INNOVATION OF DPA6013 FINANCIAL ACCOUNTING 4 LEARNING SYSTEM USING HYBRID APPLICATION FA4v1

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ABSTRACT

This innovation developed due to an observation of past research where accounting students prefer to have a modern and technology base teaching method compared to the traditional method. For this study, the researchers had developed an application for Finacial Accounting 4 (FA4) that supports IR 4.0, the hybrid FA4v1 application which focuses on the use of Cloud Computing technology, one of the cores of IR 4.0 as a teaching and learning (TnL) application. This application used concepts of m-learning which is part of e-learning that integrates cloud and mobile phone applications. In General, the purpose of this study is to determine the effectiveness of adapting e-learning using self-developed hybrid applications FA4v1 based on IR4.0 technology for an accounting course in Politeknik Sultan Haji Ahmad Shah (POLISAS). The two main objectives of this study are (1) to investigate the perceptions of the students (application user) on the hybrid FA4v1 usage and (2) to make a comparison between the conventional method and by using the FA4 v1 application tool in teaching and learning. Two instruments had been used to measure effectiveness. Instrument 1: Students from 5th-semester Diploma in Accounting program are required to answer questionnaires in evaluating the effectiveness of the learning system based on their perceptions toward the FA4v1 application. Instrument 2: comparative evaluation of time, equipment and cost between the usage of FA4v1 application and the conventional TnL methods. The result revealed that all the respondents have positive perceptions of the application. All the respondents agreed that the FA4v1 apps effective and efficient in TnL process. All the satisfaction measured is a high level of satisfaction which is more than the score means of 4.00. This finding also showed TnL by using FA4v1 is more effective and efficient compare than conventional TnL in term of time-saving, can measure students understanding in real-time and cost-effective.

CCS Concepts

• Applied computing → E-learning • Applied computing → Interactive learning • Applied computing → Collaborative learning

Keywords*: mobile learning; e-learning; mobile apps; accounting education*

1. INTRODUCTION

The fourth Industrial Revolution (IR4.0) involves physical cyber system technology which gives new challenges to all sectors in the world that requires them to transform in line with digital transformation to sustain its competitiveness. In line with IR4.0, the fourth surge in Malaysia Education Development Plan (Higher Education), TVET4.0 aims to produce quality TVET graduates based on new teaching and learning methodologies, responsive and sustainable governance, new applied research approach and innovations and also technology guided talents. Mobile devices have become important in the IR4.0 teaching and learning (TnL) environment which is the education communities used the mobile phone as storage, to process and retrieve information anytime and anywhere. Rafidah, et.al, [19] the result revealed that most of the students have a smartphone and they are most likely prefer to use their smartphone for learning purposes.

The researchers have chosen financial accounting 4 (FA4) the subject that she taught to apply mobile learning application in TnL that supports IR4.0 because the researcher has expert content in this subject. This application was developed base on a mobile learning concept that integrates cloud application and smart application. In Malaysia, m-learning practices are not widely used compared to developing countries such as Europe and the United States of America [1]. Issham Ismail et.al, [20], the study revealed that an overwhelming majority of students in Malaysian public universities were still moderately ready for mobile learning. Many of them seemed to be not quite familiar with such a

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learning approach even though there is an interest among them to learn more about mobile learning. The study from Filiz Angay Kutluk et.al, [21] most of the students who have used mobile devices for learning and educational purposes or made research/homework about accounting lessons with cell phone and handheld computer and spent more time on mobile devices for learning and education on daily basis, think that using mobile devices for learning purposes would be easy and they intend to use it because of the immediate access to information, and would enable them to make research/homework about accounting lessons more quickly, using mobile devices for making research/homework about accounting lessons would help them perform their studies anyplace.

For this study, the researchers had developed an application that supports IR 4.0, the hybrid FA4v1 application which focuses on the use of Cloud Computing technology, one of the cores of IR 4.0 as a Teaching and learning application. This application used concepts of m-learning which is part of e-learning that integrates cloud and mobile phone applications.

