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Mat Kilau Side Scroller RPG Game: Innovating History Education with Game-Based Engagement

Juliana Mohamed^{1,*}, Mohamad Fazirul Rafiq Afandi¹, Ku Ameer Hafiz Ku Asmawi¹
Muhammad Izham Maziz Mohd Rasul¹, Harith Iqbal², Nur Ellyana Mohd Ariff³

¹ Department of Information Technology, Center for Diploma Studies, Universiti Tun Hussein Onn Malaysia, 84600 Panchor, Johor, Malaysia

² Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, Malaysia

³ College of Engineering, Design and Physical Sciences, Brunel University London, United Kingdom

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ABSTRACT

Digital platforms that integrate cultural heritage provide innovative opportunities for education, entertainment, and national identity preservation. This study presents the educational role-playing game (RPG) *Mat Kilau Side-Scroller*, developed to teach Malaysian history through an interactive 2D side-scrolling experience. The game combines historically accurate storytelling, action-adventure gameplay, and principles of User Experience (UX) and Human-Computer Interaction (HCI) to engage primary school students aged 8–9 years. Pilot testing with 30 participants indicated strong engagement, with 73.4% reporting improved understanding of Mat Kilau's life and historical events, and 80% rating the game as easy to use and visually appealing. These results demonstrate that the game effectively supports historical literacy, digital literacy, and cultural appreciation. The study highlights the potential of edutainment games to enhance classroom learning, promote informal education, and contribute to local creative industries by fusing interactive design with cultural storytelling.

1. Introduction

History education often struggles to engage younger audiences due to traditional teaching methods that rely heavily on rote learning [1]. Digital platforms that incorporate cultural heritage offer an innovative solution by combining education with interactive experiences. The *Mat Kilau Side-Scroller RPG* was developed to immerse players in the life of Mat Kilau, a 19th-century Malaysian national hero who resisted British colonial forces [2].

By integrating a 2D side-scrolling RPG structure with interactive storytelling [3], the game enables players to explore historical events, understand cultural values, and develop critical thinking skills. This project specifically addresses gaps in digital heritage education, where existing tools often lack interactive, culturally authentic gameplay that simultaneously promotes historical literacy and digital skills. The study emphasizes the integration of historical accuracy, UX/HCI principles, and engaging

* Corresponding author.

E-mail address: julianaju@uthm.edu.my

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game mechanics to create an effective learning experience. The paper details the development process, design principles, and pilot evaluation, demonstrating how game-based learning can enhance comprehension, engagement, and cultural appreciation in history education.

1.1 History of Mat Kilau

Malaysian history education has undergone significant changes over time, with a focus on developing pupils' sense of national identity and allegiance. To improve student cohesion and solidarity, the Malaysian education system makes history a compulsory subject [4]. Innovative methods have been employed to enhance the teaching and learning of history, including the use of information and communication technology (ICT) to make the subject more engaging and effective [5].

In the late 19th century, a notable uprising against British colonial power in Pahang was spearheaded by the fabled Malay warrior Mat Kilau. Mat Kilau, born in Pulau Tawar, Jerantut District, Pahang, in 1866, was renowned for his valor and proficiency in martial arts, particularly Silat [6]. He battled against British meddling in Pahang's administration alongside his father, Tok Gajah, and other local fighters, including Dato' Bahaman and Mat Kelubi [6]. Local academics and religious authorities strongly supported Mat Kilau's fight, and in Malay culture, he is regarded as a national folk hero and patriot[6].

1.2 Existing Digital Heritage Education of Mat Kilau

The existing application, called "The Adventure of Mat Kilau," [7] shares a quite similar theme compared to "He-Story Jump! Mat Kilau Side-Scroller RPG." However, the existing application focused on enhancing listening skills, specifically listening comprehension, in the form of an interactive computer game. The gameplay of the application involves the player listening to the provided instructions. After each instruction is given, players would move the characters using the keyboard or cursor to complete the missions, with each stage highlighting different vocabulary, actions, and difficulties. Additionally, the game also provided some history related to Mat Kilau, although it lacked a proper storyboard and a clear flow of the story plot.

