

Research Article

Malaysia Folklore Interactive Game Development: Tun Mamat Adventure Mission

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Abstract

This study discusses the context of interactive stories centered around the legendary character of Tun Mamat, with a specific focus on their capacity to preserve cultural traditions among kids. Thus, this digital game, named Tun Mamat Adventure Mission, was created to introduce children to Malaysian folklore. It proposes a new alternative for storytelling that enhances the user experience. The objectives of this study were: i) to develop an interactive game that introduces the cultural identity of Malaysia's historical story in helping to sustain Malay folklore and ii) to test the game's usability in terms of player engagement and education. The research method used in this study is a qualitative research design. The sample for this research contains 6 kids aged around 12 years old and above as a respondent. Post-playtest sessions involve having participants (kids) play the interactive game to discover the educational value and satisfaction that the kids get from playing the game. The instrument includes the game itself, and an observation sheets that observe the player's reaction while playing the game to know the engagement between the player and the game. Besides, this research also uses ADDIE Model instructional design in the development of an interactive game. Based on post-playtest feedback, it is clear that player involvement with the game is extremely high, as evidenced by their facial expressions and verbal expressions of enjoyment. This means that the game's usability, especially regarding player involvement, is outstanding. Furthermore, in terms of educational gains, there is a noticeable difference in retention of knowledge before and after playing the game. Initially, the children seemed to have a limited knowledge of the folkloric plot. However, after playing the game, they have shown a better understanding of the folklore.

Keywords: Malaysian folklore, educational game, culture, usability, kids' engagement, experience.

INTRODUCTION

The development of technology over time has demonstrated its importance in our day-to-day existence, and these developments have led to the digital domination of technology in the preservation of data, cultural heritage, textual documents, and artefacts (Abdul Ghafar et al., 2023; Budiastuti et al., 2023; Hasbullah et al., 2022). Some efforts are being made to prevent cultural heritage from vanishing or disappearing, such as digitizing it. A great deal of study has been done on the digitization of folklore, to conserve customs and provide audiences with education and entertainment (Riyandari & Wohangara, 2021). Malay folklore has become less popular among the younger generation as technology has advanced (Rahim, 2014). Some may have never heard of 'Puteri Gunung Ledang' and 'Sultan Melaka story'.

Malay folk stories appear to have been absorbed by modernization. Younger generations prefer to play modern games on smartphones or laptop computers (Rahim et al., 2017; Zolkipli et al., 2023). Hence so, an interactive game of Tun Mamat Adventure Mission has been developed to hold back Malaysia Folklore from being forgotten by youngsters. This interactive game is made to educate kids about the Malaysia Folklore of 'Puteri Gunung Ledang'. The idea of connecting games to cultural heritage is not new, and many researchers are finding ways to convey cultural content through narrative games that better engage players while conveying real-world facts while playing (Malegiannaki et al., 2020).

Interactive games, also known as video games or digital games, refer to a type of media that engages players in active participation and decision-making within a virtual environment (Gentile & Gentile, 2021). Players interact with the game world, characters, and mechanics, influencing the outcomes and experiences within the game. Thus, the purpose of this paper, we presented to explain the process of game development and game testing in the context of user experience (12-year-old kids and above) toward game engagement by using qualitative methods. A playtest and observation sheet will be made after the game development to test the game's usability in terms of player engagement and education.

From the research that has been made, the research finding is positive in using an interactive game to educate the kids about Malaysian folklore. The kids show good satisfaction while playing the game and also an understanding of the narrative storytelling of the game. The benefits of this study are kids could learn and understand Malaysian folklore in a fun way and game developers could understand the good user experience in game mechanical design in enhancing the engagement between the player and game.

LITERATURE REVIEW

To understand the topic differences in game design, we need to consider game-based learning from a pedagogical perspective (Polin, 2018). Numerous learning theories have been developed throughout history, which can be categorized into three educational theories: behaviorism, cognitivism, and constructivism (Mynbayeva et al., 2018; Baroque & Melo, 2004). Behaviorism posits that learning is essentially reactive behavior to specific stimuli (Winch, 2002). Particularly in game design, behaviorists focus on establishing and strengthening stimulus-response (S-R) models through repeated practice as a means of achieving mastery (Ahlbrand, 2017).