1.1 m-Learning Definition

Shital P. B and Pankaj B.D. [24], Electronic Learning or E-learning incorporates all forms of online instruction using personal computers-learning is the follow up of E-learning which for its part originates from D-learning (Distance learning). The term `M-learning' has lately emerged to be associated with the use of mobile technology in education. Mobile learning simply means "learning on the move'. In other words, the new term simply attempts to differentiate between learning that takes place in a formal context such as a classroom. In this, the learning process takes place anytime, anywhere while we are moving in our environment. According to Lan dan Sie [3], m-learning is defined as a learning model that allows students to gather learning materials at anywhere and anytime with the use of mobile technology. Parsons [16] relates that m-learning is part of e-learning and distance learning. If m-learning is related to the internet and wireless, it's not far different from the original concept of e-learning. Oller [10] stated that mobile learning also happens in classes, but the main difference is that the learning process not just happens in classes but at anywhere and anytime.

Financial Accounting 4 is a suitable course to develop an m-learning application which fulfills student's need to gather learning materials at anywhere and anytime because they are required to do fieldwork at selected companies for their case studies. The updated changes in accounting standards require them to always refer to a reference platform in which m-learning apps acts as a provider and quick reference tools.

1.2 Cloud Computing Definition

According to Suzita [11], Cloud Computing in simple definition is to store and retrieve data and applications using the internet. Examples of data stored are documents, images, videos, and audios. Users can retrieve those data using any computers or mobile devices with an internet connection. Lee Badger et. al, [22] define Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

1.3 Problem Statement

This innovation developed due to an observation of past research where accounting students prefer to have a modern and technology base teaching method compared to the traditional method. The study from Ramen et.al, [28], takes into consideration factors and types of method used, on the learning process and the study observed that the student prefer modern tools alongside with the traditional face to face to cope with accounting studies. The perceived this 'Hybrid method' as a must to get the best of themselves as they can review online materials according to their flexibility and conveniences in case they are unable to attend classes, less time spent on travel and on-campus and no time constrained and can learn at their own pace. Result proved that student preference for traditional and modern methods are almost the same but also perceived hybrid as innovative ideas that should be promoted. Rehab U. T [26], proved that Accounting student's attitudes toward the modern teaching method are more than those attitudes toward the traditional teaching method. Avanish K. S and Mohammed I. S [27], respondents showed positive responses toward technology-based teaching as compared to traditional classroom teaching and students believed that technology-based teaching helped them in solving accounting problems better. Belias D et al. [29] conclude from their study it could be claimed that, although different studies have looked into student responses towards modern teaching tools and their effectiveness measured in terms of student performance in final exams, there are issues pertaining to such tools that are still unclear. It is noticeable that many students report a preference for personalized teacher-centered teaching methods and suggest the use of the above modern teaching tools and practices as ancillary tools, only. In light of the above, it could be argued that modern teaching methods, strategies, and tools should adopt and integrate Information and Communication Technologies (ICT) on the premise that the latter is adapted to each student population's interests, abilities, and ambitions.

To solve this problem, a hybrid application has been developed by researchers which are a mobile phone application integrated with the cloud computing technology to facilitate students to access lecturer notes, conduct evaluation and communication processes between educators and students. The researchers took consideration in times saving, friendly used, cost-saving, self-learning, teaching and learning can be performed anywhere, interesting learning and efficient.

1.4 Innovation Objectives

The development of the learning system application for DPA6013 Financial accounting 4 (FA4) uses hybrid technology where it combines mobile applications and web technologies. It gives advantages to developers where the content creators can update in the cloud for users to access updated content in real-time. This application is not just can be accessed using mobile devices but also any devices that have an internet connection.

In General, the purpose of this study is to determine the effectiveness of adapting e-learning using self-developed hybrid applications called FA4v1 based on IR4.0 technology for an accounting course in Politeknik Sultan Haji Ahmad Shah (POLISAS).

The two main objectives of this study are:

1. To investigate the perceptions of the students (application user) on the hybrid FA4v1 usage.
2. To make a comparison between the conventional method and by using the FA4 v1 application tool in teaching and learning.

