

JPLVENTURES: An Android 3D Game about Jose P. Laurel for LPU – Cavite

Samue Luis Lucido¹, Joma T. Peralta², John Rhovic V. Juliado³, Philip B. Heje⁴,
Alyssa Vicente⁵, Joven B. Cajigas⁶, Edison Feranil⁷, Toni D. Granado⁸

¹²Lyceum of the Philippines - Cavite, General Trias, Philippines

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Abstract: With the continuous advancement of technology, game-based learning has been increasingly integrated into various subjects to enhance student engagement and improve learning outcomes. Research shows that students are more motivated and retain knowledge better when instructional objectives are reinforced through games and interactive activities (Plass, 2022; Sutton, 2021; Fasanella, 2020). This study aims to develop a mobile game as an alternative learning platform focused on the subject *JPL Life and His Works* at Lyceum of the Philippines University – Cavite. A mixed-methods approach was employed, with a pre-survey distributed to fifty-six (56) students across all year levels. The game was developed using Unity 3D, Adobe Photoshop, Blender for 3D asset creation, and C# as the programming language within the Unity engine, designed specifically for Android mobile devices. System evaluation included compatibility and functionality testing. Results from thirty (30) student users and ten (10) IT experts, assessed using the MARS (Mobile App Rating Scale), rated the system as “highly acceptable” with an average mean score of 3.63 and a standard deviation of 0.42. Findings suggest that the developed mobile game effectively enhances student involvement and provides an engaging and efficient learning experience. This research demonstrates the potential of mobile game-based platforms as valuable tools to support learning in higher education.

Keywords: LPU-Cavite, 3D game, Educational game, Jose P. Laurel, History, Interactive game.

I. INTRODUCTION

Many students today face considerable challenges when engaging with academic subjects they perceive as difficult, particularly when traditional instructional methods dominate the learning process. Common approaches such as lecture-based discussions, passive reading, or worksheet-driven exercises often fail to stimulate students’ interest or foster meaningful engagement. Based on the proponents’ preliminary survey, many respondents reported that the course *JPL Life and His Works* is particularly demanding, especially due to the memorization of historical names, dates, and terminologies. As Tan (2018) observes, history is an inherently challenging subject because it requires both comprehension and memorization yet often fail to resonate with students when taught through conventional means. This disconnect between instructional delivery and student engagement can lead to reduced motivation, lower retention of information, and overall academic underperformance. In recent years, educational research has increasingly highlighted the value of integrating technology and game-based learning to improve student outcomes. Game-based learning leverages interactive digital platforms to enhance student motivation, participation, and retention by aligning educational objectives with engaging, play-based experiences (Sutton, 2021; Fasanella, 2020). According to the researchers’ pre-survey findings, a significant majority of student respondents expressed enthusiasm for an interactive game to support their learning in the *JPL Life and His Works* course, with 84.6% preferring the platform to be Android-based and 86.7% favoring its accessibility on mobile devices. These insights suggest that an educational game tailored to the course content could significantly improve students’ learning experiences by transforming memorization tasks into more interactive and enjoyable activities. In response, the researchers propose the development of “JPLVENTURES: An Android 3D Game About Jose P. Laurel for Lyceum of the

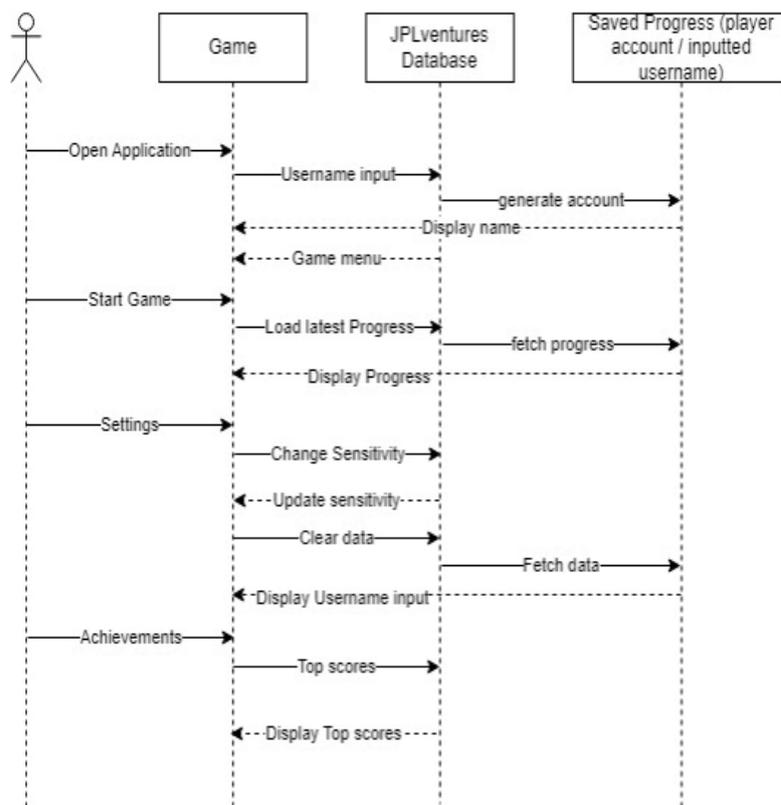
Philippines University – Cavite”. This educational system is designed to supplement traditional learning methods by providing an engaging, game-based approach to studying the life and contributions of Jose P. Laurel, the university’s founder. By making the learning process more interactive, the project aims to increase student interest, strengthen historical understanding, and promote deeper retention of key concepts. Furthermore, the researchers envision this initiative as a meaningful contribution to the university’s commitment to Sustainable Development Goal (SDG) #4: Quality Education, which emphasizes the importance of providing inclusive, equitable, and innovative learning opportunities that empower students and enhance educational outcomes.

