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Elements of Multimedia Used in the Jawi Mobile Application

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ABSTRACT
Jawi script is derived from the Arabic script and contains six additional characters to represent Malay vowel sounds. Mobile applications incorporate multimedia elements such as text, images, sound, video and animation to enhance learning. This research aims to study and evaluate multimedia components found in Jawi mobile applications. This research focuses on how multimedia elements are used and how important they are to increasing user engagement and learning outcomes. This study uses content analysis to evaluate multimedia elements in a selected sample of Jawi mobile applications. The main finding shows no video content, although other multimedia elements are widely used. This indicates that there is room for improvement in the design of these mobile applications, as video could increase user engagement and Jawi mobile application developers should consider diversifying multimedia components to be more interactive and dynamic.

Keywords: *Jawi script, Elements of Multimedia, Mobile Application, Arabic Script*

1 INTRODUCTION

Jawi script has an extended history has been crucial to developing Malay-Muslim thought for centuries. In ancient times, Jawi script played an important role in society as an intermediary in all matters, including government administration, diplomatic relations between affairs, Malay customs, trade, and the education system (Abdul Latif, 2014). However, since the Roman script arrived in Malaya, most businesses have used the Roman script for official purposes, while the Jawi script only focuses on matters related to Islam.

In the contemporary digital era, mobile applications have emerged as essential tools for learning and participation across every field, including education. Modern preschoolers, for instance, learn to work with mobile phones, tablets and computers efficiently, according to their needs, because in today's era, mobile technology has become a part of everyone's life (Kostiantyn et al., 2024). In these educational, multimedia elements include text, images, sound, videos, and animations, using technology to improve comprehension and memory (Banerjee, 2019).

Using various media elements that facilitate information processing, multimedia, or digital learning materials helps students develop strong mental representations (Abdulrahman et al., 2020). Research on the use of multimedia for learning has shown that students who use both words and pictures have better results than those who use words (Chen, 2012). This study explores how multimedia elements are incorporated into Jawi mobile applications, focusing on using text, image, sound, video and animation to enhance the learning and appreciation of Jawi writing.

1.1 Research Objectives

This objective of this study was to examine the use of multimedia elements in the Jawi mobile applications.

1.2 Problem Statement

Multimedia combines many media types, including text (alphabetic or numeric), symbols, graphics, audio, video, and animations, often facilitated by technology to enhance understanding or retention (Abdulrahaman, 2020). There is a lack of research on how multimedia components such as graphics, sounds, and animations impact Jawi, while multimedia applications have been shown to enhance students' concentration, understanding, and creativity (Shapii et al., 2020).

Multimedia learning in the classroom poses several obstacles besides its potential (Huda, 2024). Meanwhile, in Malaysia, there is still a lack of interesting multimedia tools for Jawi literacy in Malaysian schools. Limited teaching resources, lack of classroom practice, and student's perceptions of Jawi as irrelevant all contribute to a lack of interest (Noraishah & Sakinah, 2023).

2 LITERATURE REVIEW

The literature review provides an understanding of this topic. It analyses multimedia elements in Jawi mobile applications, such as text, images, sound, video, and animation. Finally, it examines mobile applications as learning aids and their advantages in the education sector.

2.1 Overview of Jawi

The Arabic abjad adapted for Malay became known as Jawi in the Malay world. After centuries of use, it was gradually replaced by Rumi, or the Latin script, at the dawn of the colonial period (Coluzzi, 2020). Indeed, the history of using Jawi script is very close to the introduction and appreciation of Islam throughout the Malay Archipelago in general and in Malaysia in particular. The Malays created Jawi script based on Arabic letters to spell the Malay language, which was used as the language of Islam (Musa, 2005). Jawi consists of 31 Arabic characters, including six non-Arabic letters, which are ڠ, چ, ڤ, ث, ڽ from left to right (Nga, Cha, Ga, Pa, Nya and Va), which are not derived from Arabic language.

However, in 1965, the government accepted the Rumi script as the Malay language's writing system to replace the Jawi script. After this date, the use of Jawi in Malay decreased as a form of writing and printing media. As evidenced by the Jawi newspaper Utusan Melayu, which was the only newspaper that used the Jawi script to deliver news, it had to stop publishing due to a lack of response, especially from the Malay community itself (MUIP, 2021).

2.2 What is Multimedia?

Mayer (2001) defines multimedia as presenting material using words and pictures. The material is verbally presented by words, such as using printed or spoken text. Pictures show the material in pictorial form, such as static graphics, including illustrations, graphs, photos, or maps, or dynamic graphics, including animation or video.