In contrast, cognitivism shifts the focus to the learner's processing and application of new information within an organization with existing knowledge (Kirwan, 2014). Turning to game design, this theory emphasizes the simulation function of video games; The game must facilitate the player's higher-level cognitive processes through organized knowledge structures and simulated application scenarios. On the other hand, constructivism, according to the theories of Piaget and Vygotsky, people learn through personal experiences and social interactions, helping learners understand their reality (Huo, 2019).

Constructivist designs of educational games emphasize adaptive and unique experiential learning and collaborative tasks (Ertmer & Newby, 1993). Based on these three educational theories and their special emphasis on learning methods, we propose six types of game mechanics that influence the learning experience and learning outcomes of players, such as mentioned in Figure 1.

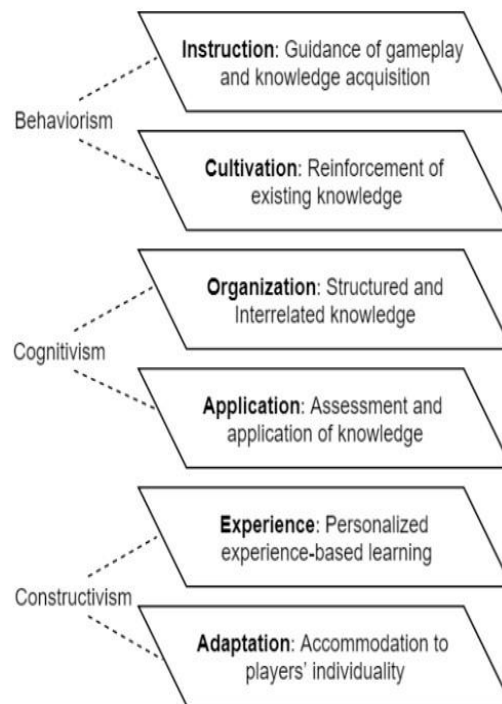


Figure 1: Six types of game mechanics based on three schools of learning theory

In Fairuz and Ng's (2018) study, they were working on developing a game design based on Malaysian folklore, Toyol. The game introduced the characteristics of Toyol through an interactive multimedia platform and implemented Toyol folklore in the form of digital game design as a digital entertainment tool to convey an understanding of people's culture, beliefs, and knowledge about Toyol. This research paper gives a contribution to the education area and the potential to raise awareness, teach, train, mobilize, and engage people to drive positive social change through digital games. This paper also suggests future works that involve progressing to the next stage of research, focusing on game designs with an emphasis on Toyol's educational entertainment value in the form of digital game applications.

This digital game aims to promote and enrich Malaysian folklore while serving as a medium to preserve Malaysian culture through gameplay and video games. Furthermore, conducting further research on the effectiveness of the game design in promoting and preserving Malaysian folklore and culture will be essential to assess its impact and reach. Additionally, the paper proposes exploring the possibility of developing more digital games based on other Malaysian traditional games and folklore, broadening the scope of preserving and promoting Malaysia's rich cultural heritage through interactive digital experiences.

Quwaider et al. (2019) discuss the impact on players' behaviors toward video games and emotions, exploring both positive and negative effects. Data collected from players was analyzed to determine the impact on the players when playing the video game. Data were collected using self-reported methods such as questionnaires, surveys, interviews, and ethnographic observations. The paper concludes that video games can induce various changes in players, including aggressive, negative, or cooperative behaviors, as well as attention to the positive.

The limitation of this paper is that it relied on self-reported data, which may not always be accurate. The paper also did not explore the impact of different types of video games on players' behaviors and emotions,

it also did not consider the impact of video games on players' physical health and did not address the impact of video games on players' academic performance. Hence here, this part of the topic that isn't covered and explained in this paper would be a good opportunity for other researcher to do research focusing on this part in their future research paper.

Next, the research by Persada (2019) discusses the trend of user experience in game development. The study found that there is ambiguity and contradiction in the explanation of user experience (UX) in game development, with a lack of distinction between UX as a method and UX as an outcome. It emphasizes the need for game designers to learn about social aspects alongside technical aspects, as UX and game development are interconnected hence the study suggests that UX and game development are interconnected to achieve user satisfaction and good interaction. Besides, the paper discusses the importance of usability aspects such as learnability and memorability play a crucial role in making games more interactive and easier to use.