II. METHODOLOGY

A. Process Model

According to Vanner (2020), process modelling visually represents the workflows or operations within an organization, breaking each phase down into its individual components for a clearer understanding. Much like a detailed flowchart, it maps out every task involved in the procedure, showing how these tasks interconnect and align with the broader organizational context. This approach provides a comprehensive view of the entire process, helping stakeholders understand the sequence, dependencies, and overall impact of each activity within the organizational environment.

Figure 1: Sequence Diagram of JPLVENTURES



In Figure 1, the Sequence Diagram illustrates the game’s flow: when the player starts the game, they must first input a username to create an account. After account creation, the main menu appears, offering options such as starting the game, adjusting settings, or viewing achievements. If the player chooses to start the game, the system loads the latest progress linked to their username. Through the settings menu, the player can modify the game’s sensitivity, with any changes automatically saved to their preferences. Additionally, the player can opt to create a new game by clearing existing data, which deletes the current database and requires setting up a new username or account. The achievements section allows the player to view earned achievements based on their current progress in the game.

fails, they respawn in the hallway at the current level, while successfully completing a challenge allows them to advance to the next stage. The Settings option enables the player to adjust movement sensitivity, the Instructions section provides gameplay guidance, and the Quit Game button allows the player to exit the application.

B. User Interface Design

The user interface refers to the components of the project that users directly interact with, encompassing the visual appeal, usability, and overall simplicity of the system. A well-designed user interface not only attracts users but also ensures a smooth and intuitive experience, allowing them to navigate and perform tasks efficiently without confusion or unnecessary complexity.

Figure 4: User Interface – Main Menu of “JPLVENTURES”



Figure 4 showcases the main menu interface of JPLventures, providing users with a clear and organized selection of key actions. The menu includes options such as "Start Game," "Almanac," "Settings," "Achievements," "Instructions," "Credits," and "Quit Game," ensuring intuitive navigation and accessibility. This layout enhances the user experience by allowing players to easily access game features, review progress, adjust preferences, and understand gameplay mechanics before beginning their adventure.

Figure 5: High score button from the Main menu of “JPLVENTURES”

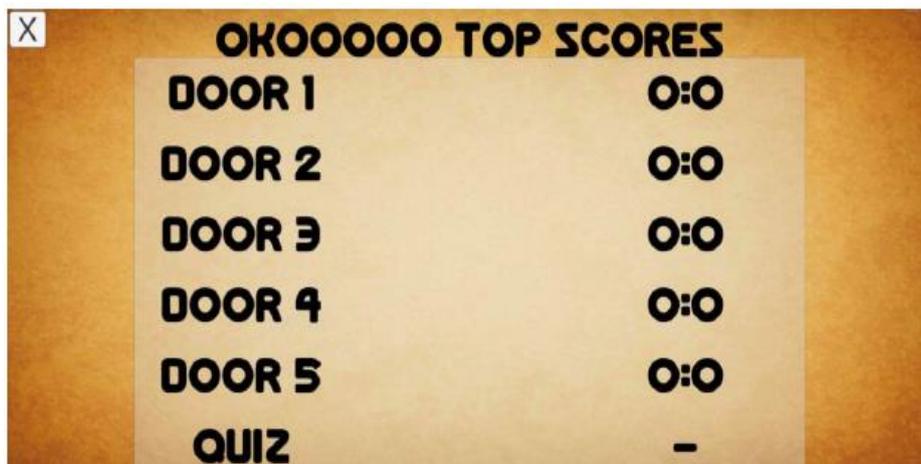


Figure 5 displays the High Score tab, where users can view the fastest completion times for each door or level. This feature highlights only the best attempt, automatically updating the record whenever a new fastest time is achieved. It provides players with a clear benchmark for performance and encourages replayability by motivating them to beat their previous records.

