Dr. Pepe: A 2D Mobile Game on Jose Rizal's Life and Works

John Adrian D. Escabel
Lyceum of the Philippines University
Brgy. San Isidro, Taysan, Batangas
0947-145-0058
John.escabel@lpubatangas.edu.ph

Joshua S. Sevilla
Lyceum of the Philippines University
Brgy. Masin Norte, Candelaria Quezon
0910-002-8877
Joshua.sevilla@lpubatangas.edu.ph

Michael H. Magmanlac
Lyceum of the Philippines University
Brgy. Banay-Banay 1, San Jose, Batangas
0956-698-4383
Michael.magmanlac@lpubatangas.edu.ph

John Paul D. Valencia
Lyceum of the Philippines University
Brgy. Marilag, Rosario, Batangas
0993-375-4448
John.paul.valencia@lpubatangas.edu.ph

ABSTRACT

Upon several studies and research regarding the development of various mobile games that include e-learning on its features, the developers came up with an idea of a mobile game that will utilize and enhance the capabilities of the users on absorbing the knowledge and ideas this game has to offer. Hence, Dr. Pepe, a 2D android game was developed specifically to aid the current generation of historians and students on learning more about the history, biography and legacy of the country's National Hero, Jose Rizal in his struggle on claiming the independence of the Philippines through his way on peaceful way.

This game was built using the Unity3D Engine to target the Android platform having a version 4.4 Kitkat up to 7.1 Nougat. The game is composed of 5 progressive stages and each of them had 10 trivias in which when collected will stack up on the collectibles section of the game. The gameplay is based on a 2D platformer, typically with 3 lives and having an on-screen controller and simple navigational menu.

To further enhance the learning of the users, the researchers added another feature, A 2D animation on the life and works of Rizal, that will help the users to gain more learnings about him. The animation was created using Adobe Flash software.

Keywords: *Jose Rizal, 2D, android game, 2D platformer game*

1.0 INTRODUCTION

As the researchers find out the E-learning is also applicable on mobile devices and these are proven in the recent years, they came up to an idea of developing an android game that helps the student to learn more about Philippines' national hero, Dr. Jose Rizal, who is also known as Pepe during Spanish time. They developed this game using the Unity 3D software, the most widely used software for developing amazing games and applications on all platforms. This lead to enhanced and faster knowledge gaining through the use of latest technological advancements today. It may seem that E-learning has many advantages and better offerings than traditional learning methods before

and the researchers used that to build this educational game. This game was built using the Unity3D Engine to target the Android platform having a version 4.4 Kitkat up to 7.1 Nougat. The game is composed of 5 progressive stages and each of them had 10 trivia in which when collected will stack up on the collectibles section of the game. The gameplay will be based on a 2D platformer, typically with 3 lives and having an on-screen controller and simple navigational menu.

1.1 Objectives of the Study

This study is specifically intended to

1. Develop an Android game with an integrated e-learning and 2D animation about Dr. Jose Rizal's life, works and legacy;
2. Use the Unity and Adobe Flash software in the development of this android game; and
3. Create an android game that will help students to know more things about Jose Rizal and entertain them with a game created with a new concept to develop their skills improving their strategic method.

2.0 LITERATURE REVIEW

The purpose of these literature is to give the researchers an idea about the related topics on their desired topic and to help them understand it.

Mobile Learning

"There are two trends that are rapidly having an increasing impact on Technology-Enhanced Learning. However, both approaches present significant technological challenges. Mobile technologies are very diverse, and the market pressure pushes the continuous development of new technologies and features" [1].

Mobile Gamification

"Digital games are exceptionally popular amongst the computerized locals, they utilize them for stimulation commitment, happiness and fun. With the rise of the web and mobile apps, edutainment and gamification are like-wise winding up progressively in the educational sector. With the rapid advancement of mobile innovations, games are now entering another era where their goal is no longer for entertaining only but also for teaching and information sharing. Games can offer intuitive learning exercises and tasks that can encourage cooperation and imagination" [2].

Motion Amplifiers

The researchers present a newly designed sketching tool for creating animated illustrations that contain the enhanced dynamics of stylized 2D animations. The system provides a set of new motion amplifiers which implement a set of highly established principles of 2D animation. [3].

"Abstract Star are ratings that are given through the evaluation of mobile apps that can directly impact the revenue of its developers. For android platform, these apps must run on different kinds of devices which increase the chance for device-specific problems and issues. Device-specific problems could impact the rating assigned to an app, given the varying capabilities of devices (eg. hardware and software)" [4].