1.5 Research Questions

This study is going to answer these following research questions:

1. What are the perceptions of the students (application user) on the effectiveness of hybrid FA4v1 usage?
2. Is there a significant difference between the conventional method and by using the FA4 v1 application tool in teaching and learning?

2. LITERATURE REVIEW

2.1 e-Learning in Teaching and Learning

The rapid changes in technology require educators to equip themselves with new methods of content deliveries. Learners nowadays act as a connector, creator and constructivist in the learning process. Easy access to information and experts is one of the features in the mobile apps that would really assist students for a better understanding of their learning. According to Salem et al, [7], the use of e-learning gives positive feedbacks on individuals. Result analysis shows that the use of e-learning had increase student's abilities to process information precisely. Besides that, it can also improve their comprehension of related activities during the Teaching and learning process. It also assists in providing basic information that can help students to make effective and precise decisions that can improve overall teaching and learning process productivities. Knowledge delivering methods must be carefully designed in order to fulfill industry needs that require student competencies in their work environment in the financial sector. Imparting the essential technical skills through the use of technology will enhance them in dealing with real-life accounting issues that play an important part in their daily life. The conventional method of teaching in higher education requires face to face interactions but the emerging of rapid ICT had impacted the accounting fields for innovative transformation in the structure and function of accounting education. Mohd Shoaib & Aditya [9], founds that the role of mobile learning is increasing among students. The result shows that the applications are more increasing in the higher education environment. Besides that, the results show that students had adequate knowledge and awareness in using the internet and mobile technologies in their educational environment.

Johan et. al, [5], proves that most respondents are more likely to learn through e-learning as it gives more flexibility either to learn with teachers or self- learning and it also allows them to learn at anywhere and anytime. Studies from Irwanto [4] shows that students preferred to learn using their smartphones since they have borderless access to information wherever they are located and time-saving. Mousazadeh et al., [6], founds that the overall advantage of e-learning includes learning promotions, individual satisfaction, learning on their own pace and time, self and collaborative learning are cost and time effective that makes it possible for everybody to access faster information in Teaching and learning. The adoption and implementation of technology-based teaching and learning methods, however, require proper and accurate alignment within the syllabus. Teachers and students must also empower themselves in ICT skills and abilities in using various types of technologies use for teaching and learning accounting.

2.2 m-Learning Tools

M-learning is part of e-learning but m-learning can be assessed easier compared to by using a desktop because it can be assessed anywhere and anytime. Benta et al. [12], shows that there are different opinions on the usage of m-learning. Some are really concern about content relations but most agree that it will be an interesting learning tool. Poh S. S and Suay P. W [25], using gaming as an m-learning tool in accounting education, the study indicates that this app empowers students to learn to account in a fun way, outside the classroom and respondents were satisfied with the application. Diah H. S [23], proved that there are significant differences between students who received learning materials of accounting information systems with face to face classes and mobile learning. This implies that additional learning with mobile learning is more effective than face to face learning.

3. METHODOLOGY

3.1 FA4v1 Application Development

The researchers used ADDIE model for development of the mobile learning application which are includes five phases (1) Analysis of mobile phone use among students, (2) the process of designing mobile learning application, (3) the process of development mobile learning application, (4) the implementation of mobile learning application, (5) the process evaluation the effectiveness of mobile learning application.

- 1st phase is the analysis of mobile phone used among students which is the findings will help the researcher to develop mobile learning application to the students. The purpose of this analysis was to identify the perspective and practices of mobile learning among students from the components of usage of mobile devices for learning, types of mobile devices used and time spent on using mobile devices for learning. The researcher used analysis that was made by Rafidah et.al, [19] because they used the same education level as the

researcher's respondent. Their need analysis is involved 45 undergraduate students who studied the Diploma program in Universiti Teknologi Mara (UiTM), Malaysia which indicates three findings i.e. (1) Respondents like to use mobile devices especially for studying or learning. (2) Most of the respondents have a smartphone and they are most likely prefer to use their smartphone for learning purposes. (3) Almost all the respondents agreed that they used their devices for learning and most of the time they spent their day on using mobile devices for learning.

