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# Usage of Semiconductor Interactive Learning Application (SemIL App) in Electronics Subjects

Herlina Binti Miur Zabidin<sup>#</sup>, Zawiyah Binti Mokhtar<sup>\*</sup>, Norasmah Binti Abu@Awang<sup>#</sup>

<sup>#</sup> Padang Terap Community College, Lot 1529, Jalan Kuala Nerang, Taman Belimbing Indah, Kuala Nerang, Kedah, Malaysia

E-mail: [herlina@kkpt.edu.my](mailto:herlina@kkpt.edu.my), [norasmah@kkpt.edu.my](mailto:norasmah@kkpt.edu.my)

<sup>\*</sup> Tuanku Sultanah Bahiyah Polytechnic, Kulim Hi-Tech Park, 09000, Kulim, Kedah

E-mail: [zawiyah@ptsb.edu.my](mailto:zawiyah@ptsb.edu.my)

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## Abstract

The changes in today's world that have entered the era of industrial revolution 4.0 have led to all aspects of human life becoming increasingly dependent on digital technology. At a time when the threat of the Covid-19 Pandemic hit and changed the strategy of education services, mobile applications are seen to be able to provide a solution to a more viable learning method against the current worsening situation. Smartphones are the device of choice for teaching and learning (PdP) because they are comfortable and easy to carry anywhere. Although there are various other platforms such as WhatsApp, Telegram, Google Classroom and others, but access to the Internet sometimes makes it difficult to access learning materials for students. Based on this, the idea to develop a SemIL Application came about when there were students who did not get the notes or learning materials that were delivered.

**Keywords :** Application; Electronic Subject; SemIL Apps; Semiconductor

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## I. INTRODUCTION

The usage of mobile applications is a must because it is not focused on communication only, even the education sector is required to use smartphones and laptops because it has shifted to M-Learning [1]. According to [2], the highlight of the study concludes that learning based on mobile learning can solve problems in learning, especially Mathematics. The focus on using App Inventor to develop applications is seen to help self-learning. [3] stated that the existence of Android open source allows m-learning applications to be built. As a result, students can access archived final exam questions regardless of time and location.

In fact, according to [4] study, students appreciate mobile learning as an approach and significantly increase their motivation and create a positive effect on academic achievement and performance. In conclusion, [5] stated that android-based mobile devices are the choice of many people because of good performance, availability of connections, application support at reasonable prices and are learning media that are easily accessible anywhere and anytime using M-learning.

## II. LITERATURE REVIEW

Based on previous studies, there are several issues that highlight the use of applications among

which Uys in [6] stated that students spend almost 16 hours a day on the use of smartphones but most of the time is intended to interact with friends and there is no data on the use for learning purposes. Norliza In [7] stated that the level of readiness and suitability of mobile learning is at a high level. But based on [8], students' willingness to accept mobile devices is an issue because it distracts students from learning. Even in higher education, there are challenges in terms of internet access, censorship by university and economic issues. But according to Arokiasamy in [9], to face the challenge, mobile devices play an important role in increasing access to education in Malaysia and globally.

The research findings of [11] concluded that the perception of usefulness and ease of use of the application has a correlation in influencing the use of additional mobile application-based learning materials. According to Park & Lee in [12], study respondents have around 80 mobile applications and only 16% are used directly for learning. Thus, based on the study of [13], to integrate any technology meaningfully into education, developing content and platforms for use must be a requirement that meets the instructional design approach.

### A. Objective & Hypothesis

The objective of this study is focused on students' perception and motivation towards the interactive application that is SemIL Application in the subject of

Electronics. In order to achieve this objective, research questions as below have been formulated:

- 1.What is the student's perception of the usability of SemIL applications in electronic subjects?
- 2.What is the level of student motivation to apply SemIL in electronics subjects?
- 3.To what extent do student perceptions influence student motivation towards the use of the SemIL application in electronics subjects?

The null hypothesis (Ho) resulting from research question 3 is there is no statistically significant relationship between the mean of perception and the mean of students' motivation towards the use of the SemIL application in electronic subjects.

### B. Digital Application Based Learning

According to Posnik-Goodwin in [14], students are Generation-Z that is digital native will be excited to try something new, learn creatively, have fun and think outside the box. Thus, according to [7], mobile applications such as smartphones and tablets stimulate student involvement in knowledge-oriented activities and motivate self-learning because they are flexible. The use of devices in line with the wave of 21st century technology opens the opportunity for educators to build applications for additional learning modules. Based on this, the potential use of mobile applications in PdP Electronics subject can trigger the fun of learning and improve students' mastery of cognitive and psychomotor aspects.

According to Robiatul and Halimah in [11], positive student behavior results when teachers use digital teaching aids, compared to conventionally using picture cards and textbooks. Additionally, according to [15], learning based on digital games is more fun and can increase motivation and interest in learning, even making PdP more interesting. In fact, in addition to virtual face-to-face applications, interactive applications are more interesting and different from regular teaching.