A cognitive aspect, including learnability and memorability, contributes to better interaction in games, and a social aspect, such as social influence and behavioral intention will add value to the game experience. Technical aspects, such as the utilization of fun toolkits and surveys, can be useful in measuring personas as game users. These usability issues highlight the need for game developers to consider cognitive, social, and technical aspects to enhance the interactive experience of games. By addressing these issues, developers can create games that are more engaging and user-friendly. The paper concludes that the findings can be used as a reference for students in understanding the issues of UX-based game development.

METHODOLOGY

The game app framework in this study consists of three main components: data, mechanics, and aesthetics. The main data sources used to create and develop folklore application games include oral traditions, stories, cultural resources, books, and folklore. This data is processed to create game-specific situations, mission levels, and classification schemes. These tangible and intangible indigenous cultural elements, combined with game mechanics and a set of visual design concepts, are extracted and modified to form the game design elements of Tun Mamat Adventure Mission. The key to game mechanics is considering how each object functions and reacts. To better understand the cultural heritage of "Puteri Gunung Ledang", this study attempted to adopt elements of an adventure game. The main mechanics of this game were developed according to cognitive theory, game theory, sensory theory, and narrative. The navigation structure has been simplified to facilitate interaction with the game environment.

Responsiveness is the result of communication between games and young people. This allows learners to track their progress and connect their actions to the outcome of the game. The navigation structure has been simplified to facilitate interaction with the game environment. The coordination of visual aspects is prioritized, emphasizing the relevance of the modality sense of seeing either numbers or symbols on the screen, and responsiveness to instructions (hints, aids, and instructions).

The visual design of this game focuses on four main points: i) graphics, ii) presentation mode, iii) art direction, and iv) objects and game resources. The game's artistic concept focuses on 2D characterization using flat design as a representational layer of the 15th-century environment. To emphasize the folklore presentation, the 2D interface visualization uses minimalism and complete facts. The simplicity of 2D design contributes to the 15th-century "Tanah Melayu" visual style, which emphasizes the use of minimal effects, textures, shading, and natural shapes throughout the screen.

The aesthetic nature of the game elements emphasizes the traditional Malay culture of the 15th century during play. Therefore, to maintain players' immersion in the game, visual elements suitable for local children and a simple, uncomplicated, and colorful visual style are presented. Whitton's people (target players) characteristics (Whitton, 2014) and rules were also used to develop the game structure for the Tun Mamat Adventure Mission application.

ADDIE model is used to develop a suitable digital game for children. The ADDIE model as shown in Figure 2 is well-suited for education and currently serves as the basis for over 100 instructional design models (Stapa & Mohammad, 2019; Alazzawi et al., 2023). Developed in the 1970s, this development model provides a systematic and iterative process for identifying training needs, designing instructional programs and materials, implementing those programs, and evaluating their effectiveness (Woo, 2016). The ADDIE model includes interrelated processes in each subsequent phase. There are five phases or stages in creating an educational game: analysis, design, development, implementation, and evaluation.

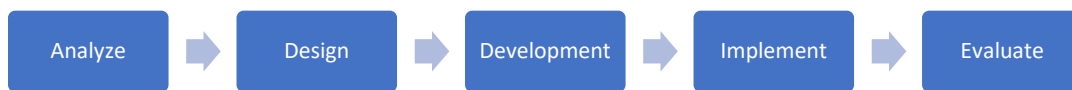


Figure 2: ADDIE Model

Analysis Phase

In this Analysis phase, a characteristic of 12-year-old kids has been analyzed by understanding the target audience for the game preferences and gaming experience have been made. Peterson (2010) introduced design techniques that enrich children's visual world, and help enhance their imaginative world, and the use of these games will reinforce the material being taught. In this research, the authors also did research according to the story and characters of 'Puteri Gunung Ledang' to ensure an authentic representation of the game.

For this game Tun Mamat will be the main character since Hang Tuah passes the task to him due to his health condition, these things have been mentioned in the new Rumi edition of "Sejarah Melayu" is transcribed from Jawi's original manuscript known as Raffles M.S. 18 titled Sulalatus Salatin (The Genealogy of Sultans) book. The authors also identify the game's objectives, learning outcomes, and game elements in this phase as shown in Appendix A.

Design Phase

The design phase is an important step in game development because it lays the foundation for the entire project. This phase involves planning, conceptualizing, and designing the gamified experience, and it is essential for several reasons. It sets the stage for the successful implementation and deployment of gamification strategies that can achieve specific objectives and drive user engagement and motivation. In this design phase, a game design concept has been made to know the flow and synopsis of the game.