Mobile Device User Interface (UI)

A mobile application is any type of application developed solely for mobile platform uses. It is designed and further enhanced by the API software developers used and selected.

"Skeuomorphism in UI design has received different responses about its usability and purpose in the design of smartphone apps. A poll overview was undertaken by design students to set up their familiarity with skeuomorphism and their feeling of its importance in UI plan. The outcomes demonstrated an absence of information about the regions of UI plan yet once completely investigated they concurred that skeuomorphism is pertinent yet not as a remain solitary process. In any case, it has been recognized as an outline instrument that might be utilized as a part of conjunction with different procedures as appeared by Google UI configuration investigating skeuominimalism. They likewise go to the express that they found the exploration was exceptionally helpful to them in enhancing their insight on the point and building up their range of abilities as a designer" [5].

Mobile Game Design Mechanics

A mobile game possesses the API that a mobile application has but contains huge graphics and media advancements like animation and 3d rendering to improve its output and increase its attention to entertainment and media consumption.

"Good game design happens when the game is viewed from as many perspectives as possible" [6].

"The use of spectral imaging has the advantage of being a rapid and relatively low-cost solution for the examination of large areas" [7].

"Gamification may be a new term, but the idea of using game-thinking and game mechanics to solve problems and engage audiences isn't exactly new. The military has been using games and simulations for hundreds (if not thousands) of years, and the U.S. military has been a pioneer in the use of video games across branches" [8].

Game Development

"With the advancement of computer graphics, the text-based games were replaced by the graphically immersive counterparts. In the long run, the text-based predecessor gave way to the enhanced graphically intensive genre. It introduced the developer as a worthy part of the development procedure. As resolution increased, so did the game part it requires. The reward for gaining access to the various features is the discovery of new techniques and optimizations, designed to stimulate the senses and draw the player into the fantasy" [9].

"Creating the digital games one loves to play discovers an exercise-driven, non-technical approach to game design without the need for programming or artistic expertise using Game Design Workshop" [2].

Computer Animation Algorithms and Techniques

"Computer graphics (or CG) has changed the way in experiencing the art of moving images" [10].

"Multimedia animation with multidimensional concept maps improves learning achievement" [11].

"Computer graphics and animation have created a revolution in visual effects. Advances are still being

made, and new effects are finding a receptive audience. Yet there is more potential to be realized as. players in the entertainment industry demand their own special look and desire a competitive edge. Computer animation has come a long way since the days of Ivan Sutherland and the University of Utah. Viewed as another step in the development of animation, the use of digital technology is indeed both a big and an important step in the history of animation. With the advent of low-cost computing and desktop video, the animation is now within reach of more people than ever" [12].

"Animation in multimedia learning environments has multiple facets and can serve multiple functions" [1].

"Markerless motion capture is an active research in 3D virtualization" [13].

Gamification of Learning

"When considering whether to incorporate gamification into learning and advancement methodology, guarantee that efforts are not just a "rush on" of good for nothing, superficial game components. Workers need a structure and a system to take an interest in the gamification exertion. Clearly, described the challenge before them must be providing transparency into how they can be successful and providing an explanation of gamification. These steps can lead to better learning, retention and eventually expanded primary concern comes about" [7].

"The use of simulations and digital games in learning and assessment is expected to increase over the next several years. Although there is much theoretical support for the benefits of digital games in learning and education, there is mixed empirical support. This research report provides an overview of the theoretical and empirical evidence behind five key claims about the use of digital games in education. The claims are that digital games (1) are built on sound learning principles, (2) provide more engagement for the learner, (3) provide personalized learning opportunities, (4) teach 21st-century skills, and (5) provide an environment for authentic and relevant assessment" [14].

Deep Learning Strategies

"In this study, the effects of two different interactive learning tasks, in which simple games were included were described with respect to student motivation and deep strategy use. The research involved 235 students from four elementary schools in The Netherlands. One group of students (N ¼ 128) constructed their own memory 'drag and drop' game, whereas the other group (N ¼ 107) played an existing 'drag and drop' memory game. Analyses of covariance demonstrated a significant difference between the two conditions both on intrinsic motivation and deep strategy use. The large effect sizes for both motivation and deep strategy use were in favor of the construction condition. The results suggest that constructing a game might be a better way to enhance student motivation and deep learning than playing an existing game. Despite the promising results, the low level of complexity of the games used is a study limitation" [15].

