according to assessment parts.

5. Conclusion

Based on results discussed in Section IV, the industries generally viewed the students as above average and excellent. However, a small percentage of students obtained only satisfactory marks, which were mostly related to their work performance. To improve this, the Faculty should take corrective action in the forms of special training and courses to better prepare the students for the real working environment. The corrective action can have a significant impact on the students as their skills can be improved in two semesters prior to their graduation.

Acknowledgement

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Appendix 1: Training supervisor rubrics evaluation form

A. Communication Skill - C01, P4, A3

Item	Marks					Marks Obtained
	1 – Very Poor	2 - Poor	3 - Satisfactory	4 - Good	5 - Excellent	
Expression of ideas	☐ Unable to give any ideas	☐ Able to give minimal ideas	☐ Able to express ideas satisfactorily	☐ Able to give acceptable ideas clearly	☐ Able to give good ideas clearly	/5
Communication ability	☐ Unable to communicate with co-workers	☐ Poor communication with co-workers	☐ Able to communicate satisfactorily with co-workers	☐ Able to communicate with co-workers	☐ Able to communicate effectively with co-workers	/5

B. Professionalism Evaluation - C02, P4, A3

Item	Marks					Marks Obtained
	1 – Very Poor	2 - Poor	3 - Satisfactory	4 - Good	5 - Excellent	
Punctuality and attitude	☐ Poor punctuality and unable to adhere to rules and regulations	☐ Moderate punctuality with minimal adherence to rules and regulations	☐ Punctual with satisfactory adherence to rules and regulations	☐ Punctual with good adherence to rules and regulations	☐ Punctual with outstanding adherence to rules and regulations	/5
Safety	☐ Unable to adhere to safety requirements	☐ Minimal adherence to safety requirements	☐ Adhere to safety requirements satisfactorily	☐ Adhere to safety requirements most of the time	☐ Always adhere to safety requirements	/5

C. Work Performance Evaluation - C03, P4, A3

Item	Marks					Marks Obtained
	1 – Very Poor	2 - Poor	3 - Satisfactory	4 - Good	5 - Excellent	
Co-operation	☐ Fail to show any cooperation at all	☐ Give less co-operation	☐ Always give satisfied co-operation	☐ Always give full co-operation when required	☐ Very proactive in giving co-operation	/5
Quality of work	☐ Fail to accomplish tasks assigned	☐ Able to accomplish part of the tasks with delay	☐ Accomplish the tasks on time with minimum correction	☐ Accomplish the tasks on time with no correction	☐ Accomplish the tasks before the deadline with no correction	/5
Learning capability	☐ Unable to learn despite with supervision	☐ Able to learn with substantial supervision	☐ Able to learn with supervision	☐ Able to learn with minimal supervision	☐ Demonstrate outstanding and proactive learning capability	/5
Application of knowledge	☐ Unable to apply theoretical knowledge at work place	☐ Able to apply minimal theoretical knowledge at work place	☐ Able to apply acceptable amount of theoretical knowledge at work place	☐ Able to apply substantial amount of theoretical knowledge at work place	☐ Excellent demonstration of theoretical knowledge application at work place	/5

Total Marks = [40]