A detailed game concept outlining the game mechanics, gameplay, levels, and user interface is also being created in this phase. Procreate editor as in Figure 3 has been used to create the game characters' design and a Texture Packer is also used to create a character sprite sheet in purposing the movement of the character. Next Adobe Illustrator and Adobe Photoshop are used in designing the environments, and assets, staying true to the 'Puteri Gunung Ledang' theme and setting as Figures 4 and 5.



Figure 3: A character design using Procreate Editor

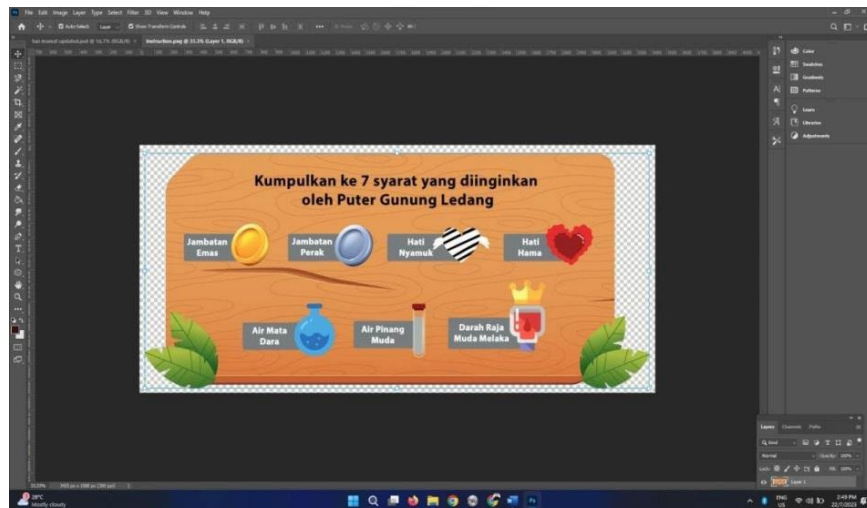


Figure 4: Adobe Photoshop in designing the assets

Lastly, the determination of the platform PC and technology stack for development. During the design phase, the ideas and concepts of the game are translated into visual representations to enhance understanding, as illustrated in the Game Design Canva of Tun Mamat Adventure Mission, as shown in Appendix B. To facilitate the programmers in developing the game's functionalities and user interface, it is essential to create game flow diagrams and screen flow diagrams, as shown in Figures 6 and 7.

