https://doi.org/10.31436/ijpcc.v12i1.665

# Design and Preliminary Evaluation of an Immersive 3D Stereoscopic Simulation Game for Historical Education: The Hindenburg Disaster

Khairil Nazrel Bin Khairil Khusnin, Muhammad Fayyadh Bin Muhamad Rashidi, Nurazlin Zainal Azmi*
Department of Information Systems, Kulliyyah of Information & Communication Technology,
International Islamic University Malaysia, Gombak, Malaysia

*Corresponding author: nurazlinazmi@iium.edu.my
(Received: 25th November 2025; Accepted: 31st December, 2025; Published on-line: 30th January, 2026)

***Abstract*—** History education often relies on static text and images, offering limited opportunities for experiential learning about complex historical events. This study addresses this gap by designing and examining an immersive 3D stereoscopic simulation game centered on the 1937 Hindenburg disaster. The objectives were: (i) to model a historically informed 3D replica of the Hindenburg environment, (ii) to develop an interactive gameplay experience that situates players within the unfolding event, and (iii) to conduct a pilot evaluation of usability and perceived educational value. The game was developed using Blender for asset creation and Unreal Engine 5 for implementation, following an iterative pipeline of pre-production, production, and post-production. A toggleable stereoscopic mode was integrated to enhance depth perception and immersion. The pilot evaluation was conducted with four participants using functional testing and user-acceptance feedback. Results indicated that users found the application easy to navigate, immersive, and supportive of understanding the sequence and context of the disaster, while also identifying areas for improvement such as clearer guidance and expanded interaction features. These findings provide preliminary evidence that stereoscopic serious games can serve as promising supplementary tools for historical learning and motivate future refinement and larger-scale empirical evaluation.

***Keywords*—** serious games, stereoscopic 3D, historical simulation, immersive learning, game-based learning, pilot evaluation.

## I. Introduction

History education often relies on static text, images, and teacher-centered delivery, which limits students' ability to visualize events, empathize with historical actors, and understand causal relationships. Interactive digital environments and serious games, however, have shown potential to transform historical learning from passive "learning about" to active "learning through experience," allowing learners to explore events, contexts, and consequences dynamically. The Hindenburg disaster of 1937 – a catastrophic accident that claimed 35 lives and ended the era of hydrogen-filled passenger airships – remains an important yet comparatively under-represented topic in public awareness and educational media when compared, for example, to the Titanic [1].

Prior work has demonstrated that simulation and game-based learning can improve motivation, immersion, and conceptual understanding in history education. Studies on historical strategy and role-playing games report increased engagement, critical thinking, and perspective-taking when learners interact with reconstructed historical environments rather than simply reading about them. Meanwhile, modern simulation games such as Microsoft Flight Simulator and Stormworks illustrate how realism, interactivity, and physics-based systems can meaningfully support experiential learning. However, few existing studies explore the use of stereoscopic 3D environments specifically for historical reenactment, particularly those combining narrative decision-making, immersive perspectives, and historically grounded reconstruction.

This study addresses that gap by proposing a 3D stereoscopic simulation game centered on the Hindenburg disaster. The primary aim is to recreate the historical event through an immersive stereoscopic view, enabling users to explore the airship environment and understand the sequence of events leading to the tragedy. The specific objectives of this work are:

1) to design a 3D replica of the Hindenburg airship based on historical references

https://doi.org/10.31436/ijpcc.v12i1.665

2) to develop an interactive gameplay experience that situates users within the disaster scenario; and:

3) to conduct usability-oriented user testing to examine navigation, immersion, and perceived educational value.

The main contributions of this work are threefold. First, it presents a practical design framework for integrating stereoscopic 3D technology into a serious historical game. Second, it demonstrates a prototype that translates historical narrative elements into interactive first-person gameplay. Third, it provides preliminary user-testing insights regarding usability, immersion, and learning perception, informing future development of stereoscopic educational simulations.

The remainder of this paper is organized as follows. Section II reviews related work on simulation games, historical learning, and stereoscopic environments. Section III describes the methodology and development approach, including asset modeling and gameplay design. Section IV details implementation procedure. Section V presents results and user feedback. Section VI concludes the paper and outlines directions for future work.