Multimedia can be categorised into two main types: linear and non-linear. Linear media runs sequentially and does not have navigational controls like mass media. Non-linear media allows users to interact and control navigation. Hypermedia content is another term for non-linear media (Banerjee, 2019). Due to its interactivity, non-linear multimedia has gained popularity on digital platforms by providing dynamic and user-centred experiences.

2.3 Elements of Multimedia

2.3.1 Text

Text is one of the five basic elements of multimedia, along with images, audio, video, and animation. Text comprises character strings typed onto a keyboard to create words, phrases, paragraphs, and even whole articles (Banerjee, 2019). According to Richard Mayer (2001), text in multimedia elements refers to presenting information in the form of printed text, such as words written or displayed on a screen.

Besides, text can be used for titles and headlines to provide a clear indication of the subject matter. Next, menus serve as direction tools to guide users. Navigation provides a clear framework for how to get there, and content represents what the user sees or interacts with upon reaching their destination (Vaughan, 2014). All these elements work together to provide a consistent, intuitive, and compelling user experience.

2.3.2 Image

In multimedia software, images are one of the most important types of information representation. They are important in determining the visual impact of multimedia software. Richard Mayer (2001) states that images in multimedia elements refer to pictorial forms used to convey information. This can include static graphics and dynamic graphics. Static graphics are non-moving visuals such as illustrations, photos, diagrams, graphs, or maps. Besides, dynamic graphics are moving visuals such as animation and videos.

2.3.3 Sound

Sound, which touches the senses and evokes deep feelings, is the most sensual part of multimedia. It can be any "speech," from a whisper to a scream. How sound is used determines the success of a multimedia presentation. Richard Mayer's Cognitive Multimedia Learning Theory (2001) states that when sound, such as oral storytelling, is used correctly, it can help improve comprehension because it supports visual information and reduces cognitive load. However, Mayer (2001) also warns against unnecessary or distracting sound, such as irrelevant background music, as it can negatively affect the learning experience. Besides, sound can also have an impact and transform a project from ordinary to professional when used correctly, according to Vaughan (2014).

2.3.4 Video

According to Liu (2021), video images are very similar to the movies and television we are familiar with. They are essential in multimedia because they have a time series and rich information connotations. Besides, video is an electronic technology that captures, records, stores, processes, transmits, and reconstructs still images that capture scenes in motion (Banerjee, 2019). For a multimedia experience, video provides moving pictures and usually combines sound and images.

2.3.5 Animation

Animation makes static presentations come alive. It is vital to change over time and can add significant power to multimedia projects (Vaughan, 2014). Animation is handy for increasing understanding of the ideas that influence movement (Pavithra et al., 2018). For example, Thoughts like playing the guitar or hitting a golf ball are difficult to model using a single image, or even a consecration of an image, and equally difficult to explain using text. The animation uses human visual persistence to produce graphic images of continuous rapid motion changes. Unique effects include zooming, rotating, changing, fading in, and fading out (Liu, 2021).

2.4 Mobile Applications

Software applications, referred to as mobile applications, are designed to be used on mobile devices like smartphones and tablets. They are the result of recent advances in technology. Media, information technology, the internet and advanced technology have contributed to the development of mobile applications (Phongtraychack et al., 2018).

Nowadays, there are various types of smartphone applications, including applications related to finance, education, advertising and marketing. Mobile applications are widely used in education, which has resulted in the emergence of mobile learning. According to Evans (2008), mobile learning is more effective and instructive than books and more supportive. Mobile learning offers benefits such as immediate access to student information, diverse learning modalities, contextualised education, autonomy in the learning process, and the promotion of supportive and motivated learning settings (Bağcı & Pekşen, 2018).

3 RESEARCH DESIGN

This research employed a qualitative method. The research design for this study employed content analysis to analyse the importance of multimedia elements in selected Jawi Mobile Applications. According to Krippendorff (2013), content analysis is a research method used to derive reliable conclusions about texts or other meaningful content and the contexts in which they appear. A sample of eight Jawi Mobile Applications was selected for data analysis. The selection of Jawi Mobile Applications was based on their ratings, arranged in descending order from highest to lowest, as illustrated in Figure 1.