In-class Video Game Uses

"Data are gathered using observation, focus group and individual interviews, and document analysis. The high school was a rural school located in a small town in the Midwestern United States. The teacher had been teaching the

game for several years and spent one school week teaching World War II, with students playing the game in class for three days of that week. The purpose of this study was to understand teacher and student experiences with and perspectives on the in-class use of an educational video game. Results showed that the use of the video game resulted in a shift from a traditional teacher-centered learning environment to a student-centered environment where the students were much more active and engaged. Also, the teacher had evolved implementation strategies based on his past experiences using the game to maximize the focus on learning" [16].

"Games are part of a day to day life, entertaining users, but in the meantime demonstrating practices. By applying game mechanics and dynamics to tasks and e-learning processes user engagement can be increased with an e-learning application and its specific undertakings. While having numerous utilizations in commercial practices, gamification suggest entrenched strategies similar to those found in games" [17].

3.0 METHODS

This section provides a clear and precise description of how the study will be conducted.

A mobile game is a video game played on a smartphone, smartwatch, PDA, tablet computer, portable media player or calculator. IT has grown to become a big part of this innovation and it was considered a great pastime killer.

The research will focus on the game for Dr. Rizal life and works with animation. The animation is the process of making replicas of motion and the demonstration of these changes is through the means of the displaying sequential images that minimally differ from each frame. The need for this game is to teach the gamers about Rizal life and works.

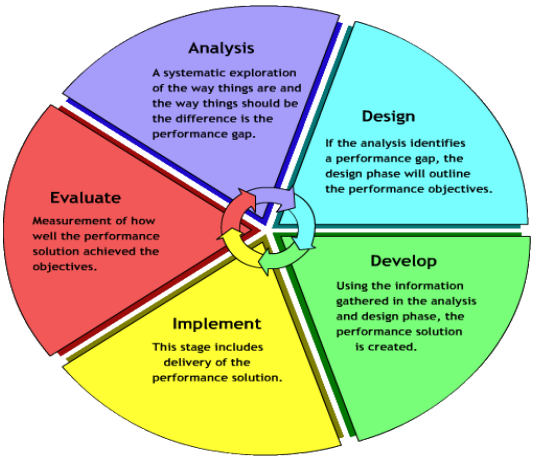

Figure 1: ADDIE Model

The researchers used ADDIE project development model; they gathered the following methods and steps for the completion of the project. This model is needed for developing an interactive game. It is used by the researchers to achieve the objectives of the proposed project. It is made up of five phases which include the following:

Analysis Phase

The researchers analyzed, researched, gathered data, more information about Jose Rizal life's and works, and documented the parts needed, the user, the content, and the technology used in the process.

Need Analysis

The researchers arbitrated and researched the things, data, and information that are needed and required to make the adventure game of Dr. Jose Rizal.

Researchers asked some suggestions to professionals and professors on what the better and easy to use in making this game and documentation.

User Analysis

The researchers determined who the target users of this game. Researchers conducted research and surveys about what is currently more popular and trending today in people.

Content Analysis

The researchers defined precisely the project proposal contained by researching and analyzing the needs to be developed; the scope and structure of the content, specific content that are needed by the users to learn more from Jose Rizal's life and works. Researchers focused and study more about Rizal's life and works to make it more interesting and knowledgeable for users.

Technical Analysis

The researchers established the baseline technical capabilities and specifications by conducting a research about what is the best and most appropriate to use.

Design Phase

The researchers based on the product of the analysis phase and their ideas and concept of the design in making the GUI more presentable and easy to use.

Development phase

Researchers built an Android game that defined on the former phase. The researchers used and considered all of the required skills in making the game. Researchers developed the game based on the approved creative outline and script, the concept, a storyboard of all frames and flowchart of all possible interactivity.

Implementation phase

The researchers integrated media and code, conducted production, and testing.

Evaluation Phase

The researchers asked for suggestion from different users in making this documentation and the game.

