

Mobile Learning for Mathematics II Module (FGE1123) to Improve Teaching and Learning Method at UC TATI: A Pilot Study

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KEYWORDS	ABSTRACT
Mobile technology Mobile device Mobile learning Mobile apps	In this new decade, technology has become an essential in daily life. Most of the activities in our life will use technology such as communication, purchasing, online payment and banking. In education, teaching and learning method also has gone through the phase of changes. Nowadays, the traditional method in teaching and learning need to be improved or changed as the students are more interested in technology. Furthermore, with the introduction of the internet, there is a need to enhance teaching and learning methods through the utilization of the technologies. Hence, this study aims to develop a mobile app for Mathematics II (FGE1123) module and to improve teaching and learning method through the utilization of technology. Methodologies for this study consist of three phases. The first phase is gathering the user requirement and information, the second phase is design and developing the app and the last phase is to test the app. Based on this study, the Mathematics II app is successfully developed and the students satisfied and found the apps is interesting to use. This result shows that mobile learning is good and effective teaching strategies to improve students' interest in learning.

1.0 INTRODUCTION

In this new decade, technology has become an essential in daily life. Most of the activities in our life nowadays use technology such as communication, purchasing, online payment and banking. One of the technology has been used is mobile devices such as smartphones or tablet computer. These mobile devices are more powerful and portable nowadays with plenty of useful tools for assisting people to handle daily life. The availability of smartphones at affordable prices also has led to an increase in the use of applications (apps) for various aspects of life such as communication, traveling, entertainment, productivity and learning (Bano et al., 2018).

In education, teaching and learning method also has gone through the phase of changes. Nowadays, the traditional method in teaching and learning needs to be improved or changed as

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the students are more interested in technology. Students nowadays are very much comfortable with electronic gadgets, equipment, apps and the need to use these gadgets and equipment in teaching is highly evident (Etcuban & Pantinople, 2018). It is also known that most of the students learn quickly through games and sporting activities (Etcuban & Pantinople, 2018). iPhone and Android apps should be used completely these days.

Furthermore, with the introduction of the internet, there is a need to enhance teaching and educational methods through the utilization of this technology. The utilization of this technology may improve the abilities of the lecturers to present information in an interactive way. In addition, students would also find it interesting and eager to learn.

With the advancement of mobile technology, the issue of mobile learning has been widely investigated in e-learning research. Many researchers consider it is important to integrate the pedagogical and technical strengths of mobile technology into learning environments. Mobile learning, also called M-learning is any type of content that is developed or consumed on mobile devices, and including anything from podcasts to full eLearning courses. Mobile app is a teaching and learning tool that able to become the latest trend in education nowadays. It is also among the latest technologies used in education. Most of the educational apps support single-person use of interactive learning materials, simulations and learning games (Leinonen, Keune, Veermans, & Toikkanen, 2014).

Mobile applications (apps) are used in higher education in a variety of ways, including as learning tools, study organizers, for marketing, and recruitment of new students (Pechenkina, 2017). Students can solidify the content of lecturers, self-test knowledge and collaborate with peers by using apps as learning tools (Pechenkina, 2017). From Pechenkina's study, it is found that study management and navigation apps are the most common types of apps offered to students.

Digital magazine is one of the apps that can be created by using mobile apps. Luna-Nevarez and McGroven (2018) explore the impact of curated digital magazines, created and distributed via a mobile app called Flipboard. Students' engagement, enjoyment and learning of class-related content are the impacts that are studied (Luna-Nevarez & McGovern, 2018). They found that students exposed to the digital magazines and mobile app displayed higher levels of enjoyment with class content and performed better on a knowledge assessment compare to students in a control condition (Luna-Nevarez & McGovern, 2018).

The effects of mobile teaching have been studied at high school and university levels. Etcuban and Pantinople (2018) study the effects of using the mobile application in teaching mathematics at high school in the Philippines. They found that the use of the mobile application in teaching mathematics to high school students had helped enhance students' achievement and learning (Etcuban & Pantinople, 2018).