- 2nd phase is designing a mobile learning application. The researcher focuses on the main components which are uploading notes inside the Google drive and sites, assessments for students into Google Form and transferring the notes and quizzes into Thunkable that acted as an application launcher. Information contained inside the applications are notes, references, activities, and assessments.
- 3rd phase is the researchers had developed a hybrid mobile application FA4v1 where it integrates cloud applications such as google drive, google sites, google form, google classroom and Thunkable. The system can be used using mobile devices and is very friendly to users.
- 4th phase is the implementation of the mobile learning application. This application utilized by teachers and students either by self or collaborative learning, lectures, and tutorials or for communications between teachers and students. QR code is being provided to students for them to download FA4v1 applications into their mobile devices. FA4v1 application can display student's performance marks for each assessment as soon as its being executed. It also provides reflections to students to increase their comprehension in each lesson. There are six (6) reports from the system application when students had executed the assessments available in the FA4v1 apps available in the cloud that is being controlled by the lecturer, refer table 1.

Table 1: Reporting format in FA4v1 system

No.	Title	Report Output
1	Performance Statistic	• Displays overall assessment statistics performed by students through FA4v1 apps in table and form format. • Displays assignment submission statistic by students • Displays answer statistics for every quiz question in table and graph format.
2	Performance Marks	• Displays individual mark performance for each assessment through FA4v1 apps in table and graph format.
3	Answers (Reflections)	• Display answers by students for quizzes in table and graph format. • Displays answers by students uploaded by students for assignment questions in table and graph format.

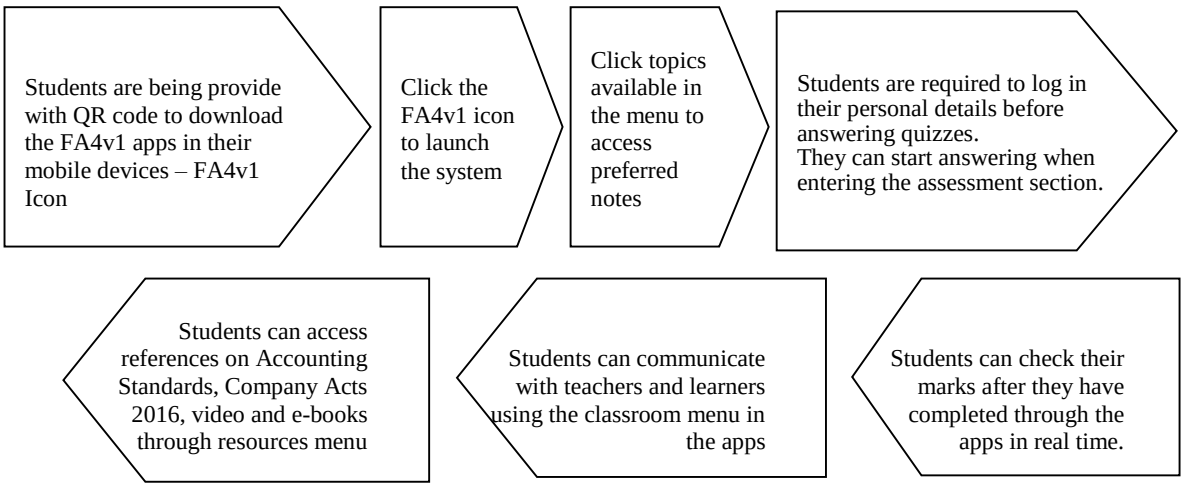

Figure 1: Diagram of FA4v1 Application usage.

- 5th phase is the process evaluation of the effectiveness of mobile learning applications. In order to measure the effectiveness of the application, two (2) instruments had been used and compare its effectiveness between the application and conventional teaching method. The instruments are:

1) Distributing questionnaires to students/users in evaluating its effectiveness of FA4v1 application in their perceptions. Online questionnaires had been submitted through the apps using the classroom module. All 17 students had answered the questionnaires.

