J -Wmyh Mobile Game-Based Learning Application

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Abstract
Nowadays, game-based education has been developed to attract students' interest. Modern Jawi script's spelling, based on the "Daftar Kata Bahasa Melayu (DKBM): Rumi-Sebutan-Jawi" dictionary, uses the same approach. The current platform for Jawi education lacks sufficient gamification elements to attract the younger generation. Therefore, this research aims to apply gamification elements to develop a mobile-based game-based learning application of Jawi: Warisan Melayu Yang Hilang (J-WMYH) through a digital platform. This mobile game-based learning would target the younger generation to pique their interest in learning modern Jawi. This application will help the youth to practice reading and recognizing Modern Jawi script. The methodology adopted is Rapid Application Development (RAD) which consists of four processes: i) Analysis and Quick Design, ii) prototype cycle, iii) Testing and iv) Deployment. A few gamification elements were embedded, and mobile game-based learning was developed using ShoeBox and Flutter. Based on the functionality test, we found that J-WMYH can function as targeted and suitable for enhancing knowledge.
Keywords: Mobile Game-Based Learning, Gamification, Modern JAWI

Introduction
Malaysia, once were called as Malay Archipelago, is a country located at Southeast Asia. It is a country that is well-known for its own heritage such as clothes, foods, and writing (Lockard et.al, 2021). The Malay society uses Jawi as writing to communicate with each other in addition to using Malay as a language. Jawi's writing is adjusted from Arabic letters to write and understand Malay language. The Jawi's writing is very significant because it represents Malaysian identity and almost equals Arabic, which helps people who learn Jawi's writing to read the Quran indirectly (Suhaimi et. al., 2020). The passage of time has faded the heritage of the nation and suppressed the existence of its importance this writing in the past (Shapii et. al., 2020).

The focus of the content of the mobile game-based learning application would be the Modern Jawi Script modernization spelling. The reason for focusing on Modern Jawi is that Jawi proficiency among students and college students is still at an alarming level (Ali & Abdullah, 2015). Shapii et. al (2020) further concluded from their research that Jawi mastery, be it in

writing or spelling, among students is weak (2020). This problem needs to be addressed immediately so that Jawi writing will not fade with time. The motivation to build this application is because the improper usage of Jawi spelling in modern words can create confusion and misuse of the Jawi writings. Therefore, using mobile game-based applications is an innovative way to introduce modern and trendy words that the younger generation frequently uses in their daily conversation. They might not know that they can write those trendy words using Modern Jawi, like Starbucks Coffee. Therefore, there is a need for more mobile application that can promote Modern Jawi to the youngster, and thus preserving the Malaysia national heritage form of communication. This small contribution hopefully can create awareness of Modern Jawi for Malaysian youth.

Nowadays, game-based learning is used as a technique and resource to increase learner interest, because most educationally designed games generate player enjoyment, which benefits educational objectives. Game-based learning will create a symbiotic relationship between gaming and learning elements, laying the groundwork for two critical foundations: a fun component and an educational component (Isa et. al., 2022).

Methods

In this project methodology, the method adopted is Rapid Application Development (RAD) which consists of four processes which are (I) Analysis and Quick Design, (ii)Prototype cycle, (iii) Testing and Deployment as shown in Figure 1.
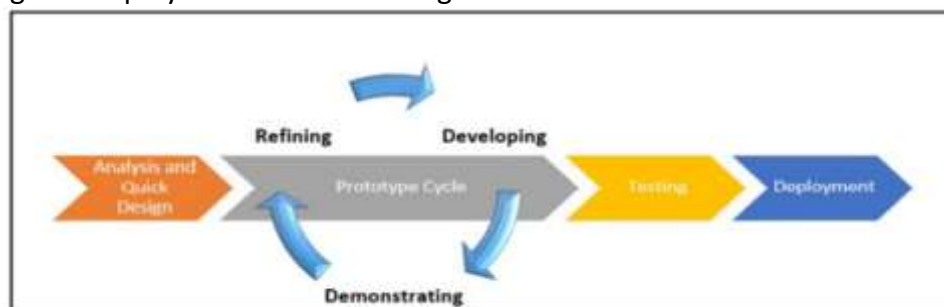

Figure 1 The Rapid Application Development (RAD) Model
(*Source:* Suhaimi et. al., 2020).

