G7 Altitude: Hikes through Peninsular Malaysia's highest peaks (3D Game)

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***Abstract*—Raising environmental awareness among young people requires innovative approaches, as traditional methods often fail to sustain interest and participation in eco-tourism and conservation. This project addresses the issue by developing a three-dimensional educational hiking game designed to promote Malaysia's natural heritage and encourage forest conservation among users aged 15 to 25. The objective is to combine entertainment and learning through an immersive experience that engages players in both gameplay and environmental education. The development follows the ADDIE model, the project progresses through structured phases including Analysis, Design, Development, Implementation, and Evaluation. The outcome is a functional game refined through user testing and feedback, ensuring effectiveness and enjoyment. The findings demonstrate the potential of serious games to foster environmental awareness and support sustainable behaviours among younger generations.**

Keywords—component; eco-tourism; educational; hiking game; 3D game

I. INTRODUCTION

This project focuses on the development of a three-dimensional educational hiking game aimed at promoting awareness of Malaysia's rich natural heritage, particularly its iconic G7 mountain ranges. Designed for teenagers and young adults, the game combines interactive gameplay with meaningful educational content to teach players about hiking safety, forest conservation, and the importance of preserving the environment. Players will explore virtual hiking trails, complete nature-themed tasks, and take on challenges that foster critical thinking and environmental responsibility. By blending adventure with learning, the game seeks to inspire young Malaysians to appreciate nature more deeply and to participate actively in protecting it.

The project has been developed into an interactive 3D game that raises awareness of forest preparedness and conservation through engaging and enjoyable gameplay. By merging education with an immersive virtual hiking experience, the game aims to capture the interest of Malaysia's younger generation while promoting sustainable values (UNESCO 2023).

A. Objectives

The objectives of this project are threefold. Firstly, it seeks to identify the essential knowledge and equipment required for hiking, forest conservation, survival, and emergency preparedness, which will be delivered through interactive gameplay. Secondly, the project aims to develop an educational three-dimensional hiking game that introduces Malaysia's G7 mountains while promoting greater awareness of environmental and safety practices during forest adventures. Finally, the project intends to evaluate the effectiveness of the game in enhancing players' understanding, engagement, and awareness by conducting gameplay testing and gathering feedback from target users through structured surveys.

B. Problem Statement

Malaysia's sports tourism sector faces significant challenges in the aftermath of the pandemic, including low public interest, limited participation,

and insufficient awareness of the nation's natural heritage (Yusoff *et al.,* 2023). The Ministry of Tourism, Arts and Culture continues to struggle with global visibility, making it difficult to attract international attention. Although Malaysian youth demonstrate good environmental awareness, their level of active participation in conservation and environmental activities remains relatively low.

C. Research Questions

This study is guided by three main research questions. The first explores the key knowledge and tools that should be introduced to players in order to support hiking safety, forest conservation practices, and basic survival skills. It also considers how interactive elements such as item collection and informative prompts can be used effectively to teach players how to stay safe, respect nature, and be better prepared. The second question examines how well the game emphasises the importance of carrying the right equipment and behaving responsibly in the forest, evaluating whether the gameplay encourages players to think critically about essential items such as first aid kits, water, and gloves and to reflect on how their actions may affect the environment, including issues such as litter management and wildlife protection. Finally, the third research question investigates the game's ability to educate and engage its target audience of 15 to 25 year olds by analysing user feedback and player experiences. This involves assessing whether the game content is interesting, age-appropriate, and meaningful, as well as determining how effectively it combines learning with entertainment to motivate players to practise forest conservation and safe hiking habits after gameplay.

II. Literature Review

A. 3D Game

A three-dimensional (3D) game is a type of video game that uses 3D graphics to create a virtual world with depth, height, and width, closely resembling real-life objects and environments. Unlike traditional two-dimensional (2D) games, which feature flat visuals and limited perspectives, 3D games generate dynamic virtual environments with greater realism, depth, and interactivity. The development of 3D games has significantly transformed the gaming industry by providing players with a more immersive and engaging experience.