4.0 DISCUSSIONS

4.1 Flowchart

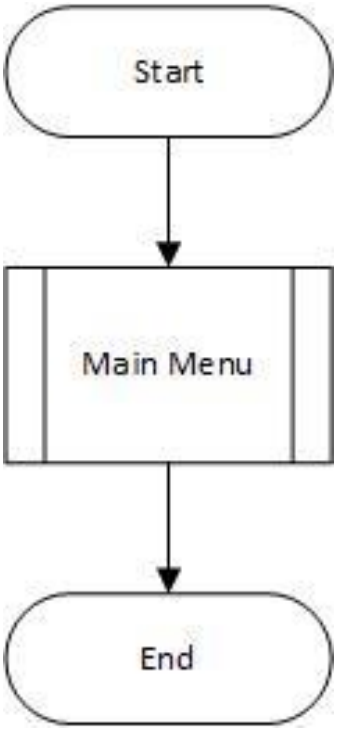

Figure 2: Main Menu

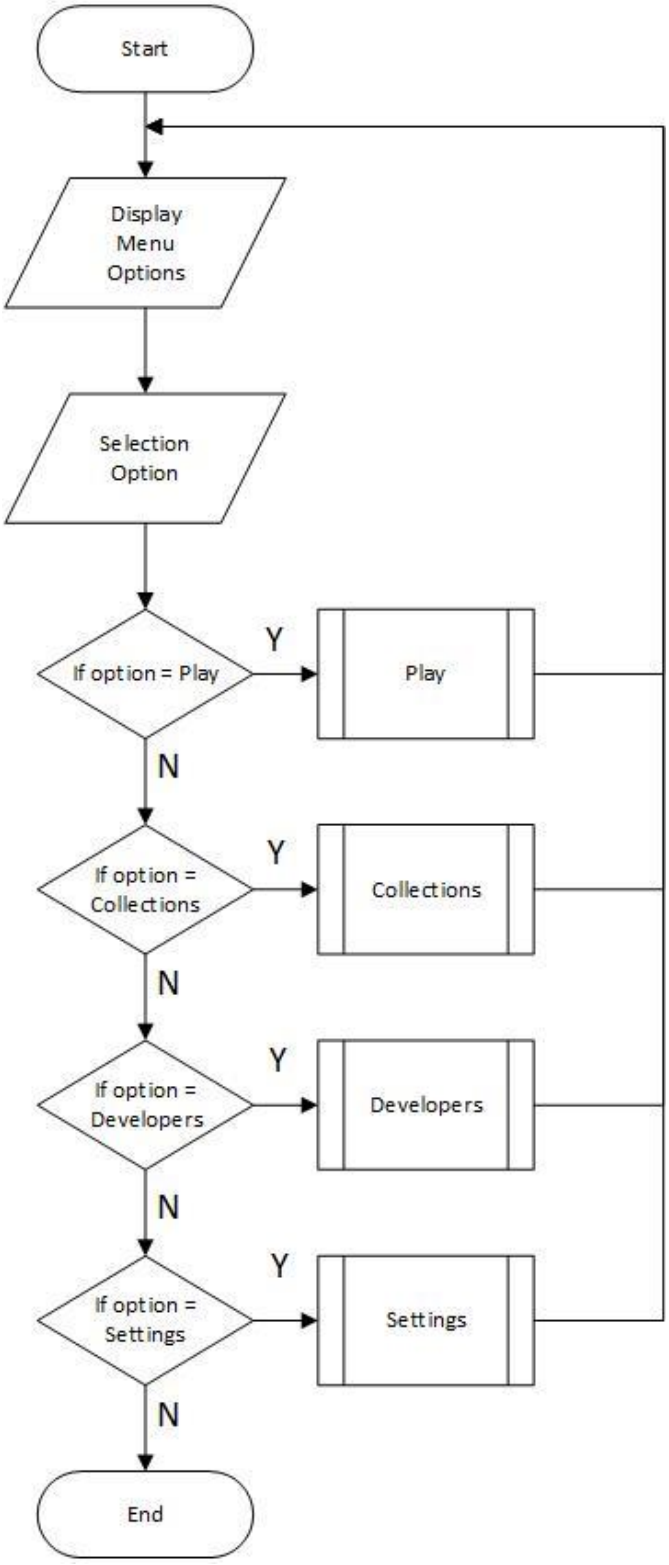

Figure 3: Menu Options

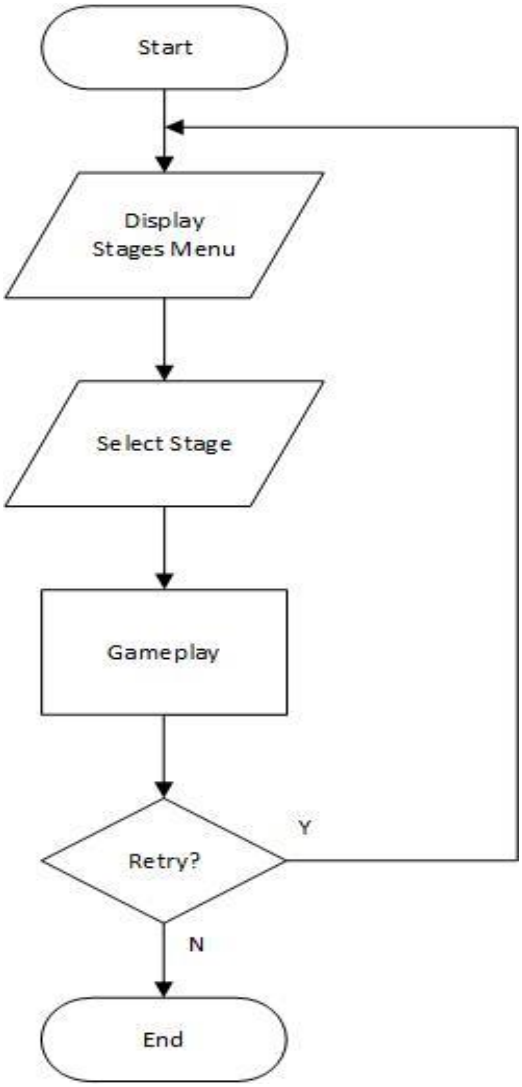

Figure 4: Play