Figure 6: Instruction button from the Main menu of “JPLVENTURES”

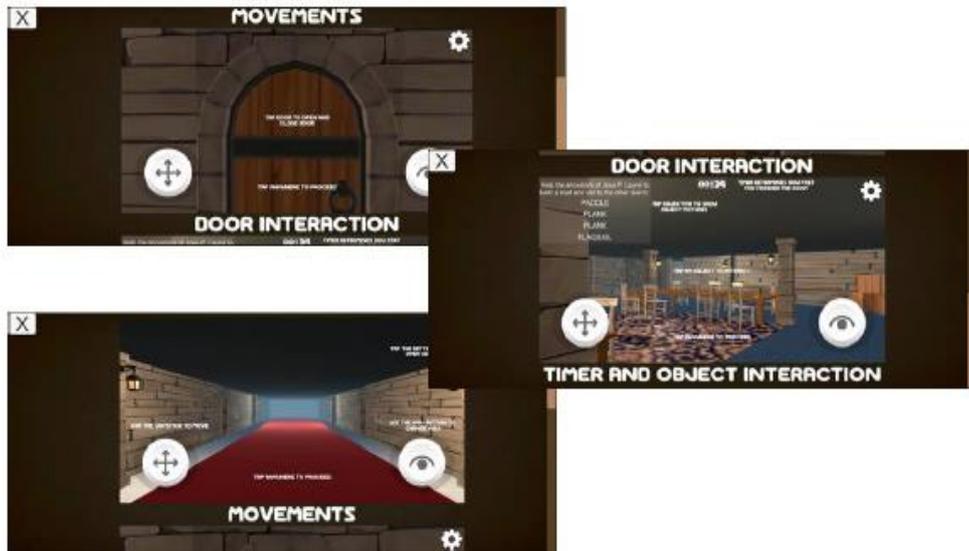


Figure 6 illustrates the screen that appears when the user clicks the "Instruction" button, providing a comprehensive guide on how to play the game. It explains the basic controls for movement, how to interact with doors, and clearly outlines the main objective of the game. This feature ensures that players, especially first-time users, can quickly understand the gameplay mechanics and engage with the game confidently.

Figure 7: Short Quiz of “JPLVENTURES”

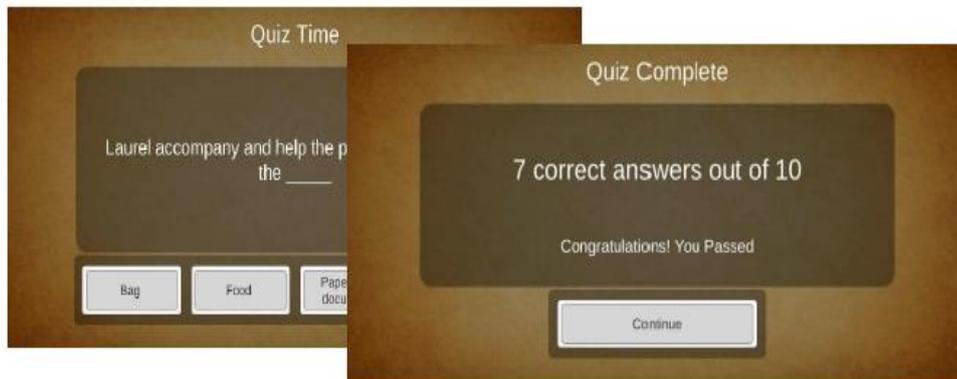


Figure 7 presents the screen that appears once the player successfully completes all five doors (1 to 5), leading to a quiz consisting of 10 questions. These questions are based on the information and content encountered throughout the game, serving as a review and assessment of the player’s understanding. This feature reinforces learning by encouraging players to recall and apply what they have experienced during gameplay.

III. RESULTS

A. Results of Testing

TABLE I: SCORING SYSTEM FOR MOBILE APPLICATION RATING SYSTEM (MARS)

Numerical Rating	Equivalent
4	Highly Acceptable
3	Acceptable
2	Fairly Acceptable
1	Unacceptable

Evaluation Procedure. The evaluation phase was successfully done with the following steps.