The questionnaires developed purposes for the study and pilot test have been implemented to verify the reliability of the questionnaire, the analysis of the pilot test data value of the reliability coefficient with Cronbach's Alpha value is 0.977. The questionnaire is divided into two sections in which the first section is the answer for the research questions and the second section is the overall comments from respondents. Test reliability of the instrument has been made to this item by using Cronbach alpha (maximum value is 1). Based on Guilford [30] stated that Cronbach's Alpha must be ≥ 0.70, for items <10 is an indicator that a satisfactory level of reliability. The analysis of the data value of the reliability coefficient for this study is 0.994.

2) Calculating time, cost and equipment for both methods i.e., conventional and by using the apps for comparison.

3.2 Population

The population of the study is Diploma in Accounting Program students from Politeknik Sultan Haji Ahmad Shah (POLISAS). The clustered sample is used in this study which is two (2) sections from Diploma in Accounting students from Session December 2018 as subgroups of the population. This is single-stage cluster sampling, all members of the chosen clusters are included in the study. FA4v1 application has been provided to semester 5 DAT5A class consists of 17 students as a group selected as a sample. They were instructed to use the application during their TnL process and evaluate the effectiveness and its impact in assisting their comprehension in learning the course.

3.3 Data Analysis

Statistical Package for the Social Sciences (SPSS) version 17 has been used to analyses data from the questionnaire instrument. Sekaran [17] stated that special steps are being used for data analysis in data editing, blank responses, data recording, data categories, data filing, and programming.

4. RESULTS AND DISCUSSIONS

4.1 Instrument 1

The questionnaires had been answered by seventeen (17) FA4v1 application users. It has been designed to gather information through the student's perception of using the FA4v1 hybrid application. Issues discussed related to accessing the notes in terms of time are much easier, cost-effective, application contents and their satisfaction. These issues were discussed using 8 questions in the questionnaires.

Descriptive statistic from 8 items regarding student's perception towards FA4v1 hybrid application is shown in table 2, which includes a percentage for each category, standard deviation and mean. The most satisfying item from their perceptions is that by Teaching and learning method using the application, it is cost saving in term of printing their notes and buying books (M = 4.65, SD = 0.49), Teaching and learning process can be implemented anywhere using mobile devices (M = 4.65, SD = 0.49). Their burdens in bringing in books are much lesser (M = 4.65, SD = 0.49). Items evaluated as satisfactory is that note accessing through the apps are much easier from the conventional method (M = 4.59, SD = 0.51), the contents in the apps are very useful for learning, revisions and reelections (M = 4.41, SD = 0.51), accessing the notes is easy and faster (M = 4.35, SD = 0.49), self-learning process through the apps are much more fun and exciting (M =4.35, SD = 0.49) and the application is easy to use and user friendly (M = 4.35, SD = 0.49).

Table 2. Mean, Standard Deviation and Respondent Percentage (*N* = 17).

	Item	M	SP	Strongly Not Agree	Not Agree	Not Sure	Agree	Strongly Agree
a	The process of accessing the notes through the FA4 v1 apps is much easier compared to the conventional method.	4.59	0.51	0	0	0	41.7	58.3
b	The process of accessing the notes through the FA4 v1 apps is much faster compared to the conventional method.	4.35	0.49	0	0	0	66.7	33.3
c	Implementation of the learning method using the system is cost-saving mainly on printing and buying books.	4.65	0.49	0	0	0	33.3	50
d	Self-learning process through the FA4v1 apps are exciting and interesting.	4.35	0.49	0	0	0	66.7	33.3

e	Teaching and Learning can be performed anywhere using mobile devices.	4.65	0.49	0	0	0	33.3	66.7
f	Burdens to bring books to class are less since using the apps.	4.65	0.49	0	0	0	33.3	58.3
g	FA4 v1 apps are easy to use and user friendly.	4.35	0.49	0	0	0	66.7	33.3
h	Contents in the FA4 v1 application are useful for learning, revision and reflective sessions.	4.41	0.51	0	0	0	58.3	41.7

First research question: *What are the perceptions of the students (application user) on the effectiveness of hybrid FA4v1 usage?*
The result revealed that all the respondents have positive perceptions of the application. All the respondents agreed that the FA4v1 apps effective and efficient in TnL process. All the satisfaction measured is a high level of satisfaction which is more than the score means of 4.00. According to Shahrin et al., [18], the mean score comprises of three levels. The levels are shown in table 3.

