Development of Mobile App (P_Lab) for Enhancing the Student Understanding In Practical Work

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***Abstract*— Mobile applications which are also known as mobile apps is a software program which is developed for mobile devices such as smartphone and tablets. Recently, the development of mobile apps for the educational purpose has been expanding rapidly. It becomes as one of a powerful tool for transforming learning and for improving the quality of education, enhancing the student understanding, helping affirm as well as advance the relationships between educators and students. Among the incredible number of mobile apps, there are a large number of apps for educational purposes. However, there is still a lack of mobile apps which focus on enhancing student understanding in Practical Work (PW). PW is important and plays a central role in Technical and Vocational Education and Training (TVET). It is because PW can develop hand on skill and at the same time as a bridging between theory and practice. However, most of the student cannot do well in PW because; students are not interested to read lab sheets, lack on preparation as well as lack on the understanding in theory which is related to PW. Therefore, P_Lab is developed with aim for enhancing the student understanding in the PW. P_Lab is a mobile app that is developed from AppMakr.com which is a do-it-yourself platform and the process requires less coding knowledge. To study the effectiveness of the P_Lab, pre-test, post-test and a questionnaire has been given to the Electrical Engineering student in Politeknik Melaka. Results showed that students made extensive use of resources provided from P_Lab, considered the P-Lab to be beneficial for enhancing their understanding in practical work, and found that it is easy to use with minimal support and training. An analysis showed a statistically significant increase in understanding scores for practical work-related questions after the introduction of P_Lab mobile app.**

***Index Terms*— Practical Work, Mobile app, Educational Tool, TVET, Enhance student understanding**

INTRODUCTION

Practical work is an activity to enhance the understanding of the theory that teaches by the lecturer in a classroom. R. Gott and S. Duggan in 1996, mentioned that, in the mid of 1850s, practical work was usually carried out by the teacher and considered as a way of describing the concept. However, in 1896, with the advent of Armstrong heurism; practical work has been seen as a way to enable pupils 'to know something for themselves' [1]. Until today, practical work remains as one of the most important components in teaching and learning activities. It is the most effective way for students to understand the concepts or theories that they are has learned while in the classroom.

Conventionally, before the practical work session, the lecturer will provide lab sheets to the students, and students need to read and understand the practical exercises. Then, during the lab, the lecturer will give a briefly explanations to the students especially on the practical work procedures that will be implemented during practical work session. At the same time, education technology has been change rapidly. It has become as a powerful tool for transforming learning and for improving the quality of education. Education technology has undergone an evolution when Mobile Learning (M-Learning) was introduced to improve the level of teaching and learning. Basically, M-Learning is a concept of emphasizing the ability to facilitate the transfer of learning process without being bound to the physical location of the learning process [2]. Therefore, the process of teaching and learning can happen anywhere, anytime and it is no longer concentrated inside the classroom [3]. As such, the practical implementation of conventional practices for a long time can begin to be improved or transformed using existing technology such as Mobile Learning or M-Learning technology.

Malaysia is one of the developing countries and at the same time it is moving towards the industrial revolution 4.0 (IR4.0). In this regard, the Institute of Higher Learning (IPT) which offers the Technical Education and Vocational Training Transformation Program (TVET) program such as Polytechnics should ensure that graduates are fully qualified to meet the needs of various industries in the face of the IR4.0 era. For that, graduates should not only excel in the academic field, but also need to be equipped with other skills such as skills in performing practical work. [4] in his study explain that adequate practical equipment, labs and workshops are an essential facility that enables students to improve their skills and perform practical work effectively. However, through the observation that has been made, although the facilities have been provided, the reality is, many students are still unable to do good and effective work. This happens because of the following: 1. Students are less prepared for the practical work.

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2. Students lack on the experience and have no knowledge about the equipment to be used. 3. Students lack / do not understand theories related to the practical work to be implemented. 4. Time to do practical work is limited as lecturers need to explain the procedures, tools to be used and related theories to the students before practical work started (Usually it will take 10-30 minutes).