In contrast, the "He-Story Jump! Mat Kilau Side-Scroller RPG" project aims to provide students with educational role-playing games that allow them to learn about Mat Kilau's history in a more exhilarating and engaging way. This game will offer a more captivating visual experience while incorporating simple yet engaging gameplay. This game should provide even more immersive experiences with various items and dialogue interactions, proper storyboarding of Mat Kilau's history, beautiful music, and include turn-based battle scenes against enemies.

1.3 Role-play game (RPG)

Games are interactive activities in which players follow rules to achieve goals. Role-playing games (RPGs) enable players to assume the roles of characters in a narrative world, engaging in decision-making and problem-solving [8]. Side-scrolling games are a classic genre in which the screen moves horizontally, providing a dynamic view of the game world [9].

This study develops an educational side-scroller RPG designed to teach primary school students about Mat Kilau, a legendary Malay warrior who led resistance against British colonial forces in Pahang during the 19th century. The game, Mat Kilau Side Scroller RPG Game, allows players to

explore Mat Kilau's life, interact with historical figures, and engage in battles that represent historical conflicts [2].

The motivation behind this project is to address the lack of interest among students in history, often due to traditional teaching methods that fail to engage learners [10]. By leveraging interactive gaming, this project aims to make learning about Malaysia's history more accessible and engaging, particularly for younger generations accustomed to digital entertainment [11].

2. Methodology

The game development followed the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation [12]. This model ensures a structured approach to designing an effective educational tool. The ADDIE model is illustrated in Fig. 1.

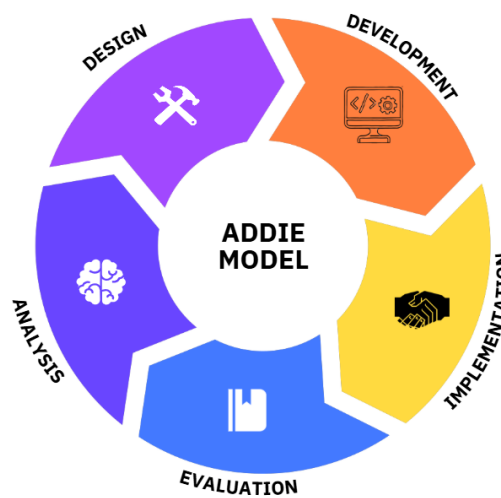


Fig. 1. ADDIE Model

2.1 Analysis

The target audience consisted of primary school students aged 8 to 9 years old. A needs assessment identified gaps in knowledge about Mat Kilau and key historical events to be emphasized in the game. Learning objectives included understanding Mat Kilau's life and contributions, as well as developing critical thinking skills.

2.2 Design

Game mechanics were designed to engage students while teaching history. A side-scrolling platformer was chosen, integrating level progression, cutscenes, and dialogues to convey historical narratives. The interface was simplified to ensure intuitive navigation for young learners.

2.3 Development

The game was developed using the Unity engine, incorporating sprite-based animations, backgrounds, and audio to create a historically authentic environment. Mechanics such as movement, collision detection, combat, and level progression were implemented using C# [12]. Visuals and soundtracks were designed to enhance the immersive experience. Below in **Fig.2** is the illustration of the development process of the Mat Kilau Side-Scroller game using Unity [12], [14].