## II. Literature Review

### A. Game-Based Learning and Historical Understanding

Existing research consistently shows that game-based learning can shift history learning from passive recall to active meaning-making. Strategy and role-playing games allow learners to experiment with multiperspectivity, causality, and "what-if" scenarios, encouraging them to reason about historical events as dynamic systems rather than fixed narratives [2]-[3]. Studies further report increases in motivation, immersion, and historical empathy when learners interact with simulated historical environments rather than relying solely on texts or lectures [4]-[5].

### B. Immersion, Interactivity, and Engagement

Simulation games such as Microsoft Flight Simulator and Stormworks: Build and Rescue demonstrate how realism, physics-based mechanics, and open-ended problem-solving can support experiential learning. Meanwhile, titles such as Portal (in stereoscopic configurations) illustrate the value of depth perception and spatial interaction in puzzle-based environments. Collectively, these works suggest that immersion and meaningful interaction are key to sustaining engagement and supporting deeper cognitive processing.

Table I maps key features observed in reference games to the design of our proposed system. Microsoft Flight Simulator contributes principles of realism and environmental authenticity [6]; Stormworks informs interactivity through physics-driven tasks [7]; Portal demonstrates depth-driven immersion and puzzle-based engagement [8]; and Titanic: Fall of a Legend highlights historically grounded storytelling [9]. These elements were selectively adapted not as direct replications, but as design heuristics guiding how realism, interactivity, narrative structure, and stereoscopic depth could be integrated into a unified educational simulation.

TABLE I
GAME FEATURES ADAPTATION MATRIX

| Feature / Game | Graphics | Interactivity | Storytelling | Stereoscopic |
|---|---|---|---|---|
| Microsoft Flight Simulator | ✓ | ✓ | | |
| Stormworks | | ✓ | | |
| Portal (3D) | ✓ | ✓ | ✓ | ✓ |
| Titanic: Fall of a Legend | ✓ | ✓ | ✓ | |

### C. Historical Simulation and Narrative Experience

Historical exploration games, including Titanic: Fall of a Legend, show how reconstructed environments and narrative progression can help players connect emotionally with past events. However, many such systems rely on monoscopic visuals and largely linear storytelling, offering limited embodied experience or decision-based exploration.

### D. Identified Gap and Design Rationale

While prior studies support the educational value of serious games, few works explicitly combine:
(i) historically grounded environments,
(ii) interactive narrative branching, and
(iii) stereoscopic 3D immersion [3]-[5], [10].

This gap shapes the design rationale of the Hindenburg simulation, which integrates first-person perspective, decision-based interaction, and stereoscopic depth to encourage users to reason about events while experiencing them from within the scenario. The review therefore establishes the foundation for our design choices: realism and interactivity to promote engagement, narrative framing to support understanding, and stereoscopic rendering to amplify immersion and presence.

## III. Methodology

This project followed a structured three-phase game-development pipeline consisting of pre-production, production, and post-production activities (Fig. 1). This structure ensured systematic planning, technically grounded implementation, and iterative refinement aligned with the project objectives.

https://doi.org/10.31436/ijpcc.v12i1.665

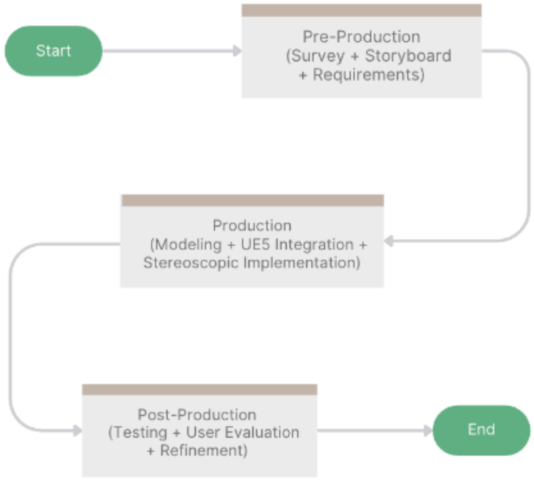


Fig. 1 Overall development methodology

### A. *Pre-Production*

The pre-production phase focused on understanding user expectations and defining design requirements. A short online survey (n = 22) was distributed to undergraduate students via Google Forms. The survey consisted of multiple-choice questions covering:

i. prior experience with simulation and historical games,
ii. interest level in history-focused gameplay,
iii. perceived usefulness of immersive 3D environments for learning, and
iv. willingness to use stereoscopic 3D features.