The reason for the above mentioned matters is because of the lack of interest and understanding of the students on the practical work to be done. Therefore, an alternative / innovation need to be done to help overcome the problem.

Mobile apps, games and web were some of applications in the tablets or mobile phones that have been used by educators around the world as educational tools. All of the applications make ubiquitous learning was possible [5]. Mobile apps can be use as innovative educational technology, because they allow learning to occur in engaging and meaningful contexts. [6] mentions that mobile devices such as tablets and mobile phones have great potential to become effective education mediums. Meanwhile, Johnson et al., (2012) stated in his study that mobile applications can provide a more engaging user experience as well as facilitate teaching and learning.

Mobile apps, was easily available online and was evolving at an incredible speed. Basically, there are five App stores which are; Google Play, Apple App Store, Windows Store, Amazon Appstore and Blackberry World. The Apple App Store offers over 700,000 apps to users, while there are more than 675,000 apps in Android Market [7]. However, in the middle of 2018; Apple's App Store offer 2 million available apps to consumers, meanwhile, the Android users were able to choose between 3.8 million apps (See Fig. 1).

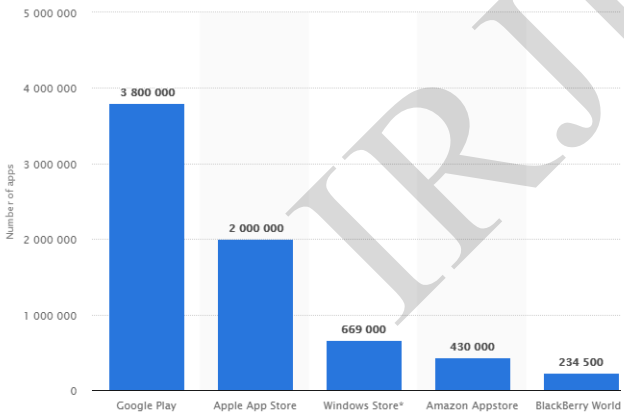

Fig.1 : Number of mobile apps available in leading app stores in 2018 (source : https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/) access on 24/8/2018

Among the incredible number of mobile apps, there are a large number of apps for education purposes. However, relevant and appropriate apps are not always available; besides, the apps are developed in different purposes. These reasons lead to the needs for creating one's mobile apps for practical work. Therefore, this paper aims are to study on the effect of the mobile apps in enhancing the student understanding in their practical work.

Meanwhile, the Malaysian Communications and Multimedia Commission (MCMC) report in 2015, 21.9 million people or 89.4% of Malaysians use 'Smartphone' as the primary medium for Internet usage, compared to other mediums such as laptops, netbooks, desktop PCs, and so on. This data adds strength to the ability of mobile applications to be used as learning materials. Meanwhile, mobile applications to enhance students' understanding and interest in practical work are still undeveloped. Therefore, developing and using P_Lab mobile applications as an initiative to address the problems faced by students in conducting practical work is the most coherent and relevant action.

METHODOLOGY

P_Lab mobile app was created by using AppMakr.com. Basically, the AppMakr's platform uses Really Simple Syndication (RSS) which is a type of web feed that can allows users to access updates to online content in a standardized and computer-readable format. These feeds can, allow a user to keep track of many different websites in a single news aggregator. The news aggregator will automatically check the RSS feed for new content, allowing the content to be automatically passed from website to website or from website to user. This passing of content is called web syndication.

Besides, AppMakr's platform also uses Integrations Application Programming interface (API) to power the content in a creator's app, which refers to very specialized pieces of computer code. This code enables two different applications, programs or databases to talk with each other and share operations. Additionally, the platform allows in-app HTML5 and CSS3, which serves locally from the mobile device and can access its camera, accelerometer, and other built-in features. The process requires minimum knowledge on the coding and builds apps with a 'What you see is what you get' (WYSIWYG) editor.