### D. SemIL Application Interface

App Inventor is not a software that is based on writing complex code, instead it designs Android applications visually. App Inventor uses the block concept to determine the functionality of the application to be designed. This SemIL interface results from the drag and drop method of visual objects to create an application that can be opened on the Android system. Once the design is complete, the application will be uploaded on the smartphone. In short, this SemIL Application is very easy to use where users can access the information in this application on mobile phones based on the following methods:

### C. SemIL Application Development

The SemIL Application was developed to help students understand semiconductor theory, master component testing methods and apply semiconductor measurement practices using smartphones. Students will use this application to improve their understanding of the learning process of the subject of Electronic Devices and Semiconductor Devices. This application is built without using any financial cost. This is because it is developed using MIT App Inventor software which is open source and suitable for windows and android platforms. This makes it easy for users to install the SemIL application on a desktop computer or phone. This application can also allow users to explore the objects provided as well as cultivate critical skills, collaborate and adapt to the development of learning. Based on Figure 1, the characteristics of mobile applications are adapted from the study of [16].

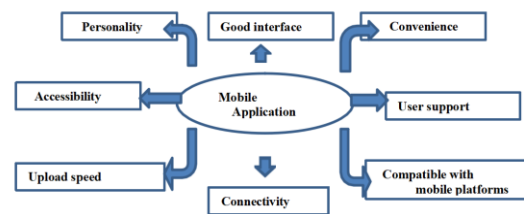


Figure 1 Mobile application features in general

- i.The user needs to install the SemIL Application to the mobile phone and open it
- ii.The user needs to allow the application access to the mobile phone.
- iii.Users select the desired subtopic by pressing the link button
- iv. Learning materials are produced in the form of notes, videos, demonstrations and others.



Figure 2 SemIL Application Interface

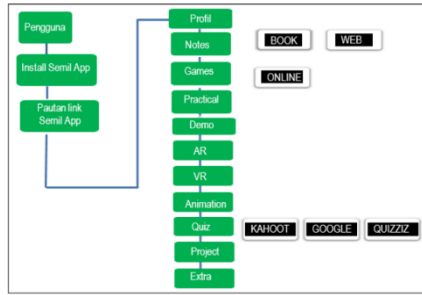


Figure 3 SemIL application interface

### III. RESEARCH METHODOLOGY

#### A. System Development

The development of this application system is aimed at the needs of interactive learning materials and makes it easier for students to access references using smart phones. This application saves costs because it does not require a thick sheet of notes and can be used as an e-module. The development of e-modules as digital literacy media in 21st century learning makes it move in tandem with Information and Communication Technology (ICT). SemIL changes the tradition of teacher-centered learning to student-centered learning. The atmosphere in the lecture room also demands physical changes that meet the aspirations of today's generation.

#### B. Data Collection and Surveys

Data collection from libraries and online open sources was chosen as a method of obtaining reference sources and information related to mobile applications and smartphones in education. This method is also used to find research information related to this field of study and to find recommendations for future studies. A simple survey technique was chosen to be implemented to get student feedback about the potential use of this SemIL application.

#### C. Study Design, Instrument and Sample

The research design is a simple survey technique to obtain quantitative data. The research instrument consists of questionnaires for the purpose of data collection. The sample of the study is Electrical and Electronic Diploma students who have taken the electronics subject as many as 20 students.

### IV. RESULT & DISCUSSION

#### A. Results

Research Question 3: To what extent do students' perceptions influence student motivation towards the use of SemIL applications in electronic subjects? Pearson's correlation analysis was used to find out the strength or height of the relationship between the mean of perception and the mean of students' motivation towards the use of the SemIL application

in electronic subjects. Table 1 shows the correlation of perception with student motivation. The results show that the results of the correlation value between the perception and motivation variables have a very weak positive linear relationship where the motivation variable will increase if the perception variable increases.

Table 1 Correlation of Student Perception and Student Motivation

	Mean Perception	Mean Motivation	Conclusion
Perception Mean Pearson Correlation	1	.066**	pp ≠ 0 (HO rejected) There is a statistically significant relationship
Sig. (2 ends)	.781	.781	
N	20	20	
Mean Pearson Correlation Motivation	.066**	1	
Sig. (2 ends)	.781	.781	
N	20	20	

#### B. Discussion & Suggestion

This SemIL application can help explain concepts related to semiconductor components where students can make connections between theory and material provided in the application through the digital content method. Indirectly, students will not only be able to master cognitive and psychomotor aspects, but also be more confident in handling semiconductor components in the workplace. The following are the results of the analysis obtained from the distribution of questionnaires.