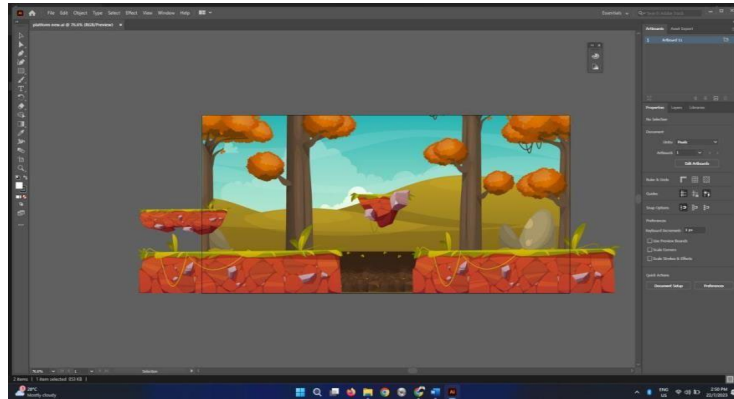


Figure 5: Adobe Illustrator in designing environments

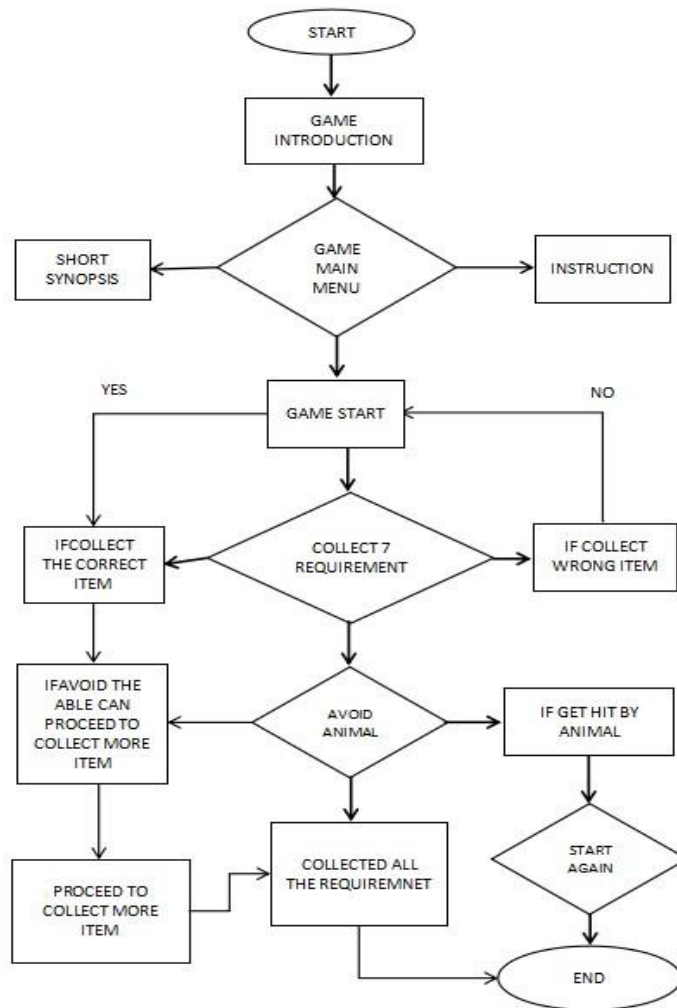


Figure 6: A game flow diagram

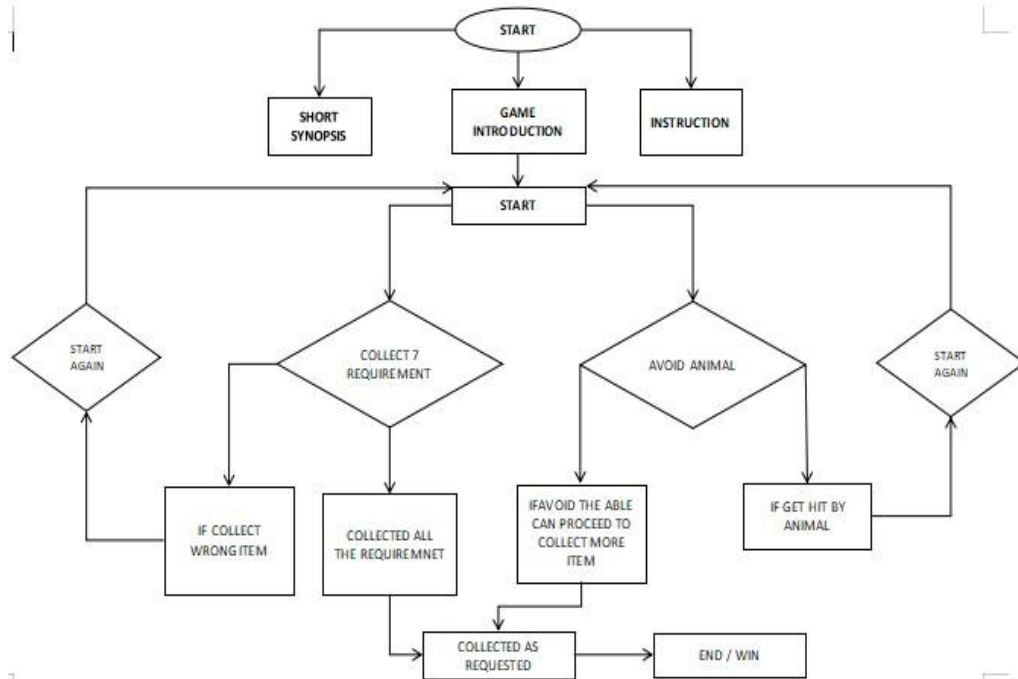


Figure 7: A screen flow diagram

Development Phase

In this development phase, an implementation of the game according to the design specifications based on the user characteristic, which is a 12-year-old kid and above. The development of the core mechanics, platformer controls, and character movements is designed based on 12-year-old kids' preferences. The software that has been used to create the game is Clickteam Fusion 2.5 Edition because it is user-friendly software, especially for a beginner game developer, as shown in Figure 8.