Meanwhile, P_Lab Mobile Apps, are developed with a few of applications that can use by the students in helping them in doing their practical work. The applications are divided into 8 mains functions which are: 1. Lecturer contact/information – this function provide lecture information such as Phone number, Email and address. Therefore it will help student to know basic info about their lecturer; 2. Call/phone function - for call application. Student can call lecturer easily by using these apps; 3. CIDOS - Provide link to the Polytechnic e-Learning Portal which contains notes and lab sheet which related to the practical work; 4. Calendar - Calendar function contains a reminder or information for students on the practical work/quizzes or test that will be conducted on the selected date which provided by the lecturer; 5. PW Guide Book - PW Guide Book contains an e-books and YouTubes link which show the student how to conduct the practical work with interesting way including, photo for each of component and trainer used

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for Practical work 1 to practical work 6; 6. Additional Notes - Contains additional notes related to the theory for the Practical Work; 7. Evaluation Form – contains evaluation form for student evaluate the apps in term of the effectiveness and 8. Live Chat. Fig 2 shows the P_Lab with the functions. All the functions are activating by clicking the icon.

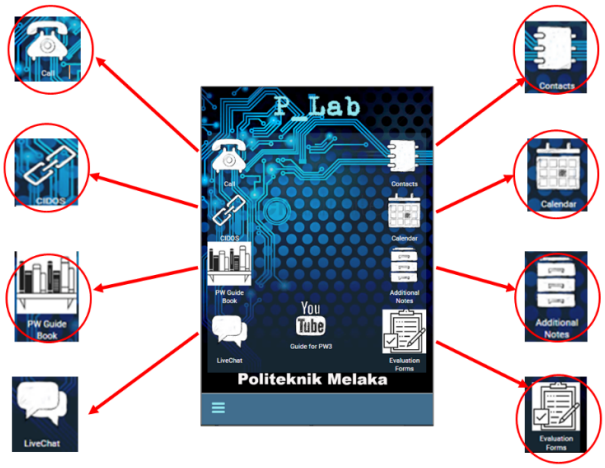

Fig. 2 : P_Lab with eight main functions

After the development of the P_Lab mobile app has been completed. A study on the effectiveness of the P_Lab was implemented. 60 students were involved with the study. 30 students from 2 groups of students for the DEJ3143 – Instrumentation, course in Politeknik Melaka; One group is from Class DJK3A, with 15 students and another one group is from Class DJK3C with 15 students. Meanwhile, 30 students from 2 groups of students for the DCC 5172 – Structure, Hydraulics and Water Quality, course in Politeknik Merlimau (PMM). One group is from Class DKA4A, with 15 students and one group is from Class DKA4B with 15 students. The student from class DJK3A and class DKA4A was given the P_Lab Mobile apps to help them in doing their practical work; meanwhile, Class DJK3C and Class DKA4B was using traditional method which is using only lab sheet as a guide for doing their practical work.

These studies used a pre-test and post-test question. The tests are given to the class DJK3A, DKA4A, DJK3C and DKA4B, to study and compare on the student understanding in the Practical work and the effectiveness of the P_Lab Mobile apps to the students. The same Pre-test and Post-test questions are given to the students before they start and after finished their practical work. It consists of knowledge component with 5 questions. The questions are based on the knowledge of the student in the practical work, which was emphasized more on the technical knowledge related to the practical work. Meanwhile, at the end of the semester after all of the practical sessions were completed; an evaluation form was given to the class DJK3A and DKA4A with aims to study on the effectiveness of P_Lab is given to class.

Result And Analysis

The data are analyzed to identify the level of students' understanding in the practical work. For pre-test question, it was found that, the lowest marks for student's used P_Lab Mobile apps are 8 for DJK3A, and 5 is the lowest mark for class DKA4A. While the lowest marks for the student's used traditional method is 1 for class DJK3C and 2 for class DKA4A (Fig 3 & 4).