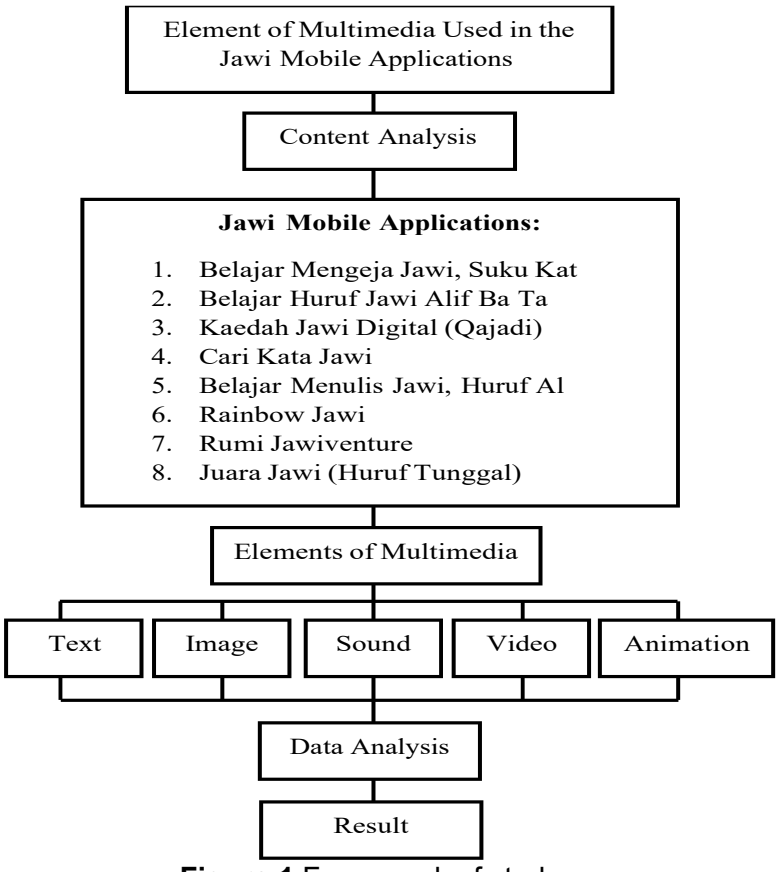

Figure 1 Framework of study

4 SELECTION SAMPLE OF JAWI MOBILE APPLICATIONS

Table 1 Selection Sample of Jawi Mobile Application Based on Rating on Android and iOS mobile platform.

	Jawi Mobile Applications	Developer	Released Date	Platform	Rating
1.	Belajar Mengeja Jawi, Suku Kat 	Syumul Studio	29th July 2019	Android & iOS	4.6 ★
2.	Belajar Huruf Jawi Alif Ba Ta 	Syumul Studio	14th May 2018	Android & iOS	4.6 ★
3.	Kaedah Jawi Digital (Qajadi) 	Qajadi2Easy	30th January 2023	Android	4.5 ★
4.	Cari Kata Jawi 	Murasu Systems	10th November 2020	Android	4.4 ★
5.	Belajar Menulis Jawi, Huruf Al 	Syumul Studio	8th April 2020	Android & iOS	4.3 ★
6.	Rainbow Jawi 	Cool Code Sdn Bhd	1st August 2023	iOS	4.2 ★
7.	Rumi Jawiventure 	Abdullah Hafiy Mohd Radzi	5th August 2023	iOS	4.0 ★
8.	Juara Jawi (Huruf Tunggal) 	Ilham Imani	23rd June 2023	Android	No Rating

All app names, logos, and trademarks referenced in this table, including © Belajar Mengeja Jawi Suku Kata by Syumul Studio, © Belajar Huruf Jawi Alif Ba Ta by Syumul Studio, © Kaedah Jawi Digital (Qajadi) by Qasid2Easy, © Cari Kata Jawi by Murasu Systems Sdn. Bhd, © Belajar Menulis Jawi Huruf Al by Syumul Studio, © Rainbow Jawi by Cool Code Snd. Bhd, © Rumi Jawiventure by Abdullah Hafiy Mohd Radzi, and © Juara Jawi (Huruf Tunggal) by Ilham Imani, are the property of their respective owners and are used here for academic purposes only.