Results indicated strong interest in historical simulations (95.5%) and positive attitudes toward stereoscopic viewing (72.7%), supporting the decision to proceed with an immersive, narrative-driven design. These findings were used to refine gameplay scope, interaction complexity, and visual presentation.

Narrative elements, character roles, and scene layouts were storyboarded using Adobe Fresco. Assets, environments, and interaction flows were defined at this stage to ensure coherence between educational intent and gameplay elements.

### B. *Production*

During the production phase, all 3D models – including characters, interior furnishings, and the Zeppelin structure – were created in Blender and textured for visual realism. Characters included four roles (Passenger, Ship Crew, Engineer, and Bystander) designed according to 1930s references [11]. Models were rigged and exported to Unreal Engine 5.

Within Unreal Engine, one complete storyline from the passenger perspective was implemented. Core mechanics included first-person navigation, object interaction, triggered dialogue, and scripted event sequences. A stereoscopic system was developed using blueprint scripts enabling toggling between normal and stereoscopic mode, adjusting field-of-view, and saving player preferences.

### C. *Post-Production*

The post-production phase focused on testing and evaluation. Functional testing ensured correct navigation, interaction behavior, and stability across scenes. User acceptance testing was conducted with four participants from mixed technical backgrounds. Participants were asked to complete a guided gameplay session and provide feedback on ease of navigation, clarity of content, immersion, and perceived educational value.

Observations and questionnaire responses were analyzed descriptively. Feedback highlighted strengths in realism and immersion, while suggesting clearer tutorials and extended interactive content.

### D. *Narrative Structure*

The system was designed to support dual perspectives: a passenger attempting to escape the disaster and a bystander assisting in rescue coordination. Although only the passenger storyline was fully implemented due to scope constraints, both perspectives were planned to encourage critical reflection on different lived experiences of the same historical event.

## IV. Implementation

### A. *Application Architecture and Development Framework*

The system was implemented as an immersive educational simulation structured around three tightly integrated layers: content creation, interaction and narrative control, and stereoscopic presentation. This architecture ensures that historical fidelity, player agency, and perceptual immersion work together to support experiential learning.

Blender was used to construct historically grounded three-dimensional assets, including the airship interior, environmental props, and character models (Fig. 2 – Fig. 4). These assets form the spatial and visual context that allows users to explore the Hindenburg as a lived environment rather than a static reconstruction. Unreal Engine 5 served as the primary runtime platform, managing real-time rendering, interaction logic, and stereoscopic visualization. Adobe After Effects was employed to create cinematic sequences and animated overlays that introduce historical context and support narrative flow.

The use of this three-tool pipeline was intentional: Blender provides modeling accuracy and flexibility, Unreal Engine enables interactive and immersive simulation, and After Effects allows controlled narrative framing. Together,

https://doi.org/10.31436/ijpcc.v12i1.665

they support both technical realism and pedagogical clarity, which are essential for serious games in historical education.

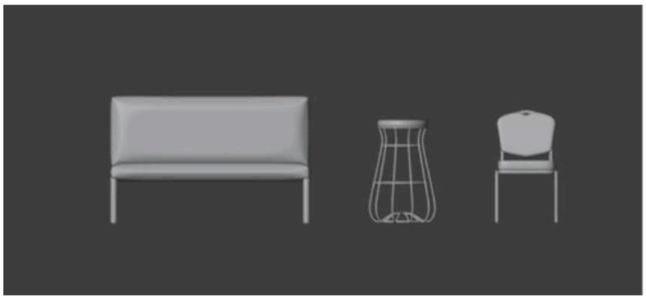

Fig. 2 Chair models

Fig. 3 The passenger model

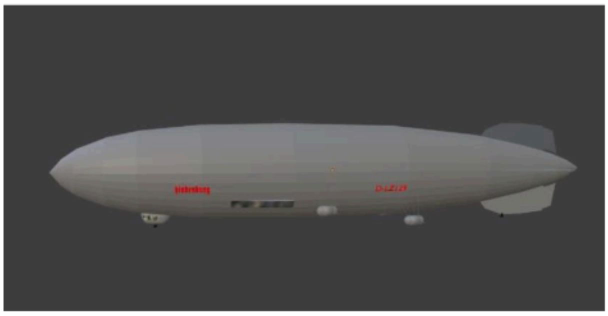

Fig. 4 Zeppelin airship model

### B. *Interactive and Narrative Design*

Player interaction was designed to promote agency, engagement, and causal reasoning, which are core to experiential learning. Within Unreal Engine, blueprints were used to implement movement, object interaction, triggered events, and environmental navigation. These mechanics allow players to actively explore the airship, respond to hazards, and progress through the unfolding disaster scenario.