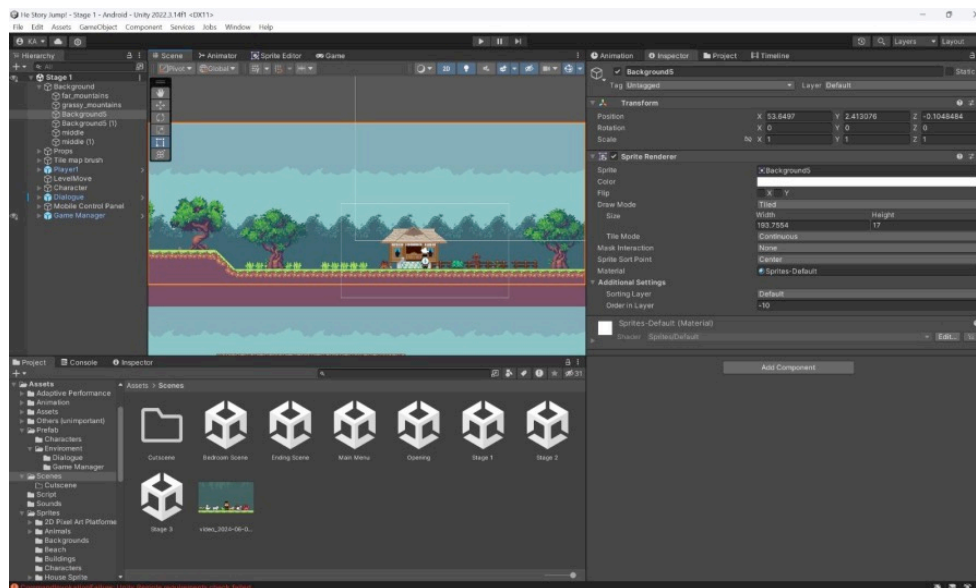


Fig. 2. Development process using Unity Game Engine

The storyline and user interface elements were integrated into the game, ensuring a seamless and engaging experience. The visual elements were designed to transport players to the world of Mat Kilau, with vibrant colors and intricate details that brought the historical setting to life. The implementation of an evocative soundtrack and realistic sound effects further enhanced the game's atmosphere. In addition to the visual and audio elements, the game mechanics were carefully implemented, ensuring smooth and responsive gameplay. This included the implementation of movement, collision detection, and level progression systems. The storyline and user interface elements were also integrated into the game, providing a seamless and engaging experience for players. Below is the process of making the side-scrolling game of Mat Kilau, the main page in Fig. 3, the main actor, Mat Kilau, in Fig. 4, and the main character with the enemy in Fig. 5.



Fig. 3. Main page of Mat Kilau Side-scrolling game

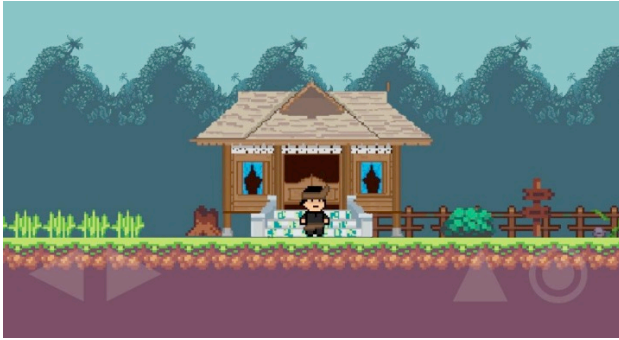


Fig. 4. Main actor, Mat Kilau



Fig. 5. The Main character with the enemy

2.4 Implementation

Testing was conducted using Unity Remote to simulate gameplay on Android devices [14]. Stability, performance, and learning effectiveness were evaluated before broader pilot testing.

2.5 Evaluation

Thirty students from SK Kota Raja, Panchor, tested the game. Observations and surveys (using Likert-scale questions) assessed engagement, learning outcomes, and user experience [13]. Feedback guided refinements in gameplay, interface, and content.

This design-based research approach was employed, comprising three phases:

a) Game Design and Development [11]:

- Storyline development based on historical research of Mat Kilau and key events in Malaysian history.
- Side-scroller RPG mechanics implemented to allow progressive exploration, combat, and quest completion.
- Visuals and sprite-based animations are designed to reflect historical context and cultural authenticity.
- Dynamic interaction technologies are integrated to balance learning objectives with game difficulty.

b) Usability and Engagement Testing [13]:

- Pilot study with 30 participants aged 8-9 years who played the Mat Kilau Side-Scroller RPG Game.
- Surveys and gameplay observation measured engagement, accessibility, learning outcomes, and user experience.

c) Data Analysis:

- Quantitative analysis of engagement and learning survey responses.
- Qualitative analysis of open-ended feedback for insights on gameplay, cultural impact, and instructional value.