Results and Discussions

a) Analysis and Quick Design

A storyboard is an essential tool to plan any multimedia project as it can provide a better visual overview. The main objective of the application is to familiarize the user with the modern Jawi scripts during gameplay. All the Jawi scripts have been taken from an authorized institution called Perpustakaan Negara Malaysia (PNM). The figure 2 and figure 3 showed some of the scripts that has been taken from Perpustakaan Negara Malaysia (PNM).

Perpustakaan Negara Malaysia (PNM) in collaboration with Dewan Bahasa dan Pustaka (DBP) and Institut Kefahaman Islam Malaysia (IKIM) has published the Jawi Clinic program on Radio IKIM since 2 June 2012 (Perpustakaan Negara Malaysia, 2012). This publication aims to promote Jawi writing and reading among Malaysians through Jawi learning slots on the radio. As an institution that offers information services to Malaysians, Perpustakaan Negara Malaysia (PNM) always ensures that the information provided to consumers is always up to date and authentic. In regard, this website was developed to enable the users to obtain information of modern Jawi words. Figure 4 and Figure 5 show an example of modern Jawi words.

سيڠکتن/سيمبول (برسام اڠک)	نام ڤنوه	ايجاءن جاوي (براسيڠن دڠن اڠک)
MYR1,000/RM10.00	Malaysian Ringgit/Ringgit Malaysia	ريڠڬيت مليسيا
SGD1,000/$10.00	Singapore Dollar	دولر سيڠاڤورا
BND1,000/B$10.00	Brunei Dollar	دولر بروني
IDR1,000/Rp10.00	Indonesian Rupiah/Rupiah	روڤياه
THB1,000/฿10.00	Thai Baht	بهت تهاي
SAR1,000/SR10.00	Saudi Arabian Riyal/Saudi Riyal	ريال سعودي
JPY1,000.00/¥10	Japanese Yen	يين جڤون
KRW1,000.00/₩10	Korean Won	وون کوريا
GBP1,000.00/£10	Great Britain Pound	ڤاءوند ڬريت بريتن
AUD1,000.00/$10	Australian Dollar	دولر اءوسترااليا
USD1,000.00/$10	US Dollar	دولر امريكا
EUR1,000.00/€10	EURO	يورو

Figure 4 World Currency

رومي	جاوي	رومي	جاوي
Starbucks Coffee	ستاربكس كوڤي	Burger King	بورڬر کيڠ
Kenny Rogers Roasters	کيني روجرز روسترز	A&W Restaurants	روستورن أي&دبليو
Domino's Pizza	دومينوس ڤيزا	Rotiboy	روتيبوي
KFC	كي.ايف.سي.	SCR (Singapore Chicken Rice)	ايس.سي.ار.
Mcdonald's	مكدونلدز	Gloria Jean's Coffees	ڬلوريا جينز کوڤي
Pizza Hut	ڤيزا هت	Chatime	چاتاءيم
Chicken Rice Shop	چيکين راءيس شوڤ	Auntie Anne's	انتي انز
Secret Recipe	سيکرت ريسڤي	Kyros Kebab	کايروس کيب
Sushi King	سوشي کيڠ	La Boheme	لا بوهيم
Texas Chicken	تيکسس چيکين	Hot & Roll	هوت & رول
Coolblog	کولبلوڬ	Seoul Garden	سول ڬردن
Marrybrown	ماريبراءون	Hailam Kopitiam	هايلم کوڤيتيام
Tealive	تيلاءيڤ	The Baker's Cottage	ذي بيکرز کوتيج
Subway	سبوي	Boat Noodle	بوت نودل
Papparich	ڤاڤاريچ	4fingers Crispy Chicken	4فيڠڬرز کريسڤي چيکين
Nando's	نندوس	Dunkin Donuts	دنکين دونتس