The game was structured around a first-person perspective to enhance embodiment and situational awareness. Although the full dual-perspective design (passenger and bystander) was planned, the passenger storyline was fully implemented and used for evaluation. This perspective places players inside the airship, where they must navigate physical space and make decisions under time pressure, reinforcing the cognitive and emotional dimensions of the historical event.

### C. *Stereoscopic Rendering and Usability Design*

A key feature of the system is its toggleable stereoscopic 3D mode, which enhances depth perception and spatial realism. Unreal Engine renders dual viewpoints corresponding to the left and right eyes, producing a three-dimensional visual experience when viewed with compatible 3D glasses.

To balance immersion with comfort and accessibility, several usability-oriented features were implemented:

- Adjustable field-of-view (FOV) allows users to modify perspective to reduce eye strain and improve visual comfort (Fig. 5).
- Toggleable stereoscopic mode enables users to switch between stereoscopic and standard rendering depending on preference or hardware capability (Fig. 6).
- Persistent settings allow stereoscopic preferences to be saved and loaded across sessions, preventing repetitive reconfiguration.

These features ensure that immersion does not come at the expense of usability, which is especially important in educational contexts where cognitive load must be carefully managed.

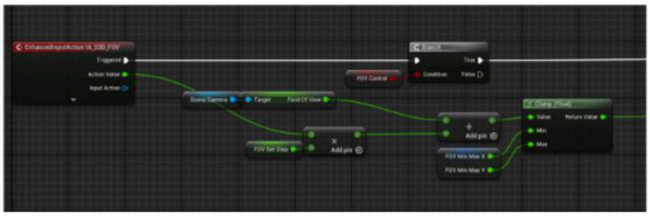

Fig. 5 Blueprint for the FOV slider adjustment

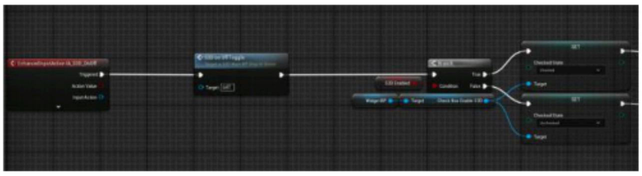

Fig. 6 On and off blueprint for the stereoscopic option

### D. *Media Integration and Scene Composition*

To support narrative comprehension and historical context, 2D and 3D media elements were integrated into the gameplay experience. Adobe After Effects was used to create animated sequences such as the Hindenburg introduction, location reveal, and newspaper highlights (Fig. 7 – Fig. 8). These scenes provide historical framing before

https://doi.org/10.31436/ijpcc.v12i1.665

and during gameplay, guiding players' understanding of the event.

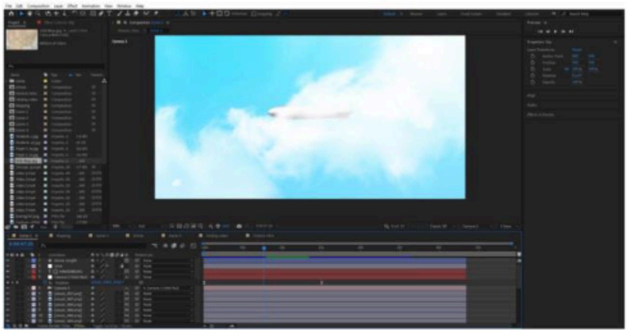

Fig. 7 Introduction to Hindenburg composition

Belleville Daily News-Democrat

32 KILLED IN ZEPPELIN EXPLOSION

Former Local Woman Missing in Zep Crash

ROMEISER DAUGHTER WAS ON SHIP

Helium to Be Used in All New Zeppelins

HINDENBURG EXPLODING IN MIDAIR!