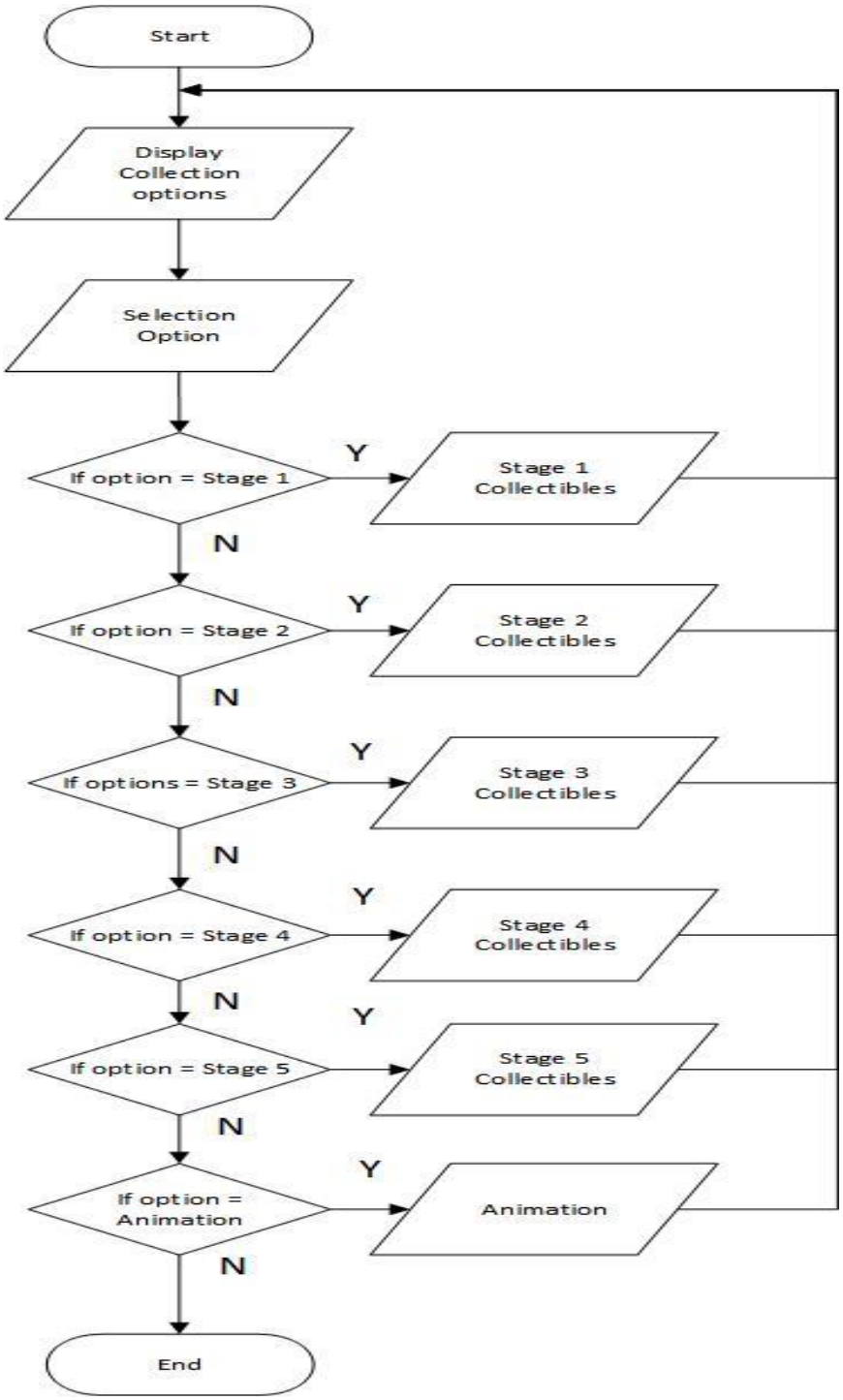

Figure 5: Collection

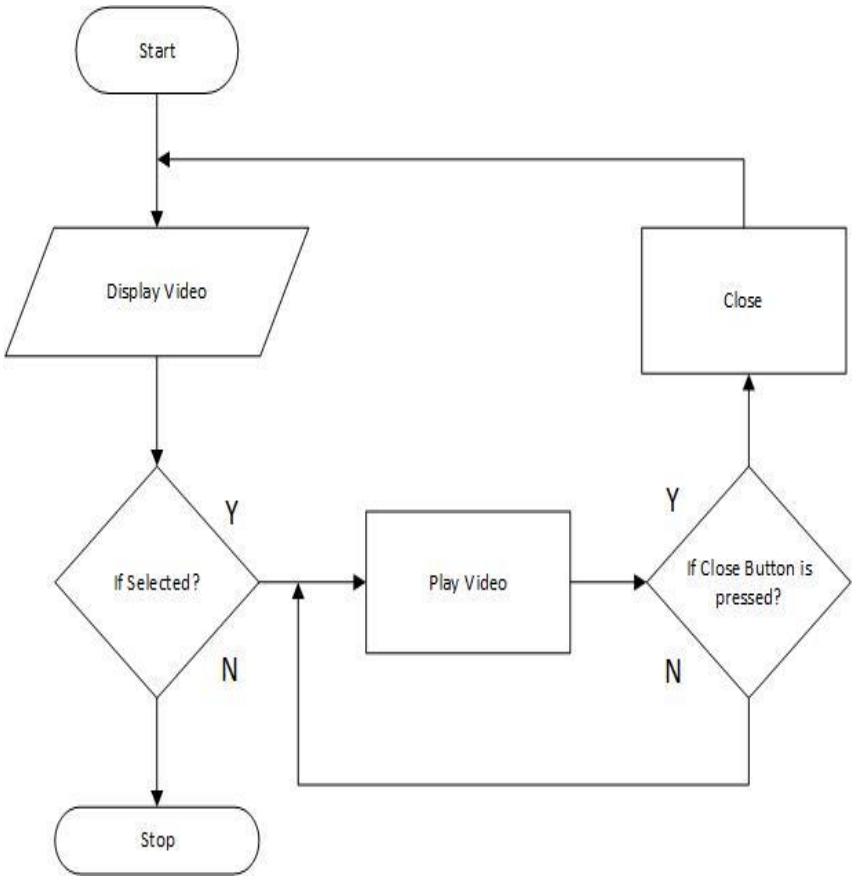

Figure 6: Video

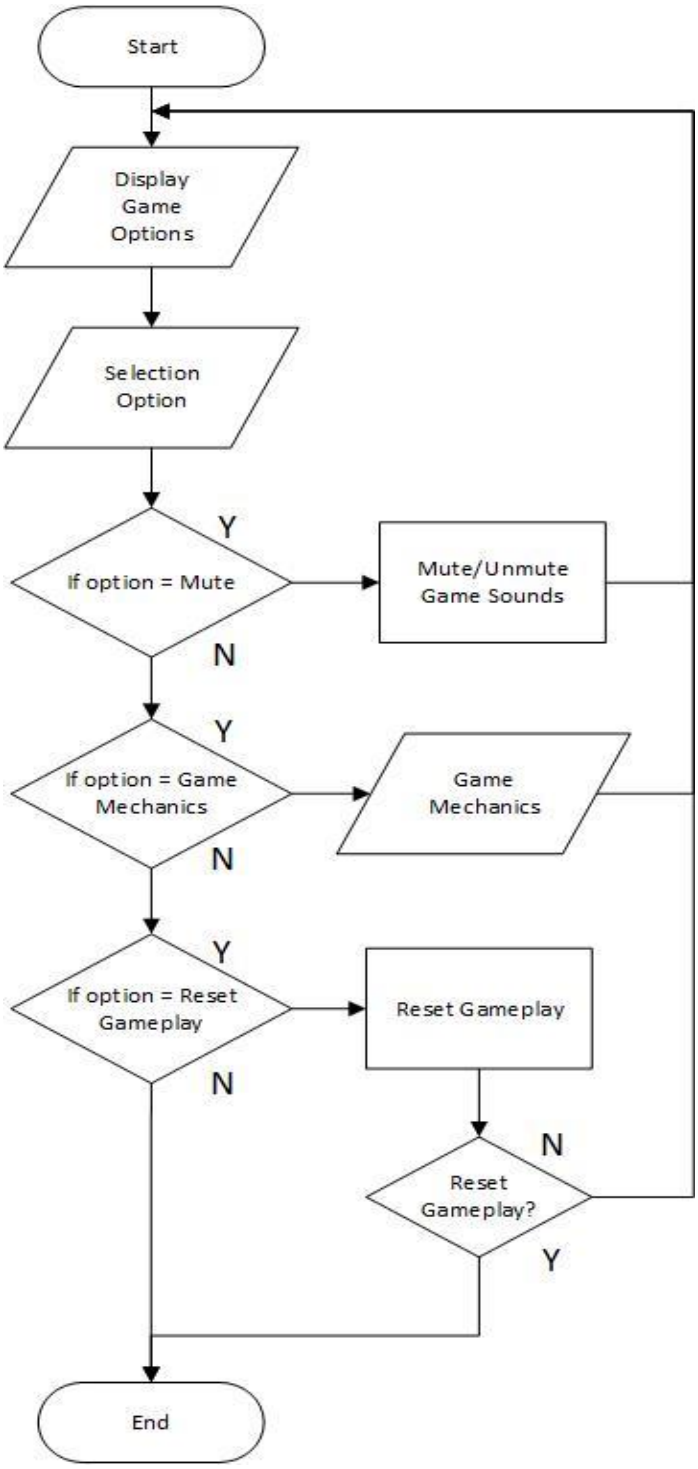

Figure 7: Options

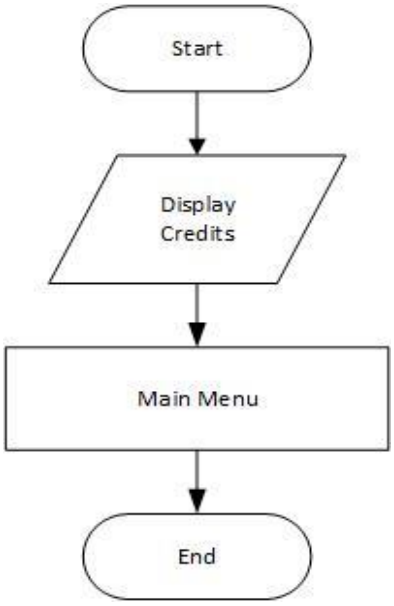

Figure 8: Credits

4.2 Screen Layout

Figure 9: Logo of the game/Icon

This logo represents Rizal on his struggle on claiming the independence of the Philippines. Rizal fights on his own peaceful way.

Figure 10: Main screen/ Main Menu

Navigate the main menu using the well-organized buttons and interfaces.

Figure 11: Level Selection

It gives choices for the users to select the right stage to start or continue their game progress