Figure 5 Fast Food Premise

Figure 6 shows the overall flow chart of overall mobile application flowchart of Jawi: *Warisan Melayu Yang Hilang* Mobile Application for Modern Jawi Words. The flowchart also tells how the gameplay starts from the beginning until the application is ended.
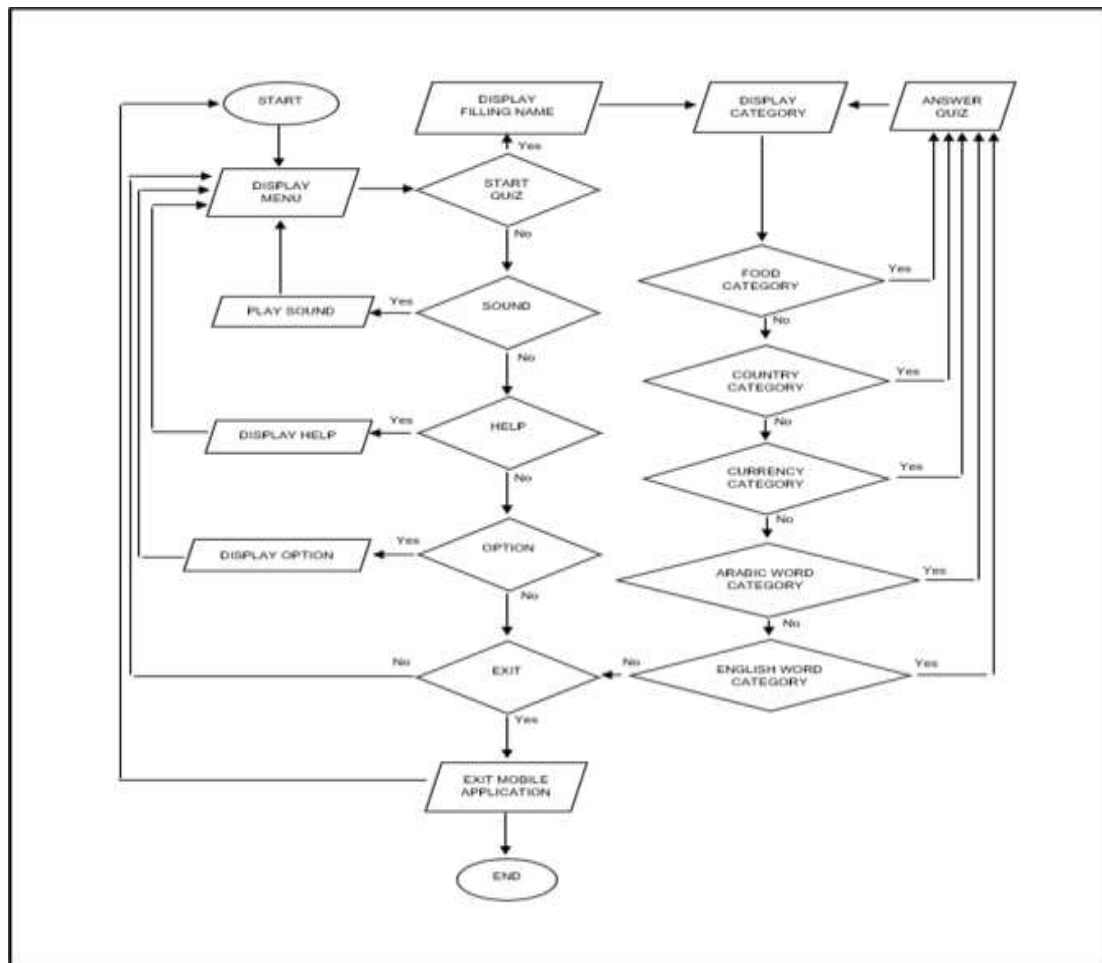
Figure 6 Overall mobile application flowchart of Jawi: *Warisan Melayu Yang Hilang*, Mobile Application for Modern Jawi Words

b) Prototype Cycle

This process requires the installation of ShoeBox and Flutter software to develop the application. ShoeBox is a software application to extract sprites. It detects sprites in a transparent image and cuts them out. This technique is essential if a sprite sheet already contains several sprites, but we only want to separate them into single image files. Meanwhile, Flutter is a cross-platform User Interface toolkit that is designed to allow code reuse across operating systems such as iOS and Android. The goal is to enable developers to deliver high-performance apps that feel natural on different platforms while sharing as much code as possible. Flutter's engine, written primarily in C++, provides low-level rendering support using Google's Skia graphics library. Additionally, it interfaces with platform-specific SDKs such as those provided by Android and iOS. The Flutter engine is a portable runtime for hosting Flutter applications. It implements Flutter's core libraries, including animation and graphics, file and network I/O, plugin architecture, and a Dart runtime and compile toolchain. Most developers interact with Flutter via the Flutter Framework, which provides a reactive framework and a set of platform, layout and foundation widgets.