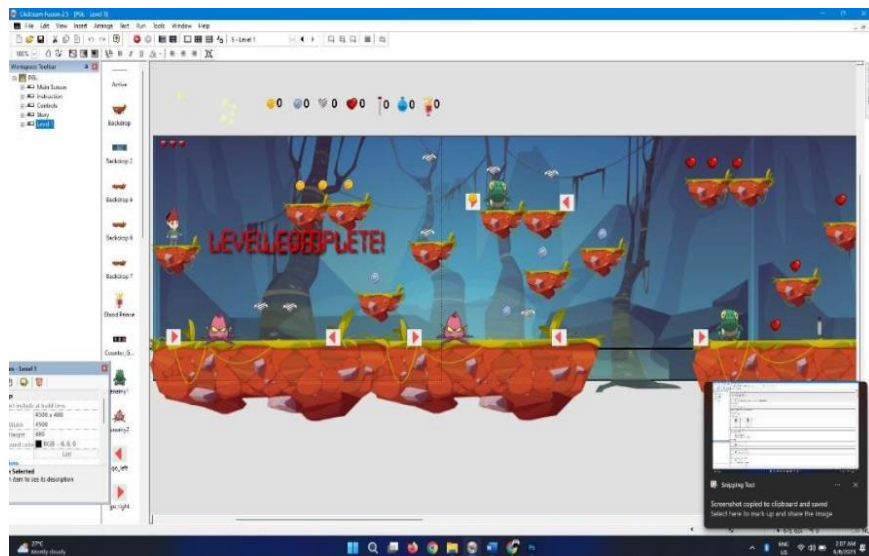


Figure 8: Clickteam Fusion 2.5 working space interface

Implementation Phase

During the implementation phase, this game can be downloaded via any online gaming platform chosen by the developer, such as Google Play Games on PC hence this game only works on PC platforms. Subsequently, the young participants receive explanations about the game's storytelling elements and instructions or tutorials on how to play the game. Following this, they are provided with opportunities to playtest the game and gain firsthand experience of the user interface.

Evaluation Phase

An evaluation has been made to know how the game engages with the player and how the game gives experience in educating the player about Malaysian folklore. A qualitative method was used by selecting a group of six players, all of whom were at least 12 years old, to test the Tun Mamat Adventure Mission game as shown in Figure 9. The instrument includes an observation checklist that observes the player's reaction while playing the game to know the engagement between the player and the game and post-playtest interviews to find out the educational experience the kids got by playing the game.

The feedback has been extremely positive, we realize that there may be an opportunity for improvement down the road. Looking ahead, we consider the potential for adding even more excitement to the game. This might appear in the form of new game elements or a study of various folk tales, encouraging an exciting and thrilling gaming experience.



Figure 9: 12-year-old kids playing the game

RESULTS

An observation also has been made while the player testing the game. A player's reaction while playing the game has been identified. Six children were observed to achieve their commitment towards the establishment and development of the Tun Mamat Adventure Mission and its cognitive component and the result of the changes in behavior toward the player after the gameplay has been observed in Table 2. Based on post-playtest feedback, we can see that player engagement toward the game is strong based on their facial expression and speech.

It shows that the usability in terms of player engagement is higher when you see them enjoying the game a lot. Besides, in terms of education, we can see that there is an improvement in the knowledge hence

before and after the game. Before the game, the kids seemed clear about the folklore storyline, but after they played the game, the kids seemed to understand better about this Folklore.

Overall, players have responded favorably to the Tun Mamat Adventure Mission, as shown in Table 1. From their viewpoint, getting to know the tale through the game is a joy, especially with the upcoming difficulties that might provide them with a lot of immersion and excitement. Another factor that attracts children to this game is its special appearance. Moreover, according to Malaysian youth, the content of the scenes related to their culture and customs arouses the desire to play.

Naturally, it makes them want to know more about the folklore "Puteri Gunung Ledang". They are more likely to accept a version with a longer ending. The positive response of children shows that this application game can promote and convey an understanding of Malaysian culture and history. Therefore, digital games have the potential to make local folklore popular again around the world.