GIANT DIRIGIBLE BLOWS UP AS IT COMPLETES TRIP

SURVIVORS TELL

Fig. 8 The Hindenburg disaster newspaper highlight [12]

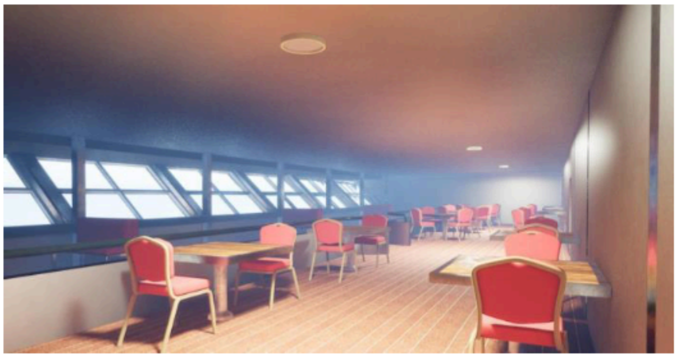

Fig. 9 Passenger lounge

Fig. 10 Smoking room

Within Unreal Engine, 3D environments – including passenger lounges, smoking rooms, and airship interiors – were assembled with lighting, textures, and physics effects to simulate the atmosphere of the 1930s Zeppelin (Fig. 9 – Fig. 10). These environments serve not merely as visual backdrops but as interactive learning spaces in which players observe, navigate, and react to unfolding events.

### E. *Audio and Multimodal Integration*

Audio was treated as a critical component of immersion and learning. Ambient sounds, environmental effects, and era-appropriate music were layered to create a believable soundscape. Narration was generated using AI-based text-to-speech tools (ElevenLabs and TTSMaker) and synchronized with cutscenes and gameplay to reinforce storytelling and guide attention.

The coordinated integration of audio, visual, and interactive elements creates a multimodal learning environment in which users process historical information through sight, sound, and action rather than through text alone.

## V. Testing and Evaluation

This evaluation was conducted as a pilot study to assess system functionality, usability, and perceived educational value prior to any large-scale deployment. The objective was not to establish statistically generalizable learning outcomes, but to determine whether the system operates as intended, provides a coherent user experience, and supports immersive engagement with historical content.

The testing activities were structured into four complementary components.

### A. *Functional Validation*

Core interface elements, including navigation controls, menu systems, and character selection features, were tested to ensure reliable and intuitive operation. Particular attention was given to primary interaction elements such as the Play button, avatar selection screen, and in-game prompts to confirm that users could progress through the application without confusion or error.

### B. *Multimedia Synchronization*

The application's audiovisual components were evaluated to ensure smooth playback and correct synchronization between video, audio, and stereoscopic rendering. This included verification of cutscene timing, narration alignment, and responsiveness of stereoscopic adjustments, ensuring that multimedia elements did not disrupt immersion or comprehension.

https://doi.org/10.31436/ijpcc.v12i1.665

### C. *Gameplay Mechanics*

Player movement, object interaction, and environmental triggers were tested to confirm accurate system response to user input. These tests ensured that navigation within the airship, interaction with key objects, and progression through scripted events functioned consistently and as designed.

### D. *Immersive Experience and Visual Fidelity*

Immersion was evaluated by examining the stability and consistency of stereoscopic 3D rendering across different scenes and gameplay states. Loading accuracy, depth perception, and persistence of user-defined stereoscopic settings were verified to ensure that the immersive experience remained coherent throughout gameplay.

### E. *Pilot User Evaluation*

User acceptance testing was conducted with four participants from mixed backgrounds (three students and one engineer). Participants completed a guided gameplay session followed by structured feedback on navigation, content clarity, immersion, and overall experience. A test plan covering navigation, multimedia playback, gameplay mechanics, and stereoscopic functionality was executed, with all core system functions achieving a 100% pass rate (Fig. 11).