Leinonen et al. (2014) present a design-based research study of mobile device apps named ReFlex and TeamUp. These apps are specifically designed for use in student-centred and collaborative school learning, in which continuous reflection is an important part of the learning process (Leinonen et al., 2014). Based on the results of their study, it is found that there is potential for fostering the practice of reflection in classroom learning through the use of apps for audio-visual recordings (Leinonen et al., 2014).

At UC TATI, the traditional method is still applied as the main teaching method. Hence, this pilot study is done to explore more about the usage of mobile apps in teaching mathematics at UC TATI. There are two objectives for this study. The first objective is to develop an app for Mathematics II (FGE 1123) module. Second is to improve the teaching and learning method through the utilization of technology.

2.0 METHODOLOGY

The first phase of mobile development is by creating mobile application teaching. To create the mobile application, firstly by gathering and analyzing information. We used our module as the base of our mobile development. For the first mobile development, we decided to use the module of Mathematics II (FGE 1123). This module has been used for several semesters by Mathematics lecturers and students at UC TATI. It consists of notes, practices and tutorials. To build our mobile app, we used the tutorial questions and the students managed to get the solutions and answers by using the mobile app.

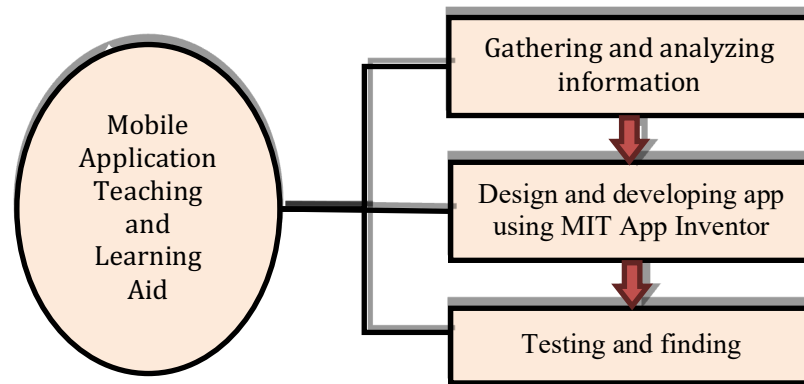


Figure 1: The phase of mobile development.

The second phase of the study is to design and develop the application by using MIT App Inventor. MIT is a web application integrated development environment originally provided by Google and now maintained by the Massachusetts Institute of Technology (MIT). It is free and open-source software. It allows newcomers to computer programming to create an application software for the operating systems. It uses a graphical user interface that allows users to drag and drop visual objects to create an application that can run on android devices.

Figure 2 and Figure 3 show MIT screen and the block editor in MIT environment during an app development phase.

