Insight of student's learning preferences on project-based course: A case study on Faculty of Electrical Engineering (FKE), Universiti Teknikal Malaysia Melaka (UTeM)

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ABSTRACT – Nowadays, implementation of the experiential learning especially in engineering education become popular. It is because, through experiential learning, the student not only equipped with the fundamental knowledge but also provides exposure to the real working environment. One of the implementation styles for experiential learning is through project-based courses. In this paper, the student preference in doing the project-based course will be observed. A Likert Scale type survey was distributed to the students who register for the project-based courses to evaluate their learning preferences in the project-based courses. Based on the result, the students prefer to have more freedom in title selection based on their interests and capability.

1. INTRODUCTION

The concept of experiential learning was introduced by Klob in 1984 [1]. Based on the theory presented, it is a process of learning that provide exposure to actual working environment. Klob's has been proposed the experiential learning concept based on the cycle as shown in Figure 1. Currently, the experiential learning concept is adopted in various engineering field of study like chemical [2], mechanical [3,4], coastal engineering [5] and mechatronics [6]. Until now, the implementation of experiential learning has been enriched through various methods such as laboratory based [2], design competition, case study [3], design thinking course [7], structured academic visit [5] etc.

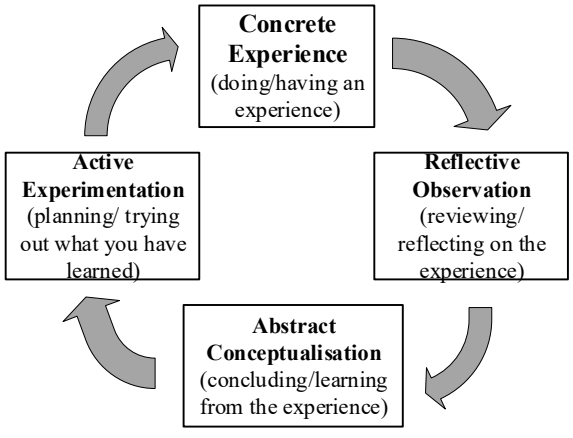


Figure 1. Klob's experiential learning cycle [1].

However, a complete academic ecosystem is an essential factor to make the experiential learning beneficial to the student. Before the student can really experience the actual nature of their future working environment, other factors such as a comprehensive curriculum structure, competent lecturer, and support staff, livingly student environment and support system and adequate facilities such laboratories, equipment, information center etc. The relationship between the experiential learning and the academic ecosystem somehow not being discussed elsewhere.

In Universiti Teknikal Malaysia Melaka (UTeM), particularly Faculty of Electrical Engineering (FKE), one of the experiential learning practices especially to undergraduate student is through project-based course. There are 3 types of project-based course offered which are, the Diploma Project (Pro Dip), the Integrated Design Project (IDP) and the Final Year Project (FYP). In this paper, the student's learning preference to the project-based project will be observed. The main objective is to evaluate how the student learning preference correlate with their perception in completing the project. The result from the correlation, several suggestions was made on how to improve the project-based course implementation.

2. BACKGROUND OF THE STUDY

The experiential learning can be implemented in several ways. In FKE, it has been implemented through laboratory activities, problem-based learning, academic visit, and project-based course. All the types of implementations have been evenly distributed among the courses through out of complete curriculum structure. Ultimately, particularly for the undergraduate student, they will take the Pro Dip, IDP, and FYP course to demonstrate their competency in the field of study.

The Pro Dip course is dedicated for the diploma student while for the IDP dan FYP course is for the bachelor student. The Pro Dip and FYP will be implement during the final year of the study and being run individually. While, for the IDP course, the student will register for the course during their 3rd year of the study before going for 10 weeks industrial training. Compared to the Pro Dip and the FYP course, the IDP course will be requires the student to work in group. Despite of applying their fundamental knowledge to complete the project, the IDP also train the student to execute project management and manage resource such as financial and human talent. Therefore, the IDP course will equip the student with several soft skill attribute such

as project management and teamwork, while the other soft skill such as communication skill, life-long learning and ethic also being covered by the Pro Dip and FYP.

Previously, the title selection for the project-based course in FKE was implemented by open selection. The student can choose their preferred title and lecturer as supervisor. At the same time, the lecturer also can decide either to accept the student or not. However, in this time, a blind selection style has been adopted. This decision is made to expose the student to the real working environment as practicing engineers where they cannot be selective on the project and the team member. Some students might get their preferred title and lecturer, and the others just satisfied with the option left. On top of that, this exercise is also an assessment to check whether the academic program of FKE prepares the student for their project-based course especially during their final year or not.

The student's learning preference of project-based course being investigate through a survey. The survey was distributed through online to all the student that registered the project-based course during semester 2 of academic session 2020/2021. The elements that being observed are type of program enrol, type of project-based course registered, title selection preference, project implementation preference and their perception of undertake project.

To evaluate the student preference in implementing the project-based course, a Likert scale survey was conducted. As much as 488 students has answered the survey. The question has cover about the student detail such as the program enrol and the project-based course registered on current semester, their preference on tittle selection and project implementation and their perception on the undergoing project.