5 DATA ANALYSIS

Table 2 Analysis of Text Elements in Jawi Mobile Application

	Jawi Mobile Applications	Text			
		Typography	Bold	Rumi	Jawi
1	Belajar Mengeja Jawi, Suku Kat	✓	-	✓	✓
2	Belajar Huruf Jawi Alif Ba Ta				
3	Kaedah Jawi Digital (Qajadi)	✓	-	✓	✓
4	Cari Kata Jawi	✓	✓	✓	✓
5	Belajar Menulis Jawi, Huruf Al	✓	✓	✓	✓
6	Rainbow Jawi	✓	✓	✓	✓
7	Rumi Jawiventure	✓	✓	✓	✓
8	Juara Jawi (Huruf Tunggal)	✓	✓	✓	✓

Table 3 Analysis of Image Elements in Jawi Mobile Application

	Jawi Mobile Applications	Image			
		Graphis	Illustrations	Diagram	Maps
1	Belajar Mengeja Jawi, Suku Kat	✓	✓	✓	✓
2	Belajar Huruf Jawi Alif Ba Ta	✓	✓	✓	-
3	Kaedah Jawi Digital (Qajadi)	✓	✓	✓	-
4	Cari Kata Jawi	✓	✓	-	-
5	Belajar Menulis Jawi, Huruf Al	✓	✓	✓	-
6	Rainbow Jawi	✓	✓	✓	
7	Rumi Jawiventure	✓	✓	-	✓
8	Juara Jawi (Huruf Tunggal)	✓	✓	-	✓

Table 4 Analysis of Sound Elements in Jawi Mobile Application

	Jawi Mobile Applications	Sound Effects	Sound Background Music	Voice Over	Tap Sound
1	Belajar Mengeja Jawi, Suku Kat	✓	✓	✓	✓
2	Belajar Huruf Jawi Alif Ba Ta	✓	✓	✓	✓
3	Kaedah Jawi Digital (Qajadi)	✓	-	-	-
4	Cari Kata Jawi	✓	✓		✓
5	Belajar Menulis Jawi, Huruf Al	✓	✓	✓	✓
6	Rainbow Jawi	✓	✓	✓	✓
7	Rumi Jawiventure	✓	✓	-	-
8	Juara Jawi (Huruf Tunggal)	✓	-	-	-

Table 5 Analysis of Video Elements in Jawi Mobile Application

Jawi Mobile Applications		Video			
1	Belajar Mengeja Jawi, Suku Kat	-	-	-	-
2	Belajar Huruf Jawi Alif Ba Ta	-	-	-	-
3	Kaedah Jawi Digital (Qajadi)	-	-	-	-
4	Cari Kata Jawi	-	-	-	-
5	Belajar Menulis Jawi, Huruf Al	-	-	-	-
6	Rainbow Jawi	-	-	-	-
7	Rumi Jawiventure	-	-	-	-
8	Juara Jawi (Huruf Tunggal)	-	-	-	-

Table 6 Analysis of Animation Elements in Jawi Mobile Application

Jawi Mobile Applications		Animation			
		2D	3D	Interactive Animation	Educational Animation
1	Belajar Mengeja Jawi, Suku Kat	✓	-	✓	-
2	Belajar Huruf Jawi Alif Ba Ta	✓	-	✓	-
3	Kaedah Jawi Digital (Qajadi)	-	-	-	-
4	Cari Kata Jawi	✓	-	-	-
5	Belajar Menulis Jawi, Huruf Al	✓	-	✓	✓
6	Rainbow Jawi	✓	-	✓	✓
7	Rumi Jawiventure	-	✓	-	-
8	Juara Jawi (Huruf Tunggal)	-	-	-	-