1. Evaluators were scheduled for a meeting depending on their scheduled availability. The evaluators are contacted using Messenger, Gmail, and MS teams.
2. Once the evaluators approved the set schedule, the evaluation proceeds.
3. The Researchers explain the relevance of the application and its features.
4. The criteria and sub-criteria of the evaluation are discussed alongside the evaluation tool.
5. The evaluators are given enough time to explore the application.
6. The evaluation form is submitted via google forms.
7. The feedback of the evaluators is tallied, and comments and recommendations were collected for the application improvement.
8. Average mean and standard deviation for the results were tallied.

TABLE II: LIKERT SCALE OF MOBILE APPLICATION RATING SYSTEM (MARS)

Numerical Rating	Equivalent
3.26 – 4.00	Highly Acceptable
2.51 – 3.25	Acceptable
1.76 – 2.50	Fairly Acceptable
1.00 – 1.75	Unacceptable

Table 2 presents the interpretation levels for evaluating the acceptability of the application. A rating between 1.00 and 1.75 indicates that the application may have failed to perform its primary functions. Scores from 1.76 to 2.50 are considered "Fairly Acceptable," suggesting that while the application runs, it lacks the consistency needed for reliable performance. Ratings between 2.51 and 3.25 fall under "Acceptable," meaning that most features meet their intended outcomes, though some improvements may still be needed. Lastly, scores from 3.26 to 4.00 are classified as "Highly Acceptable," reflecting that the application's overall functionality and objectives are effectively and smoothly executed.

TABLE III. TEST RESULTS USING THE FUNCTIONALITY TESTING

Test Respondents	Pass	Fail	Test Criteria	Percentage
Technical Adviser	27	0	27	100%
IT Expert 1	27	0	27	100%
IT Expert 2	27	0	27	100%
IT Expert 3	27	0	27	100%
IT Expert 4	27	0	27	100%
IT Expert 5	27	0	27	100%
IT Expert 6	27	0	27	100%
IT Expert 7	27	0	27	100%
IT Expert 8	27	0	27	100%
IT Expert 9	27	0	27	100%
IT Expert 10	27	0	27	100%

Table 3 highlights the functionality tests participated by one (1) technical adviser, and ten (10) IT Experts. The test instrument has 27 criteria tested; the technical adviser's evaluation resulted in a 27 out of 27 test criteria resulting in a 100% passing rate. All IT Experts passed the Functionality test with a 100% passing rate from twenty-seven (27) test criteria. Table 3 highlights the functionality tests participated by one (1) technical adviser, and ten (10) IT Experts. The test instrument has twenty-seven (27) criteria tested; the technical adviser's evaluation resulted in a twenty-seven (27) out of twenty-seven (27) test criteria resulting in a 100% passing rate. All IT Experts passed the Functionality test with a 100% passing rate from twenty-seven (27) test criteria.

TABLE IV. TEST RESULTS USING THE COMPATIBILITY TESTING

Test Respondents	Pass	Fail	Test Criteria	Percentage
Technical Adviser	4	0	4	100%
IT Expert 1	4	0	4	100%
IT Expert 2	4	0	4	100%
IT Expert 3	4	0	4	100%
IT Expert 4	4	0	4	100%
IT Expert 5	4	0	4	100%
IT Expert 6	4	0	4	100%
IT Expert 7	4	0	4	100%
IT Expert 8	4	0	4	100%
IT Expert 9	4	0	4	100%
IT Expert 10	4	0	4	100%

Table 4 shows that all eleven (11) test participants successfully passed the compatibility test, achieving a 100% passing rate across the four (4) test criteria. These results confirm the application's ability to operate smoothly on multiple Android OS versions, including 10.0, 11.0, 12.0, and 13.0. Furthermore, the testers provided valuable feedback, recommending adjustments to the app's minimum API level to enhance compatibility with a wider range of Android devices.

B. Results of Evaluation

TABLE V: MARS EVALUATION RESULTS FROM THIRTY (30) END-USERS

Criteria	Mean	SD	Interpretation	Rank
Engagement	3.68	0.40	Highly Acceptable	3
Functionality	3.69	0.40	Highly Acceptable	2
Aesthetics	3.59	0.44	Highly Acceptable	4
Information	3.71	0.38	Highly Acceptable	1
Average Mean and Standard Deviation	3.67	0.42	Highly Acceptable	

Table 5 presents the evaluation results from thirty (30) end-users, revealing an overall mean score of 3.67 and an average standard deviation of 0.42, which corresponds to a "Highly Acceptable" interpretation. Among the four criteria, *Information* received the highest mean score of 3.70 (SD = 0.38) and was ranked third, as users noted that the trivia provided in the game was highly accurate and aligned with the book. *Functionality* followed with a mean of 3.69 (SD = 0.40), ranking second due to the application's user-friendly features and overall ease of use. *Engagement* scored a mean of 3.68 (SD = 0.40), ranking third, as the application was recognized for its potential to support alternative learning and enhance student involvement. Lastly, *Aesthetics* received a mean of 3.59 (SD = 0.44), ranking fourth, as some visual elements and assets were repeatedly used, slightly affecting the overall visual appeal.