B. Case Study

The *Viking Hiking* is a fun and colourful three-dimensional (3D) platformer developed by students at Breda University as in Figure 1. Players control a Viking named Bof as he explores a lush island on his journey to Valhalla. The game focuses on simple mechanics such as jumping, dashing, and using a horn to interact with the surroundings. It offers a cheerful and light-hearted experience with a strong nature-based theme, encouraging exploration and interaction rather than relying on a detailed storyline. Although *Viking Hiking* is not an educational game, it nevertheless promotes problem-solving skills and an appreciation of nature through its design. For developers working on hiking-themed educational games, this project demonstrates how simple gameplay and natural environments can be both engaging and enjoyable. To add educational value, future versions of such games could incorporate learning objectives and real-world challenges while retaining their fun and adventurous appeal.

Fig.1: Viking Hiking Game Design

Wandering Trails is a peaceful hiking simulation that emphasises relaxation, mindfulness, and the exploration of nature without specific goals or competition. Developed as an independent project, the game allows players to walk through detailed landscapes and use a vintage camera to capture moments from their journey. With calming visuals, natural sounds, and no pressure to complete tasks, the game offers a meditative outdoor experience.

Wandering Trails provides value by promoting environmental awareness and observation skills. For developers designing hiking-themed educational

games, this case study highlights the importance of immersive design and suggests that incorporating learning objectives could make the experience both relaxing and educational (Deterding and Nacke, 2022).

Fig. 2: Wandering Trails Game Design

Firewatch is a first-person adventure game set in the Wyoming wilderness, where players assume the role of Henry, a fire lookout. The game emphasises exploration, nature, and emotional storytelling rather than combat. Players use a map and compass to navigate the forest, communicate with their supervisor Delilah via radio, and uncover a mystery through dialogue and environmental clues. Its calm yet immersive gameplay encourages players to experience solitude, adventure, and a deeper connection with nature.

Firewatch offers valuable insights into outdoor survival, environmental awareness, and mental health. For developers creating hiking-themed games, it provides a strong example of how atmosphere and storytelling can be harnessed to deliver engaging and meaningful learning experiences.

Fig. 3: Firewatch Game Design

III. METHODOLOGY

In this research, the ADDIE model serves as the guiding framework, providing a systematic approach to designing, developing, implementing, and evaluating the effectiveness of the 3D game for teenagers and young adults.

A. ***Analysis***

The Analysis phase focused on identifying the requirements for creating the game. The target users were defined as teenagers and young adults aged 15 to 25. Research was conducted on the seven highest mountains in Peninsular Malaysia, collectively known as the G7.

B. ***Design***

The Design phase emphasised the development of the game's theme and concept, storyboard, background designs, typography, and colour schemes. During this phase, the developer outlined the steps and strategies necessary to achieve the intended objectives.

C. ***Development***

The Development phase involved constructing the actual game based on the design plan. Unity, a widely used and flexible game engine, was employed to build the game. The developer created key components including 3D models, characters, forest scenes, sounds, the user interface, and gameplay features. Selecting the right tools was essential, as each contributed to specific tasks such as designing, coding, and ensuring smooth game functionality.

D. ***Implementation***

The Implementation phase focused on preparing the game for distribution and use. The game was exported as an executable (.exe) file for Windows and uploaded to Google Drive with a download link. It was designed to run on basic laptops with minimum specifications of an Intel Core i3 processor, 4 GB RAM, 2 GB storage, and Windows 10 or newer.

E. ***Evaluation***

The Evaluation phase measured how effectively the 3D hiking game achieved its educational objectives. A Google Form questionnaire was distributed online to the target users to collect feedback on aspects such as enjoyment, clarity, ease of use, and performance. The responses were then analysed to identify patterns and to assess the overall effectiveness of the game.

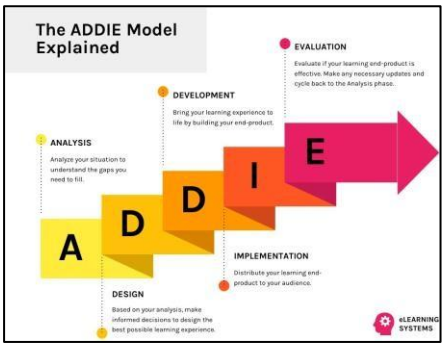

Fig. 4: ADDIE Model

IV. PROTOTYPE DEVELOPMENT

Game design development is essential for conveying the intended message of a game and shaping the overall gameplay experience. In this project, particular attention was given to ensuring that the visuals, layout, and mechanics were aligned with the educational and adventurous theme of forest hiking. A well-developed design not only captures the player's attention but also sustains their interest and ensures a seamless gameplay experience.

