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Measuring User Experience of Mobile Game-Based Learning about Mah Meri People (Mah Meri Application)

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ABSTRACT

The Mah Meri mobile application is a game-based learning tool developed to support the preservation and dissemination of the cultural heritage of the indigenous Mah Meri community in Malaysia. The primary aim of this study is to evaluate the user experience (UX) of the application and propose design recommendations for further enhancement. A quantitative research approach was adopted, employing the standardized User Experience Questionnaire (UEQ) to assess six core UX dimensions: novelty, stimulation, dependability, efficiency, perspicuity, and attractiveness. Data were collected through an online survey distributed via Google Forms to residents of Selangor, Malaysia, with a total of 400 valid responses analyzed using the UEQ Data Analysis Tool. The findings revealed that the Mah Meri application received overall positive evaluations, particularly in attractiveness, stimulation, dependability, and efficiency, while novelty obtained a more neutral response. These results suggest that although the application effectively engages users and delivers meaningful cultural learning, further improvements are required to enhance creativity and innovative features. This study highlights the potential of mobile game-based learning as an effective medium for cultural education and preservation. Future work should incorporate qualitative methods to capture deeper insights into user perceptions, enabling iterative refinements and ensuring long-term sustainability of the application.

1. Introduction

Mobile game-based learning (MGBL) has been recognized as a potentially effective tool in improving learning outcomes [1, 2]. The integration of gaming in the educational process can boost students' motivation for learning and potentially improve their learning outcomes [3]. In the context of teaching about the Mah Meri people, an ethnic group native to the western part of Peninsular Malaysia [4], the Mah Meri community is an example of a community who had improved the level of their living status through the tourism sector [5]. Mobile game-based learning could provide an engaging and interactive platform for learners to explore and understand the rich cultural heritage of this community. Mobile games may also provide an opportunity to bridge this gap by making indigenous knowledge more accessible and engaging.

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Mobile game-based learning has shown promising results in various fields. Mobile game-based learning has been applied in multiple areas such as history [6], language [7-9], museum [10-12], insects [13], and mathematics [14]. It is potentially effective in improving learning. However, more research is needed to address the fundamental question of when mobile game-based learning is an appropriate approach for learning. Mobile game-based learning has emerged as a powerful medium with the incorporation of personalization and collaboration, offering positive impacts and an entertaining platform for learners in higher education institutions [15]. Thus, mobile game-based learning has rapidly emerged as a prominent educational tool across various types of groups, such as for preschoolers [16-17], children with learning disabilities [18], and children with autism [19].

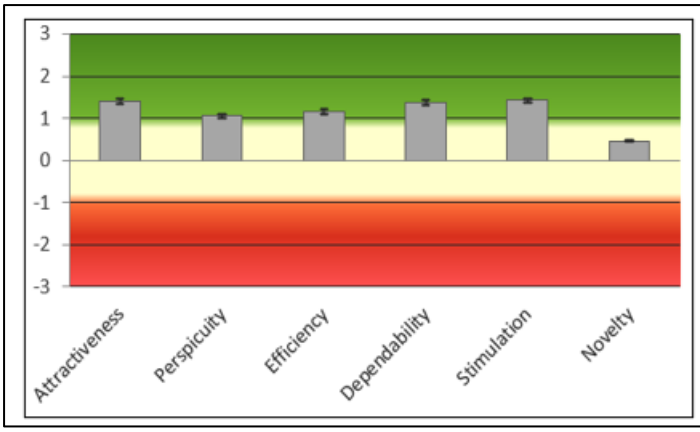
2. Methodology

The User Experience Questionnaire (UEQ) framework is used in this research together with the design of the survey questionnaire. The main research objectives are then developed once the data has been retrieved and examined using the User Experience Questionnaire (UEQ) Analysis framework, tool, and analysis [20 – 22]. This research is conducted using the User Experience Questionnaire (UEQ) framework. Then, citizens of Selangor, Malaysia, received the questionnaire in the form of a Google Form from May 27 to June 30, 2023. For this study, 400 people were the sample size for data collection. To assess the internal coherence and dependability of the questionnaire's dataset for the data collection process, all collected data underwent a reliability and validity test. To determine the primary goals of this research, the data is subsequently extracted and analysed with the User Experience Questionnaire (UEQ) Analysis Tool. The cluster column graph is employed to illustrate the primary objective of the research, which is to evaluate the significant user experience (UX) elements of the Mah Meri mobile app. Design recommendations were suggested for enhancing the Mah Meri mobile application's user experience (UX).

3. Results

3.1 Objective 1: To evaluate the Significant User Experience (UX) Elements of the Mah Meri Mobile Application

The first objective is to evaluate the significant user experience (UX) elements of the Mah Meri mobile application. The results of the User Experience Questionnaire (UEQ) elements for the Mah Meri application, based on the average value of each question item divided into the categories of attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty, are displayed in a bar graph. Figure 1 below shows the User Experience Questionnaire Results Graph. The data collected from the online survey is input and processed by utilising the User Experience Questionnaire (UEQ) Analysis Tool.