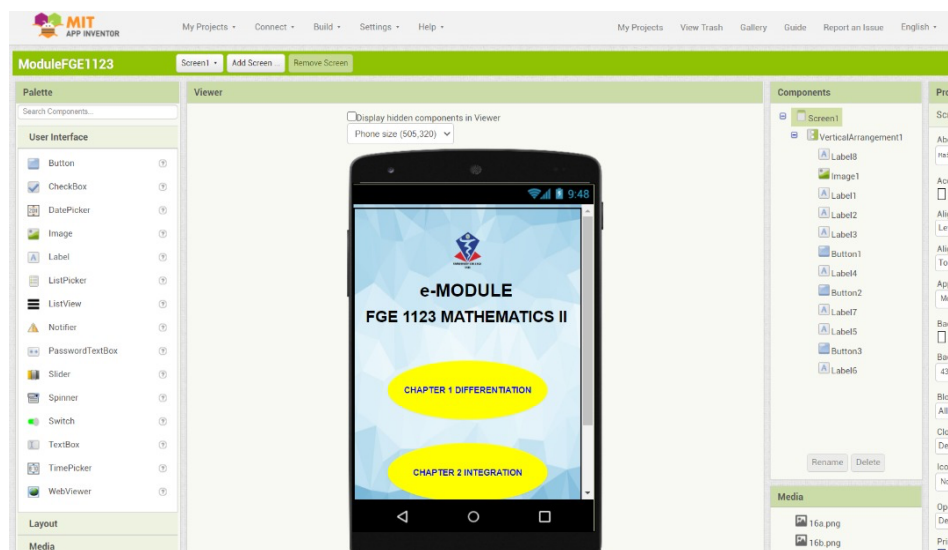


Figure 2: MIT screen to design the mobile app.

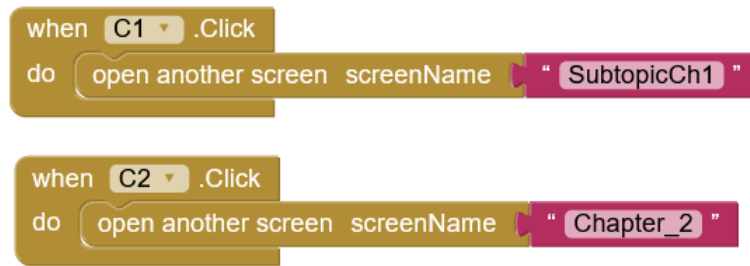


Figure 3: Block editor in MIT environment.

In MIT App Inventor, the developers create the user interface selecting component for the mobile application in a browser by using the designer and then program it with a drag and drop blocks editor that runs on the computer. Once it is ready, the application was installed on the Android Smartphone.

The last phase is to test the mobile app. A group of students who take this course during the current semester had been used. The students installed the application and they were guided to use the app in the class. Through this pilot study, students were asked to answer the simple questionnaire using Google form regarding the effectiveness of new app for Mathematics II(FGE 1123) module.

The evaluations were taken based on four questions:

- 1) Have you used our module in your lesson?
- 2) Does the module (book) help you in your learning?
- 3) How satisfied are you with the Mathematics II module?
- 4) Does the mobile app make your learning process interesting?

The evaluation of the student interaction with the app, enables the teachers to know if the app should be redesign.

3.0 RESULTS AND DISCUSSION

Using the MIT App Inventor, mobile app for Mathematics II (FGE 1123) module was successfully developed. The application was installed on the Android Smartphone and the interface of the mobile app is showed as Figure 4 (a) – (e). This application contains two chapters, which is differentiation and integration. The students can choose any question and the solutions for each chapter. All the questions are provided in the module meanwhile the details of solutions are shown in this mobile app. The students can easily access this mobile app without lecturer supervision.