3. Results and Discussions

A total of 30 students participated in the pilot testing of the Mat Kilau Side-Scroller RPG Game, consisting of 56.7% male and 43.3% female respondents, all aged 8 to 9 years old. The evaluation focused on measuring user engagement, usability, and perceived educational value. **Table 1** summarizes the survey findings across five key indicators.

Table 1
Survey Findings

Questions	Rating	1	2	3	4	5
The game is interesting		3.3%	10%	20%	46.7%	20%
Helps learning Mat Kilau history		0	6.7%	20%	56.7%	16.7%
Easy to understand		0	3.3%	16.7%	63.3%	16.7%
Characters and background are engaging		0	3.3%	16.7%	66.7%	13.3%
Satisfaction with game		0	3.3%	16.7%	66.7%	13.3%

Overall, the findings show that the Mat Kilau Side-Scroller RPG Game was well received as an entertaining and instructive resource. With 46.7% of respondents giving the game a rating of 4 and 20% giving it a rating of 5, the majority found it intriguing. This illustrates how the side-scroller structure effectively draws viewers in and encourages more play by a crucial component of game-based learning.

There are 73.4% of students gave the game ratings of 4 and 5 when asked if it helped them learn about the history of Mat Kilau. According to this research, incorporating Malaysian historical narratives into interactive games enhances young learners' historical literacy and cultural appreciation.

There were also high usability scores. With ratings of 4 and 5, 80% of participants reported that the game was easy to comprehend, suggesting that the controls, interface, and progression are suitable for children between the ages of 8 and 9. This illustrates how UX and HCI principles were successfully integrated throughout the development process.

Eighty percent of respondents gave the visual components—such as the environmental background and character design—positive grades of four or five. These components are essential for preserving immersion and bolstering the story of Mat Kilau's voyage. Eighty percent of students reported being highly satisfied with the game, a finding consistent with the other factors. This demonstrates how well the game's plot, gameplay, and instructional elements work together to create a seamless learning experience.

The Mat Kilau Side-Scroller RPG Game successfully strikes a balance between instructional delivery and captivating gameplay, as evidenced by consistently positive ratings across all indices [15]. The game appears to be a good fit for incorporation into classroom instruction or casual learning settings based on its strong usability and pleasure rankings [16].

Furthermore, the students' enthusiastic reaction to the historical components suggests that using an RPG format to communicate Malaysian cultural heritage might greatly enhance learning motivation and digital literacy. These results are consistent with earlier studies that demonstrate how game-based learning can enhance comprehension, retention, and engagement.

The findings show that the game successfully draws players in, is simple to comprehend, engages them with its story and graphics, and enhances historical learning. The majority of participants

expressed satisfaction, demonstrating the game's effectiveness as an enjoyable and instructional tool.

4. Conclusions

This study successfully developed the *Mat Kilau Side-Scroller* RPG to enhance historical literacy, digital literacy, and cultural appreciation among primary school students. Pilot testing showed that the majority of participants were engaged, found the game easy to navigate, and gained a better understanding of Mat Kilau's historical significance, demonstrating the effectiveness of combining interactive gameplay with accurate historical narratives. The game also illustrates how UX/HCI principles can enhance usability and learning outcomes in educational games. By revisiting the initial goals, the study confirms that the project addresses gaps in digital heritage education by providing an immersive, culturally authentic, and educational gaming experience. Future work will expand historical content, implement adaptive difficulty levels, and conduct longitudinal assessments to evaluate long-term learning outcomes, ensuring the game remains both instructive and engaging.

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