Table 3: Evaluation based on mean score.

Mean Score	Level
1.00 - 2.33	Low
2.34 - 3.66	Medium
3.67 - 5.00	High

4.2 Instrument 2

The impact of using the FA4v1 hybrid application and Cloud Computing, teaching and learning process became more effective and efficient compared to conventional TnL. Results obtained from instrument 2 are shown in table 4.

Table 4: Comparison between conventional TnL and used of FA4 v1 Apps in TnL.

No.	Conventional Method	Used FA4 v1 Apps in TnL
1	**Time** • The time required to access the notes is 2 minutes i.e., from taking out the book to finding pages for topic 1, however, time in finding a book is neglected. • Student's understanding can't be assessed 100 % in real-time since lecturers require time to mark the assessment	**Time** • The time required to access the notes is 5 seconds i.e., from clicking the icon to finding topic 1 in the apps. • Student's understanding can be assessed 100 % in real-time since they can be reviewed instantaneously after they submit their assessment through the apps.
2	**Equipment** Require teaching aids such as LCD projector and students need to buy books and print handouts as notes.	**Equipment** It only requires mobile devices with an internet connection as a tool.
3	**Cost** Notes printing and books.	**Cost** Mobile devices are all students already have.

Second research question: *Is there a significant difference between conventional and using the FA4 v1 Apps tool in TnL?*
This finding showed that TnL by using FA4v1 is more effective and efficient compare than conventional TnL in term of time-saving, can measure students understanding in real-time and cost-effective.

5. CONCLUSIONS

The application of hybrid FA4v1 has made a tremendous impact on transforming educators to align with Industrial Revolution 4.0 (IR4). New methodologies in teaching and learning for the current education system require educators to be ready and update their skills towards implementing new technologies. It also stimulates students to be creative and well adapt to cloud technologies which will prepare them for the digital environment at their workplace. The researcher intends to spread the apps among learners to be used extensively throughout the institution. Using the apps gave solutions in assisting class management and avoid potential errors in teaching, learning, and assessments compared to the conventional method. This study can conclude that by using FA4v1 apps is very efficient and empower students to learn in

an exciting and interesting in learning the course. The FA4v1 hybrid application integrated with Cloud Computing makes the TnL process becomes more effective and efficient. Educators use cloud computing to update notes and exercise questions into FA4v1 hybrid applications. The FA4v1 hybrid application in the mobile phone is a platform for students to access all notes for the FA4 course as well as exercise questions to test students' understanding of the subject in which they have been taught. Lecturers and students will see the achievements and levels of understanding in real-time. The process of communication as in the classroom takes place anywhere and at any time. Educators can also monitor the student's self-learning process through the cloud.

The innovation that has been developed is not just potentially being used by DPA6013 for DAT5A class lecturers but also other classes that are taking the same course. It can also act as a template for other courses to use the hybrid application. The contents can be changed to suit other courses and can be used as mobile learning. This application will be used for other classes in the next academic session.
Teaching and learning processes can be implemented anywhere and anytime. Students had easy access to their notes and learning activities and it is time-saving. Assessments can be done by lecturers and do not require more time in marking papers since the apps can give a real-time review of student performance. All information is kept inside the cloud applications and lecturers have access anytime they require. Student feedback can always be generated in real-time for each activity conducted by the lecturers. Online reports have faster access since the student's assessment data are kept in the cloud drive and do not require additional physical drive including the attendance statistic. These features allow users to gather the information that is located in a single source by using search and function that is user-friendly and easy to use. Saad et.al.,[14] found that by sharing information through a single source that can be accessed by all, it can contribute to a faster and precise decision.

FA4v1 application can be used to increase the efficiency and quality of teaching and learning. One of the features in the apps is to easily access and retrieval of lecture notes and assessment reports in real-time. It can be used as a tool to gain feedback for further improvement in teaching and learning. This was supported by studies from Ermie et.al, [15] that found that online information management is important in today's environment and is able to increase efficiency and organizational effectiveness.

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