



PRELIMINARY INVESTIGATION OF THE PRACTICALITY OF AN INDUSTRIAL TRAINING FOR ENGINEERING TECHNOLOGY PROGRAM – INDUSTRIES VIEW

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ABSTRACT

One of the important aspects of Engineering Technology (ET) program is the students must be able to apply a significant hands-on job throughout the program. Apart from laboratory work carried out at the university, the industrial training components can also contribute a significant practical work to enhance the skills of the students. In this study, the difference between ET and Engineering program is distinguished by proposing longer periods of industrial training in ET program. However, the effectiveness of longer periods of training must be investigated in order to find out whether this framework has to be retained for future training. For this, the university has structured the industrial training by imposing the students to undergo two (2) months training during the third (3rd) semester of year two (2), another two (2) months during the third (3rd) semester of year three (3) and finally, six (6) months during the last semester of fourth (4th) year (i.e. final semester). An interview has been conducted with two industrial panels to find out the effectiveness of the proposed training. A few suggestions and ideas given by both panels were considered for the development for industrial training syllabus in ET program.

Keywords: engineering technology, industrial training, conventional engineering, engineering technology difference.

1. INTRODUCTION

There have been common discussions about the benefits of industrial training [1]. Among the benefits are the industrial training expose the students to the real working environment, they also get to experience the latest technology application; apply and implement the theoretical knowledge in the form of technical skills in real industry situations and gain a new knowledge from the industry. Neuman [2] has shown that the industrial training allows students to test their skills, interest and the choice future career. Moreover, Seymore II and Higham [3] found that the industrial training provided an opportunity to build networks, learn new fields and gain work experience.

On the other hand, the disadvantages can also be found in industrial training. For example, find employment [4] highlighted several issues on industrial training. First, it is very unfortunate for some students when industries treated them as an assistant instead of an apprentice. Second, Industrial training can become extremely expensive and require more funding to sustain the program. Lastly, some of the companies may not be able to provide suitable job training for the trainee which resulting in the frustrated feeling among them. In addition to the above disadvantages, some of the companies treated industrial trainees as cheap labors and second class staffs [5].

Many agreed that without the industrial training the students might not be able to market themselves during the job application. Hence, undergoing the industrial training can be considered compulsory for many students which allow them to be more competitive for the job employability. For example, many universities in Malaysia such as Universiti Sains Malaysia (USM) and University

Kebangsaan Malaysia (UKM) require their students to complete an industrial training for the minimum of 12 weeks (i.e. engineering students) before the degree can be conferred [6].

According to Funki Orange Technology [7], the trend of current technology may not in line with the current subjects taught at the university. A rapid change of the current technologies required the university to revise their curriculum by investigating and adapting the current theory and application used in industry [8]. Similarly, the industrial training components are also required further modification and adaptation in order to suit industrial needs. The industries play an important role to provide the latest information of knowledge and technology. In this context, the academics and the industrial counterparts have to work together to provide the latest characteristics of industrial training module.

It is to note that dealing and collaborating with industry has become crucial in particular to develop a new program at the university. Michaela Martin [9] has highlighted a few points of mutual benefit of collaboration between university and industry as follows:

- Opportunity to attract additional funds for initial teaching and research, increasing financial autonomy of higher education institutions, especially if governmental core funding is tightly linked to specific academic purposes;
- Acquisition of access to up-to-date equipment;
- Opportunities for staffs and students to become familiar with the state-of-the-art industrial science; technology and management system; as well as enhance their familiarity with the constraints of industry;



- Improved interaction of higher education departments and employers for the development and adaptation of (technology oriented) degree programmes;
- Improved training and employment prospects for students;
- Supplemental income from consulting, allowing academic staff to improve their salaries.

According to Accreditation Board for Engineering and Technology [10], engineering programs often focus on theory and conceptual design, while engineering technology programs usually focus on application and implementation. Graduates of engineering programs are called *engineers*. They often pursue entry-level work involving conceptual design or research and development. Many continue on to graduate-level work in engineering. On the other hand, graduates of four-year engineering technology programs are called *technologists*, while graduates of two-year engineering technology programs are called *technicians*. In brief, the above definition illustrates a significant difference between Engineering and Engineering Technology. As mentioned earlier, the ET students must be able to apply a significant hands-on job throughout the program. Apart from imparting the practical skills in the laboratory, the role of industrial training can also significantly enhance the students' skills.

In this paper, a study on the practicality of industrial training for ET program is investigated. A new structure of industrial training is provided and tested. The investigation will be based on the comments from industrial supervisors.