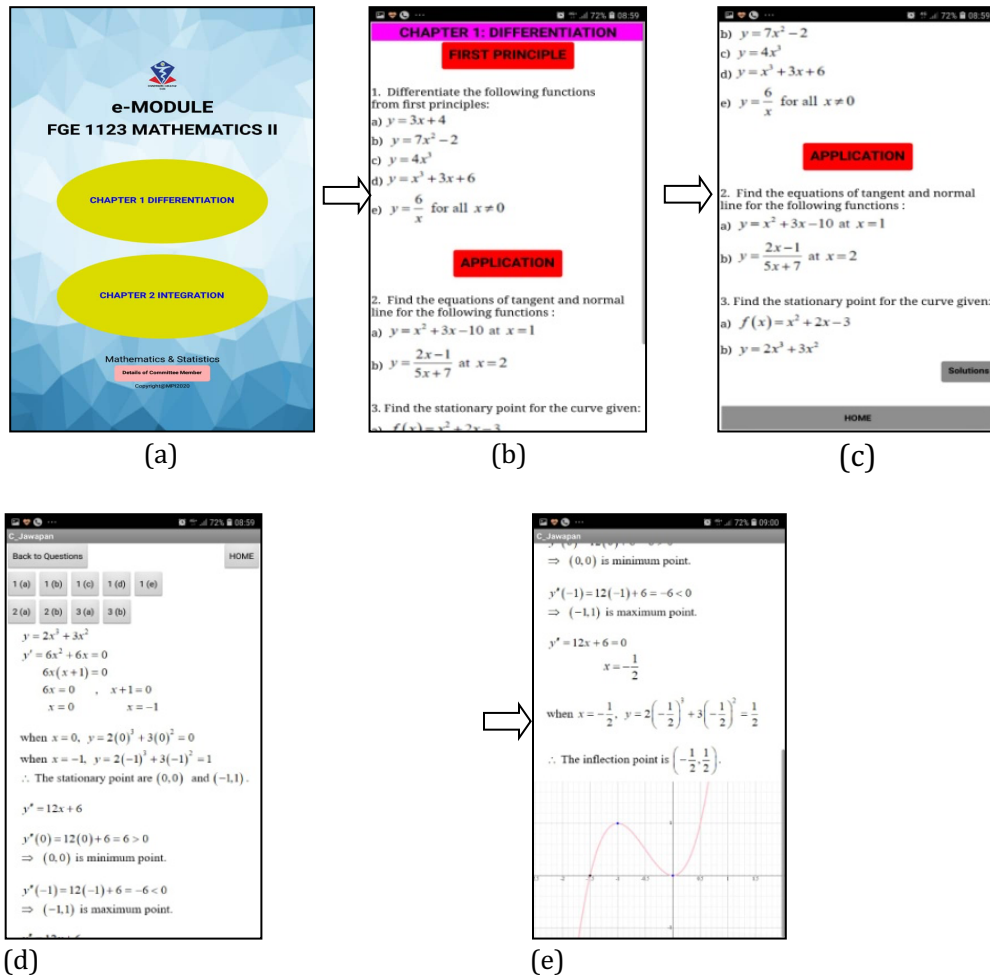


Figure 4: The Interface Mathematics II Module App. (a) General view; (b) Subtopic view; (c) Questions view; (d), (e) Solutions view.

Below are the findings on the survey conducted on a few students:

Table 1: The findings of the survey.

Questions	Results
1) Have you used our module (book) in your lesson?	Yes (all students/respondent)
2) Does this module (book) help you in your learning?	Yes (all students/respondent)
3) How satisfied are you with the Mathematics Module App?	62.5% - Extremely satisfied 25.0% - Satisfied 12.5% - Moderate
4) Does the Mathematics II Module App make your learning process interesting?	62.5% - Extremely satisfies 37.5% - Satisfied

From this survey, we can conclude that majority of the students are satisfied with the new app and all of them interested in using module apps in the learning process. To create new

innovative learning opportunities, one needs to take into account usability and rationality. We believe that the appropriate application will enhance education underpinning.

4.0 CONCLUSION

This study aimed to develop a mobile application for the module of Mathematics II (FGE1123) and to consider it as one of the interactive methods that affect students' interest in mathematical learning. The Mathematics II module consists of notes, practices and tutorial questions that have been used by Foundation students and lecturers at UC TATI. Therefore, this app is designed to enhance students' understanding by providing the details of solutions for tutorial questions. Furthermore, a survey was carried out to investigate the students' satisfaction with the module app.

The result shows that most of the students satisfied with the developed app and make their learning process interesting. According to this result, we can conclude that mobile application is a good and effective teaching strategy to improve students' interest in learning especially at the higher education stage. It also creates the potential for significant change in teaching and learning practices. The results of this study contribute to further research on learning outcomes that may lead to a series mathematics videos and generate into Quick Respond (QR) code as an interesting aid in teaching and learning. In addition, future studies can also include the behaviors or other external factors that affect the acceptance of mobile apps, in order to predict and explain students' acceptance of mobile applications learning.

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