The discussion of this paper begins with the finding on the student perception of their project-based course. After that, correlation between the finding with the student preference is discussed. There are 3 aspects were observed. First is on the student motivation to complete the project, second is their ability to complete the project and third, their ability to implement the project. The result of the finding as shown in Figure2. Based on the finding, more than 50% of the respondent feel that they have high motivation to complete their project. It shows a good indicator for ability of the project completion within the time frame.

Nevertheless, for the other two aspects shows the other way around. Less than half of the respondent feel that they might be able to complete and implement the project. About 20% of the respondent feel vice versa. This result is contradicting to the result of the student motivation. The main question is, why some student feel might not be able to implement and complete the project while having high motivation? Therefore, in this paper, the correlation between these aspects with the student preferences will be observed.

3. STUDENT SURVEY ON LEARNING PREFERENCES

The survey was distributed through online medium to all students that register the project-based course as offer during semester 2 academic session 2020/2021. There are 641 students that registered but only 488 students of 76% were participated in the survey.

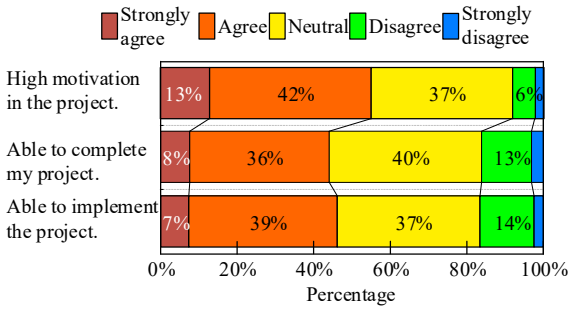
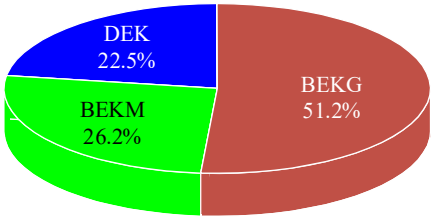


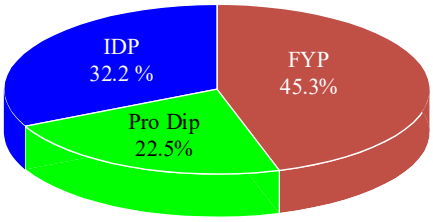
Figure 2. Initial finding on related student survey.

There are three programs student involve which are Diploma of Electrical Engineering (DEK), Bachelor of Electrical Engineering (BEKG) and Bachelor of Mechatronics Engineering (BEKM). The implementation of the project-based course is start with title selection by the student. The title could be proposed by the student themselves or given by the lecturer. For the title proposed by the student, they need to find a lecturer as a supervisor (SV). For the title that given by the lecturer, that lecturer will become his/her SV. The role of SV is providing guidance and observing the student progress in completing the project throughout of the semester.

Figure 3 show the respondent demography on the program enrol and course registered. From 488 total respondent, about 51% are from the BEKG program and about 45% of the total respondents are registered the FYP course.



(a) Academic program enrol.



(b) Project-based course registered.

Figure 3. Respondant demography.

The student preferences have been divided into two types. First is preference on title selection and second is preference on project implementation. In both preferences, the student will be provided with several options based on nature of each preference types. After that, they need to sort it based on their personal

preference.

For the student preference on title selection, there are 7 options which are based on i) student interest, ii) student expertise, iii) prior knowledge from several courses (combination from more than 1 course), iv) prior knowledge from a specific course, v) SV expertise, vi) selected by SV and vii) blind selection. These options can be categorized as either student-oriented option such as option i) until iv), while the other options are not.

For the project implementation preference, there 5 options which are i) guidance from SV, ii) guidance from other lecturer apart of their own SV, iii) assist by peers (the peers including colleague, senior and postgraduate student as stipulated in the survey), iv) execute the project in dedicated laboratory and v) work independently. The options of this preference are selected to observe the degree of independent or teamwork attribute of the project-based course's students.

4. STUDENT PREFERENCE ON PROJECT BASED COURSE

The student preference on title selection is as shown in Figure 4. Each bar on the figure shows the order of choice selected. For the most top bar is represent the 1st choice while for the most bottom is representing the last choice selected by the respondent. The percentage inside each bar represent how many percent the respondent chooses each option. For example, on the most top bar, 43% respondent choose student interest as their 1st choice as the title selection preference.

It can be generalized that, the student-oriented choice is favour by the respondent compared to its counterpart. Which the title selection through the student interest has become the most favourable to the respondent. It follows with option of the student expertise, prior knowledge from specific course and prior knowledge of several courses. It might be due to; all this option is within the student control. On the other hand, the non-student-oriented choice such as based on SV expertise, selected by the SV and blind selection has been the most unpopular option to the student. Majority of the respondent put the blind selection option as their last preference. The student has no control upon this option, hence made it is not favour to them. It shows that, they prefer to be given freedom to select the title of the project based on their interest.