2. PROBLEM STATEMENT

Engineering Technology (ET) Program has been developed in many universities in Malaysia such as UteM, UTHM and UniMAP. For instance, UteM, UTHM and UniMAP offer a Bachelor's Degree in Electronics Engineering Technology (Telecommunications) with Honours, Bachelor of Electronic Engineering Technology (Industrial Automation) with Honours and Bachelor of Electronic Engineering Technology (Honours) (Electronic System) respectively. The curriculum of the programmed is designed to meet the requirement provided by the Malaysian Qualification Agency (MQA) [11]. The MQA emphasizes more "hands-on" and "application" for engineering technology curriculum. For example, in UTHM, generally, 60% of the program will be based on the practical work (i.e. hands-on) and 40 % will be based on the theory. However, providing hands on job in classes and laboratories are not sufficient. The ET program requires involvement from industrial counterparts to provide the real on the job training. A longer period of industrial training is proposed for ET program. Feedbacks from the industries regarding the Industrial Training for ET Students are taken into consideration to determine the direction of ET Program. Hence, the outcome of this study

is vital to ensure that the suitability of the training structure can be adopted and adapted in ET Program.

3. RESEARCH OBJECTIVES

The main objectives of this research are

- To identify an appropriate approach of practical training for Engineering Technology Program.
- To provide a significant difference of Engineering Technology curriculum as compared to the conventional engineering program through industrial training.

4. RESEARCH QUESTIONS

The questions raised from this research are

- Will it be sufficient to show the advantage of industrial training for ET students by prolonging the period of training?
- How engineering technology may differ through industrial training as compared to the conventional engineering program?

5. RESEARCH FRAMEWORK

A research framework of the study was classified into fifth categories as shown in Figure-1.

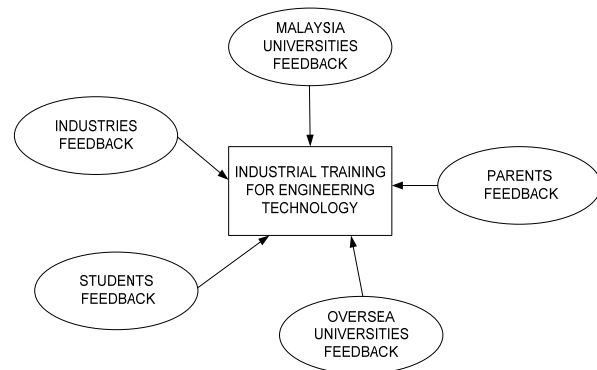


Figure-1. Research Framework of the study

6. SIGNIFICANCE OF RESEARCH

This research is crucial to find out the practicality of industrial training for engineering technology students. The program has to be different in terms of its curriculum so that the engineering technology program can attract the students to join the program. It also helps the students to distinguish the significant difference between Engineering and Engineering Technology programs through Industrial training.

7. RESEARCH METHODOLOGY

An interview session has been conducted with two industrial panels namely Panel 1, an Executive Vice President of Telekom Malaysia Berhad and Panel 2, an Executive Director of Integra Cooling Sendirian Berhad. The outcomes from this interview and survey are



important to develop a framework of industrial training used for engineering technology program in the Faculty of Engineering Technology (FTK).

8. DATA ANALYSIS

In order to analyze the data in this study, an approach of descriptive and interpretation suggested by Belenky *et al.* [12] is used. The author will try on his best to understand the subject matter during interview and will construct the sentence of the point of views based on what he understood. Similar approach is also emphasized in Othman Lebar [13].

It is to note that the FTK has introduced a longer period of industrial training where 2 months, 2 months and 6 months training periods will be imposed to the students during second, third and fourth years of study respectively. The idea is to allow the students to gain more knowledge and skills in particular on the real hands on job in industries.

9. DISCUSSION

The following suggestions and ideas have been given by panel 1:

- According to Panel 1, since the students are the first and second year of the engineering program, they are lacking of engineering knowledge. Hence, it would be very helpful if the university can provide a checklist to the students before starting the training.
- Panel 1 agreed of the longer period of industrial training proposed by the university. However, make sure the only relevance of engineering works is given to the students. Do not take advantage by assigning inappropriate job such as photocopies or dispatch a letter.
- The students must continue with the next training at the same company once the first session of industrial training is completed. However, if the task given by previous company was not relevant, it is recommended for them to apply another company for the next training session. The continuity of carrying out the same job is very important.
- Panel 1 proposed that the contents of training for engineering and engineering technology should be different. This is in particular for the first year student where they are lacking of engineering knowledge. The expectation is may be high by the organization while the students still cannot cater the real task. Consequently, it will demoralize the students.
- It is very difficult to differentiate the engineering technology program with conventional engineering solely based on industrial training.
- The countries such as Germany and United State of America have set up their engineering program in line with the development of their technology. Hence, the development of their engineering

technology program can be effective and beneficial. On the other hand, the technology in Malaysia has begun a bit late which can cause difficulty in establishing the engineering technology program.