Table 2 Perception student toward usability of SemIL Application

Question	Analysis results
1.	9 respondents (45%) strongly agree, 9 (45%) agree and 2 (10%) moderately agree that the SemIL application (SemIL App) is easy to operate and user-friendly
2.	5 respondents (25%) strongly agree, 10 (50%) agree and 5 (25%) moderately agree that the SemIL application (SemIL App) does not burden students because it is easily accessible and the time of use is flexible
3.	8 respondents (40%) strongly agree, 7 (35%) agree and 5 (25%) moderately agree that the SemIL application (SemIL App) requires a short time to be mastered and it is easy to get help from others when facing difficulties using it
4.	5 respondents (25%) strongly agree, 11 (55%) agree and 4 (20%) moderately agree that the SemIL application (SemIL App) is effective for the latest teaching and learning sessions
5.	7 respondents (35%) strongly agree, 9 (45%) agree and 4 (20%) moderately agree that the SemIL application (SemIL App) can help complete activities or assignments quickly and make learning productive/effective
6.	6 respondents (30%) strongly agree, 10 (50%)

	agree and 4 (20%) moderately agree that the SemIL application (SemIL App) can increase knowledge about electronic subjects because the content is easy to understand
7.	6 respondents (30%) strongly agree, 11 (55%) agree and 3 (15%) moderately agree that the SemIL application (SemIL App) can improve skills about electronic subjects because the experimental steps are easy to learn
8.	7 respondents (35%) strongly agree, 10 (50%) agree and 3 (15%) moderately agree that the SemIL application (SemIL App) can influence positive behavior in learning electronic subjects because its functionality is good and appropriate
9.	Referring to the graph, 8 respondents (40%) strongly agree, 7 (35%) agree and 5 (25%) moderately agree that the SemIL application (SemIL App) allows users to fully explore the content of the subject because the activities in it are easy to implement
10.	5 respondents (25%) strongly agree, 10 (50%) agree and 5 (25%) moderately agree that the SemIL application (SemIL App) makes it easier for users to share their understanding of lesson content with friends because the guidance is clear and consistent

**Table 3** Student Motivation Using SemIL Application

Question	Analysis results
1.	9 respondents (45%) strongly agree, 7 (35%) agree and 4 (20%) moderately agree that the SemIL application (SemIL App) helps time management in learning electronic subjects
2.	3 respondents (15%) strongly agree, 13 (65%) agree and 4 (20%) moderately agree that the SemIL application (SemIL App) encourages reviewing electronic subjects at home
3.	6 respondents (30%) strongly agree, 10 (50%) agree and 4 (20%) moderately agree that the SemIL application (SemIL App) saves time to make references anywhere and anytime in understanding the subject electronics
4.	6 respondents (30%) strongly agree, 9 (45%) agree and 4 (20%) moderately agree and 1 (5%) disagree that the SemIL application (SemIL App) increases self-learning access in electronic subjects
5.	4 respondents (20%) strongly agree, 13 (65%)

	agree and 3 (15%) moderately agree that the SemIL application (SemIL App) helps make electronic subject learning more interactive and competitive
6.	6 respondents (30%) strongly agree, 12 (60%) agree and 2 (10%) moderately agree that the SemIL application (SemIL App) helps make electronic subject learning activities more quality
7.	6 respondents (30%) strongly agree, 9 (45%) agree and 5 (25%) moderately agree that the SemIL application (SemIL App) helps the development of electronic subject learning inside and outside the classroom
8.	6 respondents (30%) strongly agree, 11 (55%) agree and 3 (15%) moderately agree that the SemIL application (SemIL App) gives a lot of control over electronic subject learning activities
9.	9 respondents (45%) strongly agree, 7 (35%) agree and 3 (15%) and 1 (5%) strongly disagree that the SemIL application (SemIL App) motivates learning electronic subjects because of the e-Learning element increase interest in exploring what information is being learned




## V. CONCLUSION

The results of this study concluded that the level of students' perception and motivation towards the use of SemIL applications is at a high score. This is possible because this application has the potential of good usability, useful and effective to be applied in the subject of electronics at Community College. Research feedback shows that this application has advantages in Pdp because it can provide a more enjoyable learning environment for students. In addition, this application also provides a teaching design that implements a fully mobile device that has a neat and good interface, display and functions for students to implement. The development of more applications like this is very appropriate to the current needs and demands where they can be used as efficient teaching aids and support the implementation of Pdp online based on new norms. In order to further increase the learning potential of students, it is suggested that a physical game board be provided that can be combined with the SemIL application so that the learning process of students is more competitive and provides a more enjoyable learning environment for students. Therefore, the use of SemIL Application innovation is very important for students to review.

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**AUTHOR'S INFORMATION**

<p><b>First Author:</b> Herlina Binti Miur Zabidin</p> 	<p>Department, Padang Terap Community College, Lot 1529, Jalan Kuala Nerang, Taman Belimbing Indah, Kuala Nerang, Kedah, Malaysia</p> <p>E-mail: herlina@kkpt.edu.my</p>
<p><b>Second Author:</b> Zawiyah Binti Mokhtar</p> 	<p>Tuanku Sultanah Bahiyah Polytechnic, Kulim Hi-Tech Park, 09000, Kulim, Kedah.</p> <p>E-mail: zawiyah@ptsb.edu.my</p>
<p><b>Third Author:</b> Norasmah Binti Abu@Awang</p> 	<p>Department, Padang Terap Community College, Lot 1529, Jalan Kuala Nerang, Taman Belimbing Indah, Kuala Nerang, Kedah, Malaysia</p> <p>E-mail: norasmah@kkpt.edu.my</p>