For the post-test that have been conducted, it was found that, the lowest marks for student's used P_Lab Mobile apps are 10 for DJK3A, and 7 is the lowest mark for class DKA4A. While the lowest marks for the student's used traditional method is 4 for class DJK3C and 3 for class DKA4A (Fig 5 & 6). This result shows that the student understanding in the practical work for classes using P_Lab Mobile apps was higher than classes used the traditional method. This achievement proves that the P-Lab Mobile apps made a positive impact and suitable for the purpose of teaching and learning especially in helping to enhance the student understanding in doing their practical work.

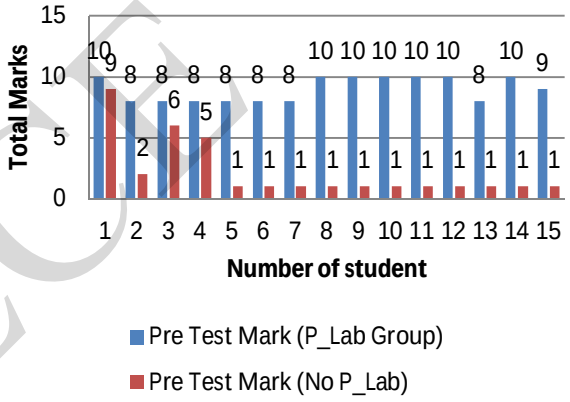

Fig. 3 : Pre Test result for a group of student used P_Lab (DJK3A) and without P_Lab Mobile apps (DJK3B)

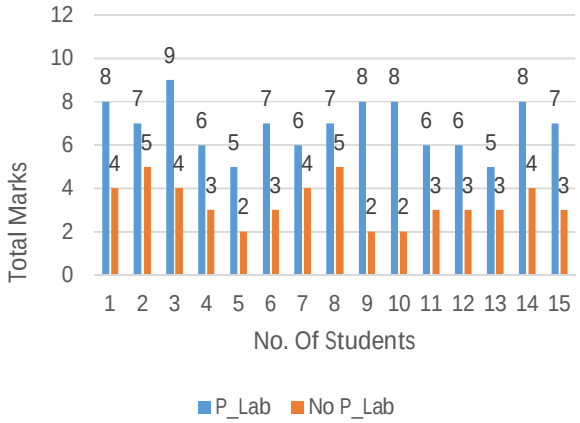

Fig. 4 : Pre Test result for a group of student used P_Lab (DKA4A) and without P_Lab Mobile apps (DKA4B)

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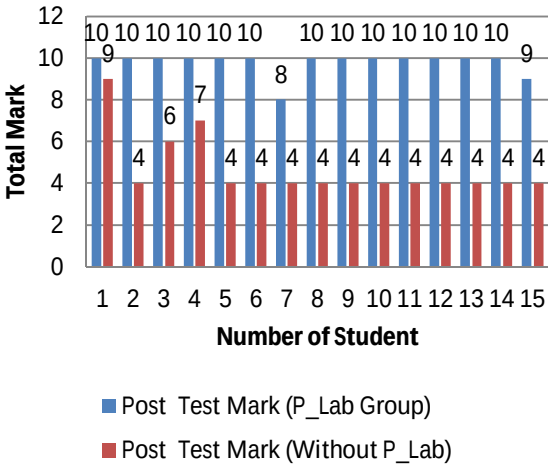

Fig. 5 : Post Test result for a group of student used P_Lab (DJK3A) and without P_Lab Mobile apps (DJK3B).

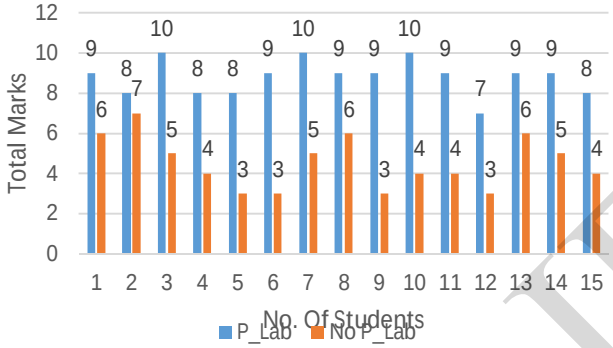

Fig. 6 : Post Test result for a group of student used P_Lab (DKA4A) and without P_Lab Mobile apps (DKA4B).