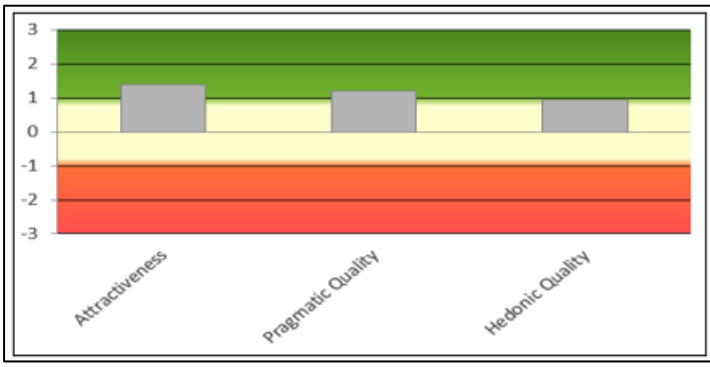
UEQ Scales	Mean
Attractiveness	1.40
Perspicuity	1.06
Efficiency	1.16
Dependability	1.39
Stimulation	1.43
Novelty	0.46

Fig. 1 User experience questionnaire results graph

Figure 1 depicts the mean value of the six significant user experience (UX) scales of the Mah Meri application, which is used to plot the graph. As a result, any scale with a value between -0.8 and 0.8 is considered neutral. Furthermore, any scale with a value less than -0.8 is considered a negative evaluation. A scale with a value greater than 0.8 is regarded as a good evaluation.

According to Figure 1, five scales are given a positive evaluation, such as the attractiveness scale (1.40), which represents a good impression of the application; the perspicuity scale (1.06), which indicates that the user is quite familiar with the application; and the dependability scale (1.39), which indicates that the user can control the application while using it. The efficiency scale (1.16), in which the user can use the application to finish the intended set of tasks within the application, is then followed by the stimulation scale (1.43), in which users are motivated to use the product. Furthermore, while the application received a positive evaluation, one scale received a neutral evaluation, the novelty scale (0.46), indicating that users may believe the application is neutrally creative or innovative.

The UEQ scales can also be categorized as a group, with pragmatic quality (perception, efficiency, and dependability) indicating task-related aspects of the quality of the Mah Meri application and hedonic quality (stimulation and novelty) indicating non-task-related quality aspects. Figure 2 depicts the Mah Meri mobile application's mean value for attractiveness, pragmatics, and hedonic qualities.



UEQ scales by Group	Mean
Attractiveness	1.40
Pragmatic Quality	1.20
Hedonic Quality	0.95

Fig. 2. User experience questionnaire grouped results graph

The pragmatic quality (1.20), attractiveness scale (1.40), and hedonic (0.95) quality are all rated positively in Figure 2. This shows that the respondents feel that the Mah Meri application provides a positive user experience (UX) and is free from major issues when performing its intended tasks.

Overall, even though all six scales are rated positively, attractiveness obtains the highest score of 1.40. When the scales are divided into attractiveness, pragmatic quality, and hedonic quality, the attractiveness scale has the highest score of 1.40, followed by perspicuity, which is classified as pragmatic quality and has a score of 1.20. This shows that the attractiveness scale is a significant factor to take into consideration when assessing the Mah Meri application's user experience (UX).

3.2 Objective 2: To Suggest Design Recommendations for Enhancing the Mah Meri Mobile Application's User Experience

The suggested design recommendations for the Mah Meri application's UX elements include attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty.

Multiple design elements and user experience (UX) things to consider should be considered to enhance the Mah Meri mobile application's attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The suggestions are as follows:

i. Attractiveness:
Incorporating visually compelling graphics, animations, and sound effects that engage the player in the game is a method to improve the attraction of a mobile game-based learning experience.

ii. Perspicuity:
The game can include easy-to-understand instructions and details, as well as interactive components that aid the player's comprehension of difficult concepts to improve the material's clarity and understanding.

iii. Efficiency:
Flexible methods of learning that change the level of difficulty depending on player performance can be incorporated into the game to improve learning efficiency.

iv. Dependability:
It is crucial to properly test the game to identify and address any errors or problems and enhance the dependability of the mobile game.

v. Stimulation:
The game can include challenging and intriguing tasks and activities that interact with the player and maintain their focus to boost stimulation.

vi. Novelty:
It's crucial to regularly add fresh content and features to the game to keep players interested.

The user experience of the mobile game-based learning application of the indigenous Mah Meri culture can be improved by considering these UX components and applying design choices that indicate their significance.

4. Conclusions

This study assessed the user experience (UX) of the Mah Meri mobile application, a game-based learning platform aimed at promoting awareness of the cultural heritage of the indigenous Mah Meri people. Using the User Experience Questionnaire (UEQ) with six dimensions: novelty, stimulation, dependability, efficiency, perspicuity, and attractiveness, the findings from 400 respondents in Selangor, Malaysia, indicated overall positive evaluations. Among these, attractiveness and stimulation emerged as the strongest contributors to user satisfaction, while novelty received a more neutral response, suggesting opportunities for creative enhancement.

The results highlight the potential of the Mah Meri application not only as an engaging educational tool but also as a digital medium for cultural preservation. To maximize its impact, future research should incorporate qualitative approaches to capture deeper user insights and guide iterative improvements. Expanding content variety, enhancing interactivity, and integrating adaptive features may further strengthen the application's novelty and long-term user engagement. By refining these UX elements, the application can better serve as both a learning platform and a means of sustaining indigenous heritage through digital innovation.

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