A. ***Storyboard***

The storyboard design for G7 Altitude helped visualize the game's flow and scenes before development. These visuals guided the game's pace, player interactions, and scene transitions, showing important moments like object collection and avoiding dangers. The storyboard design for G7 Altitude helped visualize the game's flow and scenes before development. These visuals guided the game's pace, player interactions, and scene transitions, showing important moments like object collection and avoiding dangers.

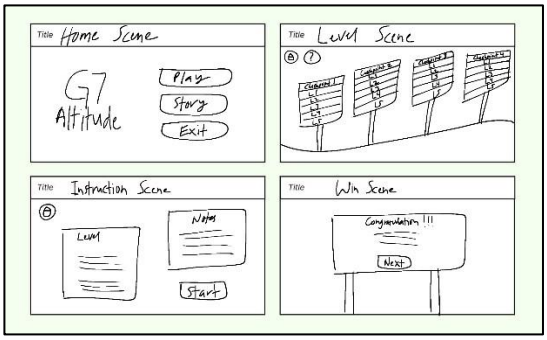

Fig. 5: Storyboard of the game

B. ***Interface***

The *G7 Altitude* game interface was designed to be clear, user-friendly, and accessible. Using Adobe Illustrator, a forest-themed background incorporating green, brown, and yellow tones was developed to create a lively and adventurous atmosphere. Key elements such as the title, buttons, scores, and prompts were arranged in a simple and structured layout to facilitate easy navigation for players.

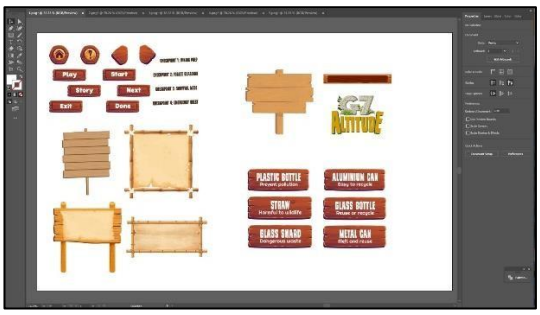

Fig. 6: Interface Design in Adobe Illustrator

C. ***Colour Palette***

The game employs a nature-inspired colour palette of greens, browns, and yellow to create an immersive forest atmosphere. These tones help players feel connected to the outdoor environment, while brighter accents are applied to 3D objects to enhance visibility and make them stand out within the scene.

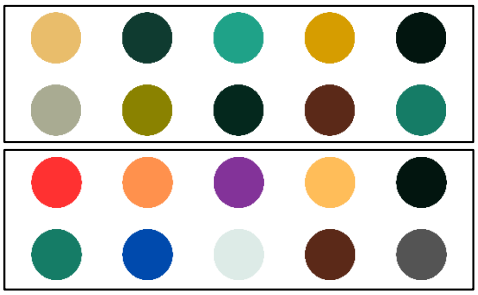

Fig. 7: Colour Palette

D. *Typography*

The game uses the Woodstamp font to match its forest and adventure theme. This bold, tall font was chosen for titles, headers, level names, and scores because it's eye-catching and fits well with the hiking vibe, while also being easy to read.

Fig. 8: Woodstamp

The Righteous font was used for longer texts like instructions, stories, and explanations. It's modern, clean, and easy to read, making it perfect for paragraphs while still looking stylish and fitting the game's theme.

