M-Learning LDD Application Development For Database Design Course: Evaluating Student Effectiveness And Interest

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Abstract

The teaching and learning (T&L) process is evolving through mobile learning technology or m-learning. The T&L is no longer just focused on the classroom but also applies self-learning without physical classroom meetings. There are three objectives set for this study: i) Developing educational applications for Database Design and ii) Evaluating perceptions of the students about m-learning applications. iii) Determine the differences of interest among students by gender. The researcher successfully developed the m-learning LDD application within four months. The first objective is to reach, and the average high mean of 4.66 was obtained for the second objective. The third finding shows that the significant value of the Independent T-Test is 0.516, which means that male students are more interested in using the application. In summary, this developed application was produced successfully, and the student studying the course of Database Design can learn, understand and test the level of understanding through the quiz provided in the m-learning LDD application. In addition, the questionnaire forms released to students of the Database Design course found that the application is very good. Last but not least, male students are more attracted to mobile learning than female students. Suggestions to improve the application by making it more interesting, easy, and efficient. Other suggestions include developing applications for other relevant Information and Communication Technology programs and spreading the application widely to other polytechnics.

Keywords: M-Learning; Database Design; Application

1.0 Introduction

The world of education today has changed and taken a new direction. Through the Malaysian Education Development Plan (2015-2025), 21st-century learning emphasizes that education needs to keep pace with current technology. The Ministry of Education Malaysia (MOE) has aimed to produce students who can think critically in problem-solving, creativity, and innovation. These skills can be further optimized through learning initiatives for the digital generation today through the application of technology through the dissemination of information and communication technology (ICT) and the student's capabilities (Malaysia Education Blueprint Malaysia, 2013).

The teaching and learning process (T&L) and ICT technology have indirectly promoted independent learning. T&L has evolved through mobile learning technology, or *mobile learning (m-learning*). Through *m-leaning*, T&L is not only focused on the classroom alone but also applies self-learning without being tied to a fictitious location in the classroom.

Technology applications can help students improve learning mastery independently (Nur et al., 2021) ICT technology can increase the success of a more dynamic and efficient T&L strategy.

Mobile devices such as smartphones, tablets, iPads, Palms, and PDAs can support m-learning (Quinn, 2020). Mobile smart technology such as smartphones, for example, is used not only to make calls but also as a device for various functions that are very important. Among the functions of smartphones is to have computing features that allow users to install application systems based on their choice of operating system, such as Android or iOS. This smartphone provides a platform for application developers to install attractive applications to deliver information, and the information can also be placed in special storage space in cloud applications. Smartphones can also function as reminder notes, replacing notebook functions, and have advantages in the form of entertainment, such as listening to music, playing online games, recording videos, and much more.

2.0 Problem Statement

Generation Z (Gen Z) is a mobile generation or generation net. The characteristics of Gen Z are individuals born after 1998 and growing up in the world of digital technology (Tapscott, 2009). Gen Z is a generation of digital literacy; they use social media and are proficient in digital and visual technologies (Salleh et al., 2022). The creation of gadgets such as smartphones and laptops, as well as the existence of Web 2.0, has brought major changes to the life of this gene (Suhaniya & Mohd. Fauzi, 2019). Observing lecturers during the T&L process conducted face-to-face in the classroom makes students more interested in technology and gadgets. Thus, researchers took the initiative to develop the m-learning Learn Database Design (LDD) application.

3.0 Objectives of the Study

There are three (3) objectives set for this study, which are

i. Develop educational applications for Database Design courses.

ii. Evaluate the readiness of students of Database Design courses using the LLD application.

iii. Identifying differences in students' interest in *m-learning* LDD application based on gender

4.0 Literature Review

According to data released by the Department of Statistics Malaysia (Department of Statistics Malaysia, 2023), the percentage of individuals aged 15 and above accessing the internet is 80.1 per cent, and they spend much time browsing social media. A Malaysian Communications and Multimedia Commission survey shows 83.2 per cent of internet users are as young as 5 to 17 years old. These people use smartphones as a communication medium, whether by text, obtaining information, watching videos, or surfing social media. (Survey, 2015)

The rapid pace of ICT technology has made room for the existence of Web 2.0. Web 2.0 is a website that allows social media users to read information and interact with and comment on the website. Examples of Web 2.0 are Instagram, Twitter, YouTube, blogs, and Facebook (Salleh et al., 2022). Generation Z tends to have lifelong learning and technology-related knowledge due to a deep interest in the Internet (Pérez-Escoda et al., 2016).