On the Home page (Figure 7), users will have five options to choose from, the first of which is to start the app, second is the Song option which plays the background sound. The 'Bantuan' button is for the Help / Tutorial function, Pilihan is the setting option and last button is the exit button.

Figure 7 Home Page

Figure 8 show the 'Kategory' category which consists of five different types of modern Jawi words. The categories are food, country, currency, Arab language and English language. All these Jawi words are based on the modern Jawi words from the PNM website. There is also a Back button on the bottom of the page.

Figure 8 Category Page

Figure 9 shows an example of one of the modern Jawi words in the Food category display in English. There are four possible answers. Only one answer is accurate, and if the user answers correctly, the user can proceed to the next page. The application also has gamification elements on this page, which is the time limit per question. It is to make the mobile application have game-based elements to entice younger generations to learn and practice the usage of Modern Jawi words in their daily life.

Figure 9 Food Premise Page

On the bottom of the page is the List option (Figure 10). When the user clicks this button, two options will pop out which are the home button and the back button. Clicking on one button will redirect the users accordingly. And the background will be opaque. Figure 11 shows the help page that consists of Jawi alphabets and the pronunciation of the Jawi scripts. It is used as the guide for the user to learn or revise the Jawi alphabet.

Figure 10 Option button

Figure 11 Help Page

c) Testing

Functionality testing was carried out to identify the errors encountered while using the J-WMYH. The functionality of the application has achieved Success result after going through rigorous debugging and testing as shown in Table 1. There are 9 test objectives that have been set to ensure that the J-WYMH runs as expected results.

Table 1
Test Case for functionality testing

	Test Objective	Potential Test Input	Expected Test Output	Test Procedure	Actual Test Result
1	To test whether user can go to the homepage by clicking on homepage button	Click homepage button	Direct to homepage	Click homepage button	Success
2	To test whether user can fill name by clicking on name button	Fill the name in the blank	Name shown	Fill the name in the blank	Success
3	To test whether user can start by clicking on start button	Click start button	Direct to welcome page	Click start button	Success
4	To test whether user can play song by clicking on song button	Click song button	Play the song	Click song button	Success
5	To test whether user can check option by clicking on option button	Click option button	Direct to option page	Click option button	Success
6	To test whether user can click category by clicking on category button	Click category button	Direct to category page	Click category button	Success
7	To test whether user can click answer by clicking on answer button	Click answer button	Popup message, true or false	Click answer button	Success
8	To test whether user can go back to previous page by clicking on back button	Click back button	Direct to previous page	Click back button	Success
9	To test whether user can end the application by clicking on exist button	Click exit button	Exit the application	Click exit button	Success

d) Deployment

The deployment phase is the phase where the system has been fully tested all the functionality and ready to release to the public. This means that there is supposedly no mistake either minor or major in the system since it has been tested during the testing phase.

Conclusion

In conclusion, we manage to achieve the aims of this study. Rapid Application Development (RAD) has been selected and used to develop the Jawi: Warisan Melayu Yang Hilang Mobile Appplication (J-WMYH) for Modern Jawi Words. The creation and execution of this mobile game-based learning application has had a significant impact for the young generations of Malays. This application has potentially ignited the passion for learning and practicing writing in modern Jawi, which was once the lingua franca used in Southeast Asia. Introducing modern Jawi words that are currently popular among them in the application can been seen as one of the proactive methods to popularize a dying writing technique. With the result obtained, we found that for future works, it is suggested to be enhanced into the iOS platform to increase the number of users and improve the feature and content of the J-WMYH.

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