- Panel 1 suggested that the students should provide the report for their first experience of industrial training.
- Malaysia is a country that uses the technology rather than developing the technology. Another word we are not providing adequate research based company. Therefore, the engineering technology program definitely suits for the industrial needs.
- The alumni can be very helpful to provide the effectiveness of the Engineering Technology program established by University Tun Hussein Onn Malaysia.

The following suggestions and ideas have been given by Panel 2:

1. The provision of the allowance by the company to the students has both advantages and disadvantages. The advantages are:
 - a) The company normally expects some work to be completed when the allowance is given. Hence, this allows students to gain knowledge through the given task.
 - b) Through this expectation, the students must show their perseverance and hard work towards the job.
 - c) The students can focus and concentrate the task without concerning about their cost of living (i.e. basic expenses).
 - d) Students may have a choice to choose a farther distance of training area. Nevertheless, in many cases, students usually prefer training area that close to their parents' house to reduce the budget and the cost of living.

On the other hand, the disadvantages are:

- a) Certain expectations are required by the companies after giving the allowance to the students. Students can demoralize if they cannot achieve this expectation. Some students may not be able to achieve the required target.
- b) The students will not learn independently because always depends on the money to carry out the job.
2. The period of industrial training is not the main factor that provides a good industrial training. It is more important to identify how much knowledge gained by students during the training. The intensity of the training will determine how much knowledge can be learned during the training.
3. Some of the industrial supervisors are not sure of the contents of the training that should be given to the



students. It is very helpful if the university supervisors can list out the job lists for the training. Then, the contents will be accommodated accordingly by the company if possible.

4. Before the students are introduced to the design work, it is very important for them to experience the use of industrial equipment. Those are lacking of practical skills can be exposed to the operation maintenance. Through this, the students learn how to use the equipment. The sequence for project development such as design project, develop the specification, introduce or apply concept requires the students to be able to use the equipment.
5. The opportunities to be exposed at different departments are not always available. The students must always ready to grab any upcoming opportunities at the company. The sequence of training may not always be provided.
6. Currently, most of the industries are not aware of the engineering technology program. In fact, they are not sure of the difference between conventional engineering and engineering technology. Hence, an explanation during an industrial visit allows the company to suggest what are the best practice can be given to ET students. At the moment, it is very difficult to provide the difference of the engineering technology program through industrial training.
7. Interestingly, the nature of industrial training in Malaysia is actually more suitable for the ET program. It shows that the ET students should not have any problem to gain knowledge and skills in industries. On the other hand, the universities and industries should think what are the best practice should be given for conventional engineering students since they prone to design and research.
8. The two (2) months training during the second year and third year of study should not be compulsory for the students. A voluntary basis will be sufficient enough for them.
9. Some of the industrial supervisors do not know how to assign the task to the students. Inappropriate job scopes that have been given to the students can cause troublesome. The students may easily lose their attention by doing work such as reading and writing. Then, this requires the students; industry and university supervisors discuss the suitable job for them.
10. The research can be assigned to the students as long the work is not urgent and normally not attached to the dateline. For example, the students are required to obtain the information and deal with suppliers to resolve some problems appear in design or production line.
11. The company normally avoids assigning important and urgent work even though the students are capable to accomplish the task. However, they can still be part of teamwork to resolve the problem. In addition, the same problem appears in industry can be given to the

permanent staff and the trainee. Thus, the mentor and mentee concepts can be utilized.

12. The industrial supervisors are encouraged to challenge the student by giving them a more difficult task. An observation is required so that the students can reach up at a certain level of accomplishment of the project given. If they cannot cope the task, it is essential to assign another simpler project.
13. In general, there is no significant difference of the students' performance from various universities in Malaysia during industrial training. The problem is usually coming from individual characteristic. However, certain patterns of characteristics can still be found by an industrial supervisor from similar university such as a confident in handling the equipment and always show the interest of learning during training. The question is, these good characteristics are adopted from their family upbringing or university?

It is much easier to assign the task to the students when the industries have the module of industrial training. The contents are structured and the students can easily follow the tasks. It is unnecessary to distinguish the ET program through industrial training. As long the training meets the purpose and target, it is considered a successful industrial training program.

10. RECOMMENDATIONS

The results from the interview show that further investigation is required to find out the best industrial training practice for ET program. As suggested by Panel 1, it will be helpful to obtain the information of students' experience from the first batch trainees

11. CONCLUSIONS

It is not easy to show the difference between ET with conventional engineering program through Industrial training. The ET program is considered very new in Malaysia, hence further explanation and discussion between universities and industries can be very helpful to provide the best practice of industrial training for ET students. In addition, both panels suggested a few ideas for continuous quality improvement such as the provision of proper contents of training provided by universities, familiarization with the engineering equipment and intensively introduce the engineering technology program to industries

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