Several studies have been conducted on m-learning applications that have proven their effectiveness. According to Triantafillou (Triantafillou et al., 2008), studies that have been carried out have found that assessment tests through m-learning applications are more efficient and effective than conventional assessment tests. M-learning applications have helped increase student motivation through self-learning. The T&L process can also run more efficiently and quickly.

M-learning is a concept of distance learning where the T&L process is not bound by location or time. Wireless devices are required to enable the T&L process to run anywhere and anytime. The use of wireless technology helps the development of innovation in education and has a positive impact on T&L.

4.1 Database Design Course

Database Design course is one of the courses offered to second-semester students for the Information Technology Diploma program (Digital Technology - DDT), Information & Communication Technology Department. This course has several learning outcomes that need to be achieved, including

i. Using basic Database Management Systems (DBMS), relationship data models and normalization concepts in the database development process (C3, PLO2)

ii. Demonstrate the database structure using query functions in the database to manipulate the database to solve needs within the organization (P2, PLO3)

There are five (5) topics to be studied in this course:

i. Fundamentals of Database Management System (DBMS)

ii. Relationship Data Model

iii. Entity Relationship Model and Normalization

iv. Structured Query Language (SQL) and

v. Database transactions

While the assessment involved nine (9) assessments. Scoring for evaluation involves schemes and rubrics. The continuous assessment of this course is:

i. Quiz (3)

ii. Case Study (2)

iii. Laboratory Tests (3)

iv. Test

4.2 LDD M-Learning Applications

The LDD m-learning application is developed as a tool for the Database Design course. The application implements one of the fun learning methods (fun education) by providing interactive notes and tutorials in the form of videos to motivate students and make the learning experience more meaningful and memorable. Quizzes are provided, and points will be awarded to students who correctly answer questions to strengthen understanding. The rewards can be shared with friends to enhance the student's rating.

5.0 Methodology

Agile methodology ensures that all application system development requirements can be met and produced to complete this project successfully. The Agile methodology includes six (6) principles or cycles that must be adhered to in software cycle development (Sameen Mirza & Datta, 2019). The first cycle is planning or necessity: a survey to evaluate the development requirements of m-learning applications for the Database Design course. Based on the survey results, it is concluded that students are interested in using a system for interesting, easy and efficient learning purposes. The second cycle is designed for the application, and software has been used to produce interesting applications and provide fun learning concepts (fun education). The third cycle is development: in this cycle, development will refer to cycle two. The fourth cycle is testing: applications that have been developed will undergo testing to detect a defect or malfunction.

The fifth cycle is launch: To ensure the application works properly, users must use it in a real environment. The sixth phase is review: user feedback will be collected and evaluated.

Data collection for this study is through questionnaires. The questionnaire was distributed to the respondents using Google Forms after they finished using the LDD application. The construction of the questionnaire item in Part B is adapted from the previous study and modified according to the requirements of the current study. This questionnaire has two (2) sections,

one of which is Part A, which contains the demographic data of the respondent. Part B related to the readiness to use the m-learning LDD application for students of the Database Design course. The respondents are students from DDT2A and DDT2F of Diploma in Information Technology (Digital Technology), Politeknik Mukah, who took the Database Design course in the second semester. This questionnaire uses five Likert scales. This scale will express strongly disapproval, disapproval, uncertainty, agree, and strongly agree. The scale starts with numbers 1 through 5. The findings of this study were analysed using SPSS version 26 software.

6.0 Analysis of Study Findings

Objective 1: Develop educational applications for Database Design courses.

Researchers have successfully developed the LDD m-learning application within four months. Figure 1 shows the m-learning LDD interface that allows users to interact with the m-learning LDD application. The app contains notes, tutorials in the form of videos, and quizzes for the Database Design course. To strengthen understanding, users can answer quizzes and give points to users who answer questions correctly. The rewards can be shared with other users. According to Zagrean (2014), reward is a strengthening activity in learning and reward motivates good behaviour through exclamation or persuasion.