On top of that, the rate of increment for the option of prior knowledge to several courses shows the interesting rate. It starts with about 4% in the first choice and increase about 6 time on the 3rd and 4th choice. This increment rate is not appeared to the other option. It is showing the important of a strong curriculum structure is essential to enhance the student interest to the project-based course.

Figure 5 shows the student preference on the project implementation. It is shows that, the students are highly dependent on others support to complete their project especially from the SV and peers assist. Despite of choosing the title based on their interest, majority of the student still rely on the guidance from the SV and colleague rather than working independently or at least execute their project in the dedicated laboratory. Apart of receiving guidance from the SV, the students are highly dependent to their colleagues. Percentage of the peers' aid was increased from only 6% in the 1st choice to 30% in the 3rd choice.

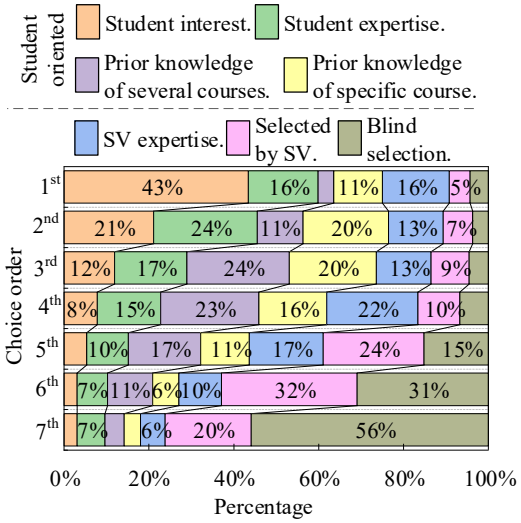


Figure 4. Student preference on title selection.

This condition is contradicting with the project implementation by university's student in other countries like in Japan. In Japan, the student is expecting to fully utilise the universities facilities such as laboratories, offices, and meeting room to complete their project. The student also encouraged to work together with their colleague or post graduate student under the same SV to demonstrate their teamwork skill and develop a mentor-mentee system. Even though, the SV office usually located near to the laboratory, however, the students tend to work independently and fully utilise the mentoring system that consist of their colleague and post-graduate student [8].

To relate the finding in Figures 4 and 5, it is shows that, even though the student think that they should have freedom in title selection, however, they still rely on others assistance to complete their project. At the same time, based on Figure 2, most of the student felt that they are having high motivation to the project. It is might due to; they got their preference in both title selection and the project implementation style. Despite of that, a less than half of respondent felt not confident to implement or complete the project. Probably, this group of respondents not getting their preference either in title selection or project implementation style or both of it.

By comparing the finding shows in Figures 2, 3 and 4, it shows that, there is a possibility for the student might not be able to get their preferences. Therefore, advice from the expert, particularly from the potential SV is still required by the student before the decision on the title selection is made. The students are not only should priorities their interest, but they should also look onto several factors such as the match SV expertise, mentoring system that involve colleagues, post graduate students, and laboratories facilities to support their project. On top of that, a complete curriculum ecosystem that comprises comprehensive courses, various area of teaching staff expertise, student support system and facilities are in

place to develop the student competencies and confidents. Therefore, the successful of the experiential learning will not only depends on the content, but also on the complete support system that build the complete academic ecosystem.

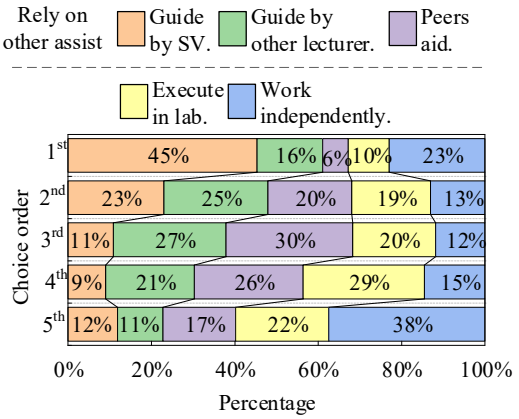


Figure 5. Student preference on project implementation.

5. CONCLUSION

The student learning preference to project-based course is being focused. From the finding of the student learning preference, comparison to the student perception to their project was made. Generally, majority of the student prefer to have a freedom to select the project title based on the factor that under their controlled. There are either based on their interest or prior knowledge from several courses. However, they still rely on others support. It can be shown on result of the project implementation preferences. Most of the student feel that they have high motivation to complete the project. Yet, the percentage of the student that think that they might not be able to implement and complete the project is having significant portion. By referring to the correlation between these factors, it can be concluded that, the student should be given opportunity to select their project title. However, they should receive some advice from the expert like from the potential SV to make the final decision. The student should consider the overall support system like laboratory equipment, SV expertise and peers support to ensure their successful to complete the project. At the same time, the faculty should plan on how to balance the SV or lecturer load, improve supervision quality, equipment updates and matching and improving other resources. To make this suggestion is happens, the faculty should provide ample time to the student to align their interest and capabilities with the available resources. On top of that, the student also should be provided with space to develop their knowledge and competency to support their project in later years of study. As for the future work, the correlation study between the output of this paper and student grade will be observed. Thus, a comprehensive conclusion could be made and improvement to the project-based course could be proposed.

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