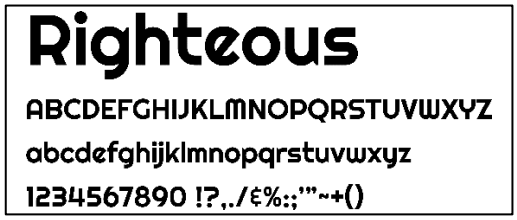

Fig. 9: Righteous

E. *3D Object and Character Development*

The game's character and collectible target items were designed using Blender 4.4. The main character is a female hiker, depicted as ready for adventure. A variety of 3D items were also created to correspond with each game checkpoint, including hiking tools, environmental clean-up items, survival gear, and emergency supplies. These objects were modelled with clear textures to enhance visibility and to support the game's educational objectives, enabling players to learn about forest preparedness and conservation through engaging gameplay.

Fig. 10: 3D Character in Blender

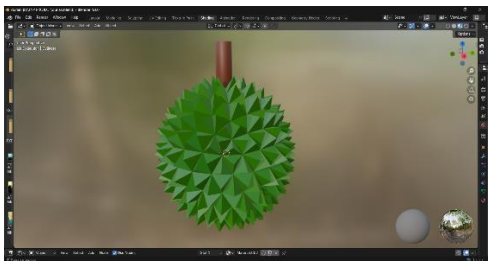

Fig. 11: 3D Objects in Blender

F. *3D Game Development*

The game was developed using Unity 2022.3.48f1, with scenes such as *Home*, *Story*, *Level*, *Instruction*, *Win*, *How to Play*, and *Game* organised for easy navigation and testing. The forest environment was created using Unity's terrain tools, complemented by 3D models imported from Blender. Interactive elements, including enemies and target items, were incorporated with scripts to manage gameplay mechanics and scoring. The user interface featured buttons for seamless navigation, while sound effects and background music were integrated to enhance immersion and provide a more engaging player experience.

Figure 12: 3D Platform in Unity

Table 1: Tools

Development Elements	Software
User Interface Design	Adobe Illustrator 2022
3D Modelling	Blender 4.4
Game	Unity 2022.3.48f1
C# Script	Visual Studio Code

G. *Game Functionality*

In the *Game* scene, players control the hiker character as they explore a forest environment to collect essential items such as hiking tools, forest conservation equipment, survival gear, and emergency supplies. Each item is labelled with its name and purpose to educate players as they progress through the game. The level difficulty increases as more items are introduced, while players must also avoid moving enemy plants or risk restarting the level.

Figure 13: 3D Game Scene

V. RESULT AND FINDING

The evaluation of the 3D hiking game was conducted to assess its functionality, usability, and educational value. Feedback was collected through an online questionnaire administered to the target user group, focusing on gameplay experience, clarity, and learning outcomes. The responses provided valuable insights into the effectiveness of the game in achieving its intended objectives.

Figure 14: Survey Question Data

Results show that approximately half of the respondents were already familiar with the G7 mountains prior to playing, while the remainder had limited or no knowledge as in Figure 5.1. Post-gameplay feedback indicated that the majority of participants felt more aware of the preparations required for forest activities, suggesting that the game enhanced their understanding of safety measures and environmental preparedness as Figure 5.2. These findings demonstrate the potential of serious games to improve awareness and knowledge retention in the context of environmental education.

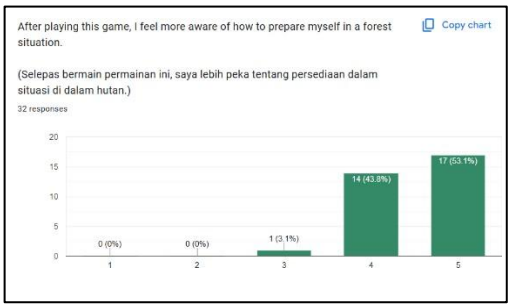

Figure 15: Survey Question Data

VI. CONCLUSION

G7 Altitude demonstrates the effective integration of entertainment and education by providing an

interactive 3D hiking experience that introduces players to Malaysia's G7 mountains while fostering environmental awareness and outdoor skills. The combination of engaging gameplay and structured educational content directly addresses current challenges in Malaysia's sports tourism sector and the limited involvement of youth in conservation activities. Evaluation findings indicate the game's potential to enhance knowledge, stimulate interest in nature, and strengthen support for environmental education among young Malaysians. These outcomes highlight the role of serious games as a viable tool for promoting sustainability awareness and cultivating environmentally responsible behaviours within younger generations.

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