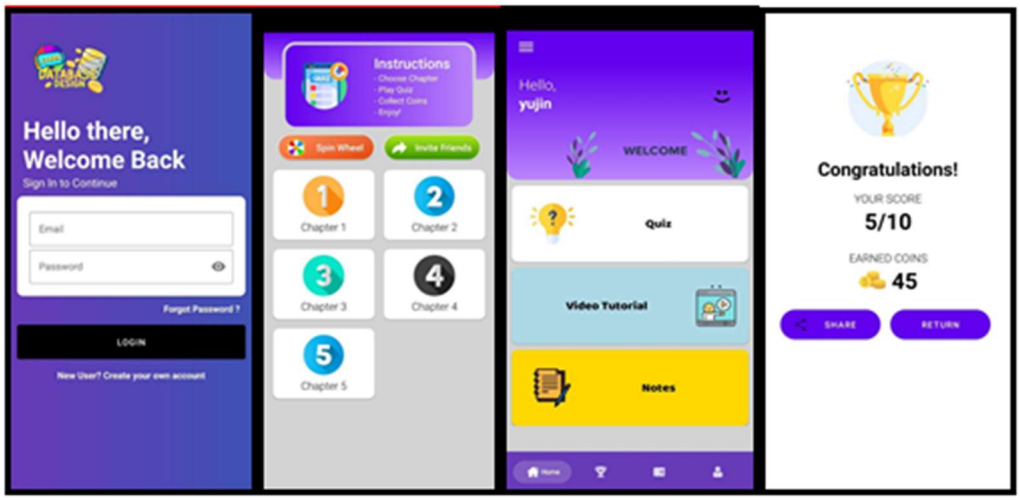

Figure 1: *LDD* Interface

Objective 2: Evaluate the readiness of students of Database Design courses using the LLD application

To answer the second objective, we developed a questionnaire instrument to evaluate students' readiness in Database Design courses using the LLD application. Questionnaires were distributed to second-semester students (2) who took the Database Design course at Politeknik Mukah. This questionnaire uses five (5) Likert scales. This scale expresses strongly disapproval, disapproval, uncertainty, agree, and strongly agree. The scale

starts with numbers 1 through 5. The findings of this study were analysed using SPSS version 26 software. The following are the findings of the questionnaire:

Table 1: Mean table for evaluating the effectiveness of m-learning LDD applications

Item		Min
A1	The use of applications like this can improve learning in the classroom.	4.58
A2	Using applications during learning will facilitate the understanding of a concept.	4.58
A3	I believe that this application will help with learning.	4.75
A4	I think this app is easy to use	4.83
A5	Learning to use the app is not a problem	4.66
A6	The operation of the application is clear and understandable.	4.58
A7	I would like to use this app in the future if i have the opportunity.	4.58
A8	Using an application like this will allow me to perform laboratory tasks on my own.	4.75
A9	I want to use this app to learn database design and other courses.	4.66
Average Min		4.66

A high mean average of 4.66 was obtained through the circulation of questionnaires, showing that students of the Database Design Course have a good perception of the use of m-learning LDD.

Objective 3: Identify differences in students' interest in m-learning LDD application based on gender

Table 2: Independent T-Test to identify students' interest in m-learning LDD applications based on gender

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Average	Equal variances assumed	0.454	0.516	0.432	10	0.675	1.086	2.513	-4.514	6.686
	Equal variances are not assumed.			0.481	9.278	0.641	1.086	2.256	-3.994	6.165

To answer this third objective, the researchers conducted an Independent T-test analysis to see the mean value between men and women and obtain a significant value on the mean difference. The significant value obtained was 0.516, greater than 0.05, so the result is insignificant. There are no differences in student interests between males and females.

7.0 Conclusion

In conclusion, the designed and developed applications are successfully produced. Through this application, students who study the Database Design course can learn, understand, and test their level of understanding through the quiz provided in the m-learning LDD application. According to Don Tapscott, through a book he produced titled Grown Up Digital (Tapscott, 2009), the present generation, or Gene Z, grew up with technology and used the internet as one of the tools of communication and learning with friends. In addition, the conclusions obtained through distributing questionnaires to students in the Database Design course show that the students have an excellent perception of the readiness to use the application. The findings are based on the average mean value for the high distribution of questionnaires of 4.66. It is concluded that these students feel this application is very effective in the teaching and learning database design courses. Lastly, there is no difference in student interest between males and females using LDD applications in learning database design courses.

Through observations and interviews with several users of the m-learning LDD application, in the future, the system developers plan to improve the application by making it more interesting, convenient, and efficient, as well as increasing the quiz questions in the form of games to make the application more geared towards teaching and learning easy and enjoyable. In addition, the researchers also considered other proposals, such as developing applications for courses compatible with the Diploma in Information Technology (Digital Technology) Program and proposals to spread this application to other polytechnics.

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Author Contributions

Nurul Asmahani O.: Conceptualization, Methodology, Software, Writing-Original Draft Preparation;
Ahmad Shahril M. S.: Software, Validation, Supervision, Writing-Reviewing and Editing;
Muhammad Iffat Farhan R.: Data Curation, Validation.

Conflicts Of Interest

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its Submission and declare no conflict of interest in the manuscript.

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