TABLE VI: MARS EVALUATION RESULTS FROM TEN (10) IT EXPERTS

Criteria	Mean	SD	Interpretation	Rank
Engagement	3.48	0.32	Highly Acceptable	3
Functionality	3.58	0.47	Highly Acceptable	2
Aesthetics	3.30	0.29	Highly Acceptable	4
Information	3.73	0.34	Highly Acceptable	1
Average Mean and Standard Deviation	3.52	0.36	Highly Acceptable	

Table 6 presents the evaluation results from ten (10) IT experts, revealing that the application achieved an overall average mean of 3.52 and a standard deviation of 0.36, interpreted as "Highly Acceptable." Among the four criteria, *Information* ranked highest with a mean of 3.73 and a standard deviation of 0.34, attributed to the accuracy of trivia content related to the book. *Functionality* followed with a mean of 3.58 and a standard deviation of 0.47, highlighting the application's useful features and user-friendly interface. *Engagement* ranked third, scoring a mean of 3.48 and a standard deviation of 0.32, as the application effectively supports supplementary learning and promotes student involvement. *Aesthetics* received the lowest rating, with a mean of 3.3 and a standard deviation of 0.29, primarily due to the repetitive use of visual assets within the game.

TABLE VII: OVERALL EVALUATION RESULTS FROM THIRTY (30) END-USERS AND TEN (10) IT EXPERTS

Criteria	Mean	SD	Interpretation	Rank
Functional Suitability	3.51	0.28	Highly Acceptable	5
Performance Efficiency	3.34	0.55	Highly Acceptable	7
Compatibility	3.59	0.54	Highly Acceptable	1
Usability	3.59	0.43	Highly Acceptable	2
Reliability	3.36	0.43	Highly Acceptable	6
Security	3.58	0.48	Highly Acceptable	3
Maintainability	3.51	0.37	Highly Acceptable	4
Portability	3.19	0.35	Acceptable	8
Average Mean and Standard Deviation	3.46	0.37	Highly Acceptable	

Table 7 presents the overall evaluation results from a combined group of thirty (30) end-users and ten (10) IT experts, with an average mean of 3.63 and a standard deviation of 0.40, interpreted as “Highly Acceptable.” Among the four evaluation criteria, Information ranked highest with a mean of 3.72 and a standard deviation of 0.37, due to the accuracy and relevance of the trivia content in relation to the book. Functionality followed closely with a mean of 3.66 and a standard deviation of 0.50, highlighting the application's intuitive features and ease of use. Engagement ranked third with a mean of 3.63 and a standard deviation of 0.39, reflecting its effectiveness in offering supplementary and interactive learning experiences for students. Aesthetics received the lowest rating, with a mean of 3.52 and a standard deviation of 0.43, primarily due to the repeated use of visual assets within the game.

III. CONCLUSION

JPLVENTURES was developed to enhance student engagement and provide a more interactive and enjoyable learning experience, transforming traditional history education into an immersive digital adventure. The project draws inspiration from a book's narrative, characters, and storyline, integrating these elements into the game to make the topic more relatable and engaging for students. Key features include player name input, time trials, a task list, trivia sections, and a scoring system—all designed to encourage participation and reinforce learning outcomes. JPLVENTURES offers an innovative approach for both students and teachers, making history more appealing through game-based learning. The application was developed using Unity 3D, with 3D assets created in Blender, visual elements designed in Adobe Photoshop, animated scenes crafted with Adobe Animation and programmed using C# within the Unity environment. It is specifically designed to run on Android smartphones operating on versions 10, 11, 12, and 13. Functionality and compatibility tests were conducted on these versions, with all features—including buttons and navigation—performing seamlessly. The application received a 100% passing rate from end users, IT experts, and the project adviser. Furthermore, a thorough evaluation using the MARS (Mobile App Rating Scale) tool was conducted with 30 end users and 10 IT experts. The app was assessed based on engagement, functionality, aesthetics, and information quality. It achieved an average mean score of 3.63 with a standard deviation of 0.51, earning a rating of “Highly Acceptable.” The evaluation results confirm that JPLVENTURES is a reliable supplementary learning tool that significantly enhances student engagement and learning effectiveness. All evaluators, including a consultant, agreed on its value, particularly for students at Lyceum of the Philippines University–Cavite.

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