6 RESULTS

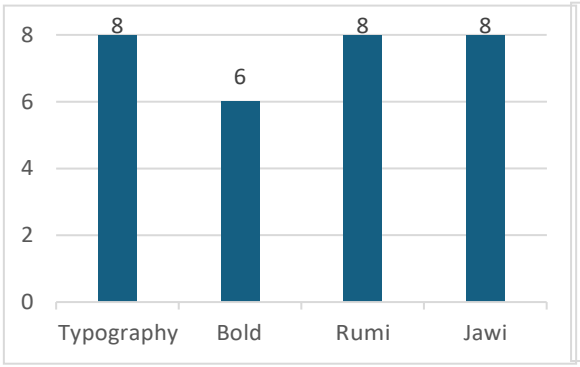

Figure 2 Results of Text Analysis in Jawi Mobile Applications

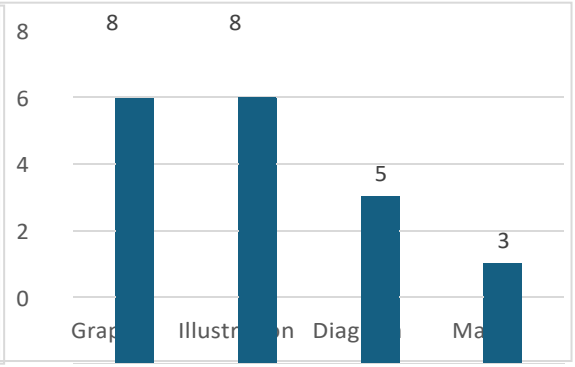

Figure 3 Results of Image Analysis in Jawi Mobile Applications

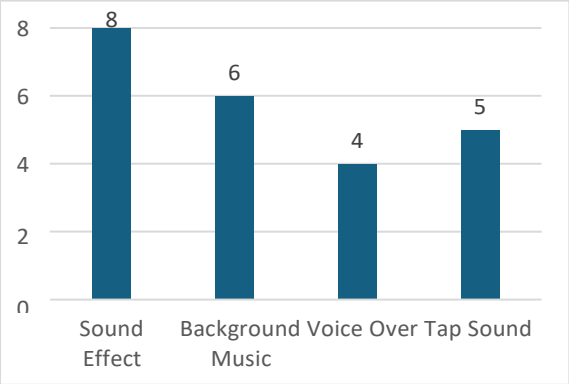

Figure 4 Results of Sound Analysis in Jawi Mobile Applications

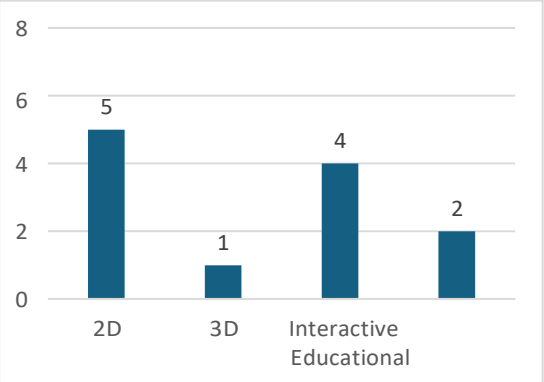

Figure 5 Results of Animation Analysis in Jawi Mobile Applications

7 FINDINGS

The results show no video elements are used because the selected Jawi mobile application mainly focuses on text-based and audio-based learning methods to teach Jawi writing. Although the video elements are entertaining, they may not be good for writing practice, script recognition, or reading practice since text, image, sound, and animation are more effective tools. Furthermore, integrating and producing videos requires extra resources, such as technical expertise which may not align with the application developer's objectives or limits.

The results show that typography, Rumi and Jawi text are the most critical elements in all eight mobile applications. The use of image elements in eight Jawi mobile applications was studied based on bar charts across four categories: graphics, illustrations, diagrams, and maps. The results show that graphics and illustrations are the most frequently used image elements. Diagrams and maps are used sparingly, indicating that they are rarely used in Jawi mobile applications. The chart shows that sound effects were the most widely used element in all eight Jawi mobile applications, according to the sound element analysis conducted. Six mobile applications used background music to add to the engaging listening experience. Four mobile applications used voice-over to teach users how to pronounce Jawi letters and provide in-app information demonstrating simple usage. Five mobile applications offered tap sounds that enhanced interaction, such as sounds produced by user actions like clicking buttons.

Animation elements can also affect the efficiency of mobile applications. Of the eight Jawi mobile applications, two-dimensional animation was the most frequently used in the five mobile applications, making it the most popular animation style to attract users. 3D animation was the least used as it was only present in one application. Four applications used interactive animation, increasing user engagement through responsive visuals—two for educational animation-aided learning. For example, the user could trace each letter of Jawi stroke-by-stroke.

8 CONCLUSIONS

In conclusion, the findings highlight the multimedia elements used in the Jawi mobile applications and strongly emphasise enhancing user engagement and learning through various multimedia components. Across the mobile applications, text, especially typography, Jawi and Rumi scripts, is prioritised. Diagrams and maps are used less frequently, but image elements such as graphics and illustration style are widely used. The most common auditory feature is sound effects, which use a variety of background music, voice-overs and tap sound to support user interaction. Animation is dominated by a 2D style, with simple interactive animation and minimal 3D and educational-specific animation incorporation. Overall, the applications of elements of multimedia effectively to improve user engagement.

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AUTHOR CONTRIBUTIONS

All authors played equal contributions towards the production of this paper.

CONFLICT OF INTEREST

There is no conflict of interest.

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