Table 1: Observation result on changes of behavior toward the player

Experience Context	Results	
Fun	Facial Expression	Speech
Enjoy	Happy	Cheer
Excited	Shocked, Happy	Scream
Thrilled	Shocked, Frustrated	Scream
Satisfaction		
Graphic (Visual)	High	
Gameplay	High	
Usability		
Interaction with Tun Mamat Adventure Mission	High	
Accessible	High	
Learning (Knowledge of heritage)		
Understanding of the history of Puteri Gunung Ledang	High	
Stimulates my learning of the Tun Mamat Adventure Mission	High	
The game		
The game highlights the story of Puteri Gunung Ledang	Highly Agreed	
The game stimulates knowledge of Malaysian historical folklore	Highly Agreed	

DISCUSSION

According to the findings of this paper, the educational game has been effectively presented to educate younger generations, particularly kids, about their own culture and heritage. This is supported by the findings of Fairuz and Ng (2018), who suggest future work that concentrates on game designs with a strong emphasis on educational and entertainment value in the form of digital game applications. Their facial expressions reveal how the kids are reacting to the game and how engaged they are with its design, which elicits strong feelings and emotions from the player.

The post-playtest results from the player also demonstrate that the kids benefit from the interactive game's usability in terms of player engagement and experience. The kids seem to enjoy the game because they don't have any problem with the user experience while playing the game. This demonstrates that Persada's (2019) discussion on user experience usability aspects—like learnability and memorability—plays an important role in enhancing the instructiveness and usability of games. Nevertheless, our study has limitations; the time limit and the sample size are insufficient to produce a more satisfactory conclusion. For this reason, we advise doing close interviews and surveys in the future that concentrate on teenagers as respondents.

CONCLUSION

Through all the research findings above we could conclude that interactive games would be a good alternative in promoting and educating kids about Malaysian folklore. The good elements of multimedia and the game will bring a high engagement and increase the game's usability. For example, a simple and interesting animation of the character that matches the player's characteristics, an easy controller, and easy instructions of the game will increase the engagement and usability of the game for the player (kids).

This research paper focused on the initially set objectives and mainly focused on the edutainment value of Tun Mamat Adventure Mission in the form of a digital game application. This application serves as a tool to promote and educate children about Malaysian folklore and indirectly serves as an educational platform. Preserving the entire Malaysian culture through gameplay and design. This game also brings a lasting impact by instilling an interest in their culture from a young by encouraging kids to continue exploring and preserving their cultural heritage as they grow older.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DECLARATION OF GENERATIVE AI

During the preparation of this work, the authors used ChatGPT to enhance the clarity of the writing. After using ChatGPT, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

DATA AVAILABILITY STATEMENT

Data available within the article or its supplementary materials.

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APPENDIX A

Game Elements for Tun Mamat Adventure Mission

Game Elements	Explanation
Game Mechanics / Interaction	The game is controlled using the mouse and keyboard. The player can move using the WASD and arrow keys, with the WASD keys controlling movement on the left side and the arrow keys controlling movement on the right side. The space bar is used to make the player character jump and overcome obstacles.
Objective / Goal	<p>To develop a game with the storied 'Puteri Gunung Ledang' legend at its root is to recreate the spirit of this important Malaysian narrative and introduce it to a larger audience, with a focus on attracting the younger generations. Our main goal is to give kids 12 and older an understanding of this cultural precious through an immersive and engaging gaming experience.</p> <p>Players will embark on an exciting journey through the legends, pairing storytelling and gameplay, and ultimately developing a deep affection for Malaysia's cultural past. This game is designed as a platform for cultural exploration. The goal for this game is to complete the requirements of 'Puteri Gunung Ledang' to win the game.</p>
Badges / Rewards	A point is given once the player collects the required items.
Challenges	Players are put on a series of exciting tasks in this game that test their skill, quick thinking, and decision-making abilities. They must overcome several challenges as they set out on an interesting adventure, including avoiding dangerous animals to survive. Life points are lost when specific animals get hit, and time limitations make every action feel more urgent.
Narrative / Story	<p>'Puteri Gunung Ledang' was a princess with mysterious powers, amazing grace, and intelligence. 'Puteri Gunung Ledang' was attracted by the Sultan's proposition and set him a series of challenging tasks to deter him from continuing. She pressed him to grant her seven jars of mosquito hearts, build a golden bridge from his palace to the top of, Mount Ledang a silver bridge from Malacca to Mount Ledang, seven trays filled with mite hearts, seven jars filled with virgin tears. Seven jars of young betel nut water, and a bowl of the blood of the Young King of Malacca.</p> <p>This mission was given to Hang Tuah, but unfortunately, Hang Tuah was too old for the mission so he passed the mission to Tun Mamat, hence the main player in this game was Tun Mamat. The game concept will be according to the requirement of the 'Puteri Gunung Ledang'. Player needs to achieve the requirements and overcome the obstacles in the game to win the game. The things that have been collected need to be dedicated to the sultan. Overall players will be tested based on their memory skills where the player needs to remember all the requirements as well. This is another motif of this game besides learning the history of 'Puteri Gunung Ledang'.</p>
Characters	Tun Mamat (2D male character with Malaysian traditional clothes). Animals such as octopuses, etc.
Levels	One level only
Rules	Players must be cautious when exploring and avoid unpleasant encounters with particular animals to protect their lives. One wrong move might result in the death of a player.
Feedback	The feedback from the game such as the sound when the player collides with the animal in the game, the player also turns black (burn) once it touches the animal. There is a sound for every collection of the item. The number of items also will be reduced on the screen provided as it collects the items.
Aesthetics	The game design is a 2D animation style and the graphic design element used in this game design is based on 12-year-old player preferences and 15 th Century Malaysia.