Figure 7 & 8 shows result for the evaluation form. Based on the figure, five questions are given to the student to study the effectivess of the P_Lab. From the result, it found that, most of student from class DJK3A and class DKA4A are aggree that P_Lab mobile app enhance the level of understanding in practical work, helpful in preparing practical work, help them to conducted the practical work easier, assit them to learn in less time and help them in stimulated further learning.

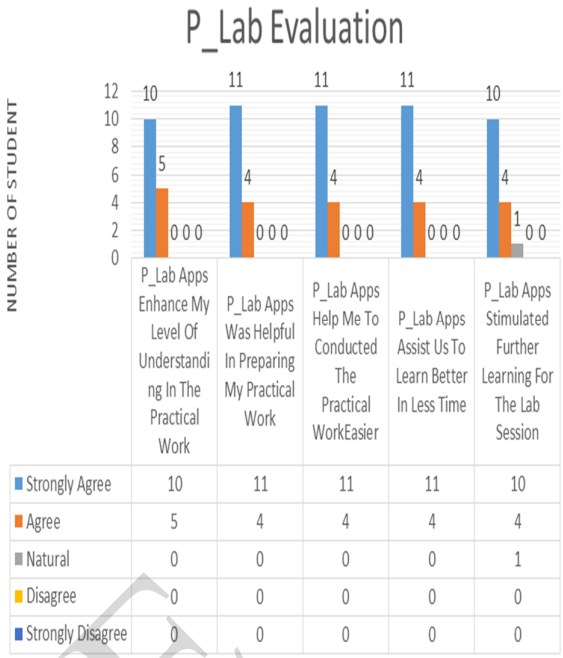

Fig 7 : Evaluation result for P_Lab Mobile apps (Class DJK3A)

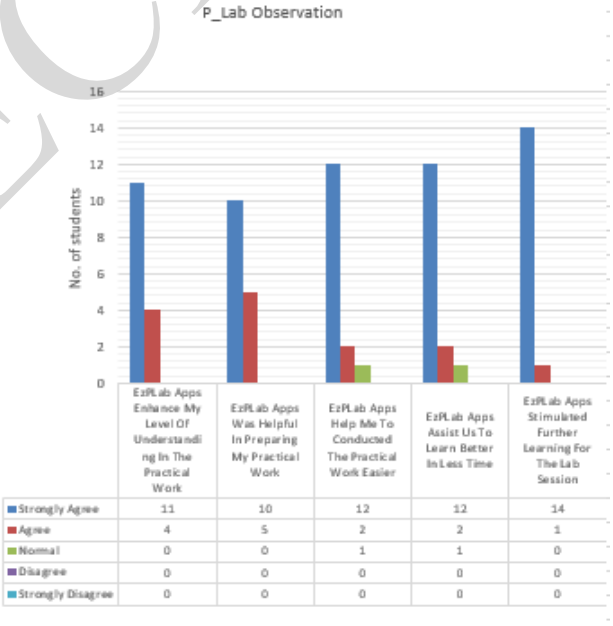

Fig 7 : Evaluation result for P_Lab Mobile apps (Class DKA4A)

CONCLUSSION

This study proves that P_Lab Mobile Apps is effective to enhance student understanding in practical work. It has a positive effect on students especially in learning while using the applications. Additionally, the majority of students said they enjoy using their app. This app helps in enhancing understanding

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through experiential learning. On the contrary, based on experience, this app helps a lot in student exercises to do practical work independently by relieving the teacher's burden during the explanation session.

ACKNOWLEDGMENT

Author would like to say thank you to the Politeknik Melaka and Politeknik Merlimau for the commitment in assuring the study completed and success.

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