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 5 | Test Case | Step | Test Steps | Expected Result | Actual Result | Pass/Fail | Note |
| 6 | Functional Test Cases | | | | | | |
| 7 | Test Case ID: TC_001 Test Title : Verifying the button functionalities in Home Screen | 1 | Click on the "PLAY" button. | Player navigates to the opening video. | | Pass | Home Screen |
| 8 | | 2 | Click on the "OPTION" button. | Option menu pop up. | | Pass | Home Screen |
| 9 | | 3 | Player change the setting accordingly to their preferences and click on the "APPLY" button. | The game will update to the new setting. | | Passs | Home Screen |
| 10 | | 4 | Player click on the "BACK" button. | Player will be redirected to the main menu. | | Pass | Home Screen |
| 11 | | 5 | Click on the "EXIT" button. | Game exits successfully. | | Pass | Home Screen |
| 12 | Test Case ID: TC_002 Test Title : Testing the Opening Video | 1 | Opening video played automatically | The opening video played with sound. | | Pass | Opening Video |
| 13 | | 2 | Click on the "Skip/Play" button. | The opening video is skipped and directed to player selection menu. | | Pass | Opening Video |
| 14 | Test Case ID: TC_003 Test Title : Verifying the Character Selection Screen | 1 | Verify character selection screen loads. | Character selection screen loads with 2 options. | | Pass | Character Selection |
| 15 | | 2 | Click on Passenger Experience. | Player will be teleported to passenger level. | | Pass | Character Selection |
| 16 | | 3 | Click on Bystander Experience. | Player will be teleported to bystander level. | | Pass | Character Selection Screen |
| 17 | Test Case ID: TC_004 Test Title : Testing Character Movement with Keyboard and Mouse Control | 1 | Press W to move the character forward. | The character moves forward when W is pressed. | | Pass | In Game |
| 18 | | 2 | Press S to move the character backward. | The character moves backward when S is pressed. | | Pass | In Game |
| 19 | | 3 | Press A to move the character left. | The character moves left when A is pressed. | | Pass | In Game |
| 20 | | 4 | Press D to move the character right. | The character moves right when D is pressed. | | Pass | In Game |
| 21 | | 5 | Press spacebar to make the character. jump | The character jumps when spacebar is pressed. | | Pass | In Game |
| 22 | | 6 | Press Ctrl to crouch the character. | The character crouches when Ctrl is pressed. | | Pass | In Game |
| 23 | | 5 | Move the mouse left, right, up, and down to look around. | The camera view changes smoothly when the mouse is moved. | | Pass | In Game |
| 24 | | 6 | Combine keyboard and mouse movements simultaneously. | The character moves and looks around simultaneously without lag or unexpected behavior. | | Pass | In Game |
| 25 | Test Case ID: TC_005 Test Title : Testing 3D Stereoscopic Mode | 1 | 3D stereoscopic settings automatically popup on each level. | Player will be able to change the setting accordingly. | | Pass | in Game |
| 26 | | 2 | Click on "Save" button. | Player can save the stereoscopic setting. | | Pass | In Game |
| 27 | | 3 | Click on "Load" button. | Player load the stereoscopic setting from previous save. | | Pass | In Game |
| 28 | | 4 | Click on small circle button on the top right. | The 3D stereoscopic settings popup disappear. | | Pass | In Game |

Fig. 11 Screenshot of selected functional test cases

Although the sample size was limited, the pilot provided valuable insight into usability and perceived learning value. Participants reported high levels of immersion and generally strong understanding of the historical content, while also identifying areas for refinement. Suggested enhancements included clearer onboarding and tutorials, richer gameplay mechanics for experienced users, and expanded stereoscopic features, as summarized in Table II.

TABLE III
SUMMARY OF PARTICIPANT FEEDBACK

| **Participant Background** | **Ease of Navigation** | **Understanding of Content** | **Key Suggestion** |
|---|---|---|---|
| BIT Student (Novice Gamer) | Excellent | Good | None |
| Engineer (Hardcore Gamer) | Excellent | Excellent | Add advanced gameplay mechanics |
| BIT Student (Novice Gamer) | Good | Good | Simpler tutorial needed |
| BIT Student (Gamer) | Excellent | Excellent | Expand stereoscopic features |

## VI. CONCLUSION

This study presented the design, implementation, and pilot evaluation of a 3D stereoscopic simulation game for historical education, using the Hindenburg disaster as a case study. The results of the pilot study indicate that immersive, interactive environments have strong potential to support historical understanding by allowing learners to experience events from within a reconstructed context rather than through static representations alone. Participants reported high levels of engagement, clear navigation, and meaningful interaction with the historical content, suggesting that the system provides a viable foundation for experiential history learning.

Rather than making definitive claims about learning effectiveness, this work contributes a proof-of-concept demonstrating how stereoscopic rendering, narrative-driven gameplay, and first-person interaction can be integrated into a serious game for history education. The findings from the pilot study offer early evidence that such systems are usable, immersive, and educationally promising, while also identifying practical areas for refinement.