APPENDIX B

Game Design Canva of Tun Mamat Adventure Mission

JGC Game Canvas		Game Name: Tun Mamat Adventure Mission		Designed by: Siti Nurfarliana binti Mohd Yusof	
GOAL  What is the aim of the game? How do you progress? How do you win? When do you lose? The aim of the game is for experience a mythical journey based on the famous story of "Puteri Gunung Ledang" and take part in a high-stakes game. To collect all the requirement from puteri gunung ledang and bring them back to the king. You must keep your lives full and gathered all the requirement on that level, if you pass all the level with full Lives, Full Items and within the time limits, you win. Otherwise, you'll lose.	HERO  Who or what is the main playable character? Where do they come from? Why are they here? What do they look like? The main playable character is Tun Mamat. They come from Melaka to help the Sultan to accomplished the mission on purposing his love to puteri gunung ledang. They look 15th Century people.	LEVELS  How does the game change as you progress? When do the levels change? How do you reach the next level? What do the levels look like? How does the game play change? The hardship of the level depending on the obstacle of the game. The obstacle of the game here is players cannot collide with specific animals specified in the game. If the player hits the animal, the player's life will decrease. The difficulty of the terrain also affects the difficulty for the player, if the player falls into the hole, the player's life will also be decrease. The life of the player can be recovered if the player find a power up icon. The other obstacle of the game is distraction item. A distraction item is putting to confuse the player. If the player collect the wrong item it will also reduce live.	TARGET AUDIENCE  Who is the game aimed at? How does the game suit them? This game is created for the player above 12 years old and above, to the people whose imerging theirself in historical story.	STORY  What is the story behind the game? Why is the hero trying to achieve their mission? What are the obstacles making the mission difficult? How do you progress in the game? Who are the characters? Where do they live? Puteri Gunung Ledang was a princess with mysterious powers, amazing grace, and intelligence. Puteri Gunung Ledang was attracted by the Sultan's proposition and set him a series of challenging tasks in an effort to deter him from continuing. She pressed him to grant her seven jars of mosquito hearts, build a golden bridge from his palace to the top of Gunung Ledang, a silver bridge from Malacca to Mount Ledang, seven trays filled with mole hearts, seven jars filled with virgin tears. Seven jars of young belief not water and a bowl of the blood of the Young King of Malacca.	
GAME PLAY  What are the controls? How do you play? How do characters interact? The game was controlled by mouse and keyboard. Use the W/ASD or ARROWKEYS to move, Use 'SPACEBAR' to jump, and use 'L' to attack.	ENEMIES  Who or what are working against your hero? Where do they come from? Why are they here? What do they look like? Time, Live, Obstacle such as Specific Animal and distraction item.	 	SCORING  Does your game have a score? How do you get points? Can you lose points? When do you win? Do you have lives? When do you lose? Yes, we get the point by collecting the items. Yes if you collect the wrong item you wont get a point and loose your life. You will win once u collect all the correct item and manage to avoid those obstacle along the journey.		
THE WORLD  Where does your game take place? What does it look like? What does it sound like? What does it feel like? Its take place in a Malacca Village and castle also Gunung Ledang Forest. Its feel like 15th Century environment.		ASSETS (ART & SOUND)  What are the other objects in the game? What do they look like? Do they have animations? Is there music? Are there sound effects? Is there a start screen? Is there a gameover screen? There are other Animal such as monkey, tiger, and squirrel. The player will be wearing a traditional malay clothes in 15th Century. The music use for this game is classic Malaysia music with Sound Effect. There is a start screen and a gameover screen.	