Despite its successful implementation of a fully functional passenger-level experience and stereoscopic system, the project was constrained by hardware limitations and the complexity of Unreal Engine 5, which restricted the completion of the planned bystander perspective and limited the depth of visual effects.

Future work will therefore focus on:

- completing the bystander perspective to support multi-viewpoint historical reasoning;

https://doi.org/10.31436/ijpcc.v12i1.665

- refining stereoscopic rendering for greater visual comfort and depth perception;
- optimizing performance for a wider range of devices, including mobile platforms; and
- replacing placeholder assets with custom-designed models to improve visual coherence and historical authenticity.

Overall, this pilot study establishes a solid technical and pedagogical foundation for future large-scale evaluation of stereoscopic serious games as tools for immersive historical learning.


## ACKNOWLEDGMENT

First and foremost, we extend our deepest gratitude to Allah, whose endless blessings and guidance have allowed us to complete this project successfully.

We would like to express our heartfelt appreciation to our supervisor, Dr. Nurazlin Zainal Azmi, for her invaluable guidance, constructive feedback, and unwavering support throughout the process. Her encouragement and insights have been instrumental in shaping this work.

Special thanks are due to all our lecturers, for their dedication, knowledge, and mentorship, which have greatly contributed to our academic journey. Lastly, we would like to express our sincere gratitude to all our dear friends for their support, kindness, and companionship, which made this journey memorable and fulfilling.


## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHOR(S) CONTRIBUTION STATEMENT

All authors contributed equally to this work.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

This study did not require ethical approval

## REFERENCES


[1] D. Grossman, "The Hindenburg Disaster," Airships.net, Jun. 28, 2019. [Online]. Available: https://www.airships.net/hindenburg/disaster/ [Accessed: Jan. 7, 2026].

[2] L. Radetich and E. Jakubowicz, "Using Video Games for Teaching History. Experiences and Challenges," Athens J. Hist., vol. X, no. Y, pp. 1–14, 2014.

[3] A. Hellerstedt and P. Mozelius, "Game-based Learning for History: Student Perceptions and Preferences," in Proc. Irish Conf. Game-Based Learn., Cork, Ireland, 2024, pp. 1–7.

[4] B. D. Redder, "Revitalisation of History through Historical Games in the Digital Era: An Opening Provocation into Teaching History through Multimodality," in Revitalising Higher Education: Insights from Te Puna Aurei LearnFest 2022, T. Bowell, N. Pepperell, A. Richardson, and M.-T. Corino, Eds. Cardiff, U.K.: Cardiff Univ. Press, 2024, pp. 71–79.

[5] G. P. Kusuma, L. K. P. Suryapranata, E. K. Wigati, and Y. Utomo, "Enhancing Historical Learning Using Role-Playing Game on Mobile Platform," Procedia Comput. Sci., vol. 179, pp. 886–893, 2021.

[6] Asobo Studio, "Microsoft Flight Simulator," 2020. [Online]. Available: https://www.asobostudio.com/games/microsoft-flight-simulator. [Accessed: Jan. 9, 2026].

[7] Geometa, "Stormworks: Build & Rescue," 2018. [Online]. Available: https://geometa.co.uk/stormworks. [Accessed: Jan. 9, 2026].

[8] N. Schneider, "Portal Stereoscopic 3D Review," MTBS3D – Meant To Be Seen 3D, Jun. 7, 2010. [Online]. Available: https://www.mtbs3d.com/articles/game-reviews/11439-portal-stereoscopic-3d-review.html. [Accessed: Jan. 9, 2026].

[9] Interactive Gaming Studios, "Titanic: Fall of a Legend" [Video Game]. Steam, 2022. [Online]. Available: https://store.steampowered.com/app/1835200/Titanic_Fall_Of_A_Legend/. [Accessed: Jan. 9, 2026].

[10] G. Inan Kaya and E. Sar Ijbilen, "Educational use of games: A mobile serious game for history education," in Edu World 2016 7th International Conference, 2017, pp. 1001–1008

[11] Schneider, S. R. (2021). What Men REALLY Wore in the 1930s. Gentleman's Gazette.

[12] The Brick & Maple, "Hindenburg," The Brick & Maple, accessed on Dec. 27, 2025. [Online]. Available: https://thebrickandmaple.com/tag/hindenburg/.