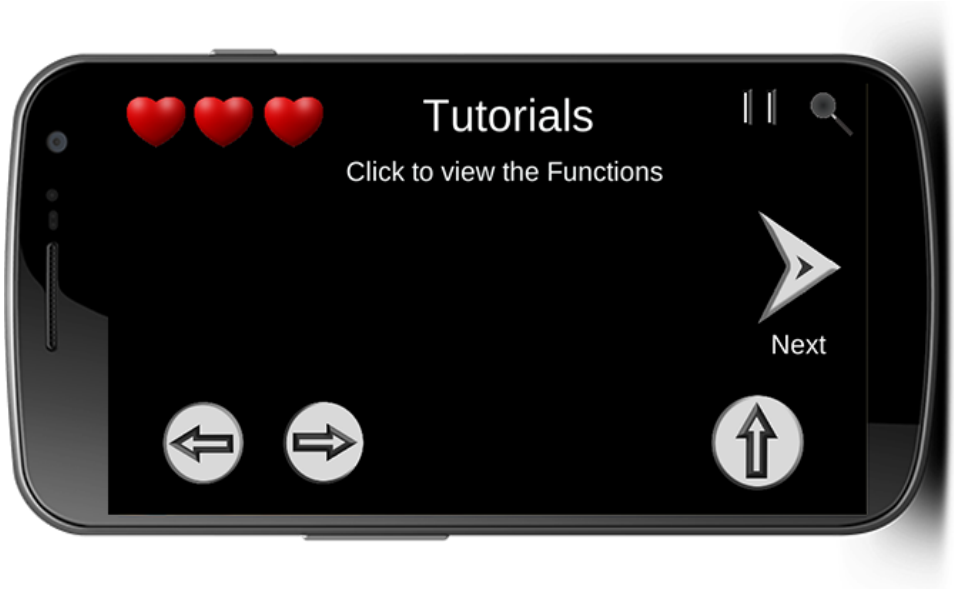

Figure 12: Tutorial

Tells the user about the basic functions of UI buttons.

Figure 13: Second Tutorial

Tells the users about the functions of obstacles, checkpoints and things to collect.

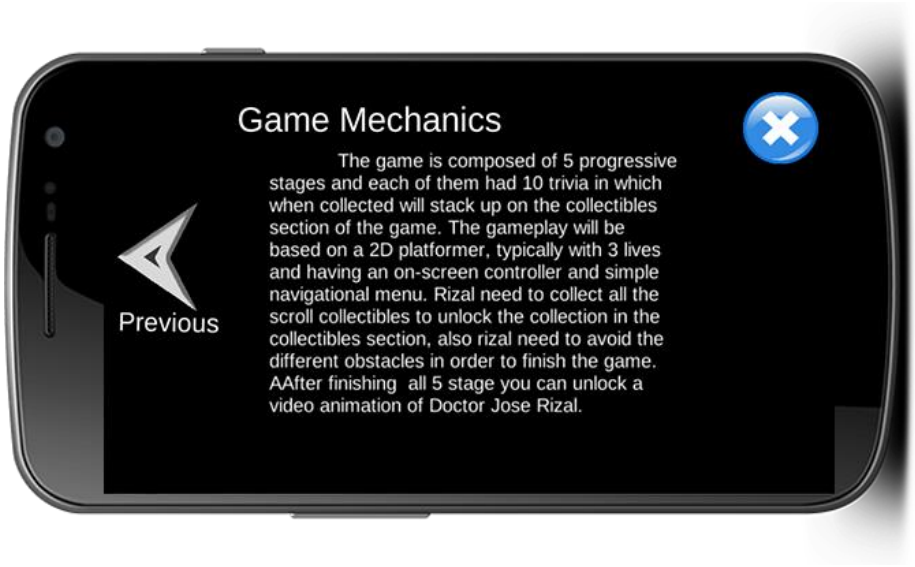

Figure 14: Third Tutorial

Tells the user about the basic game mechanics, how things works and the essence of the game itself.

Figure 15: Gameplay Stage 1

The beginning of the journey of the young Rizal, lessers obstacles and the most easiest level to play

Figure 16: Gameplay Stage 2

The continuation of Riza's journey, most of the collectibles found here are based on the youth of Rizal

Figure 17: Gameplay Stage 3

The 3rd journey of Rizal's in which he finished his education and started traveling the world.

Figure 18: Gameplay Stage 4

Rizal's journey when he began on fighting for what he knows right to ensure the independence of the Philippines.

Figure 19: Gameplay Stage 5

The final stage on Rizal's journey when he was convicted of the crimes he didn't comit up to his legacy on the Philippine nation.

Figure 20: Trivia

A sneak peek at the trivia feature of the game. This enriched the basic learning capabilities of the game itself/

Figure 21: Stage Completed

It shows that you completed current stage and you can go to next stage or you can cancel it.

Figure 22: Game Over

Gives the user a chance to retry the current level, select another stage and navigate back to the main menu.

Figure 23: Pause Menu

The pause menu panel gives the user the ability to pause/play, retry the stage, and also go back to main menu

Figure 24: Collections Stage 1

A dedicated menu in which you can view stage 1 collections.

Figure 25: Collections Stage 2

A dedicated menu in which you can view stage 2 collections.

Figure 26: Collections Stage 3

A dedicated menu in which you can view stage 3 collections.

Figure 27: Collections Stage 4

A dedicated menu in which you can view stage 4 collections.

Figure 28: Collections Stage 5

A dedicated menu in which you can view stage 5 collections.

Figure 29: Video Collections

A dedicated menu in which you can view the video collection. Navigating this part gives the user the ability to watch the 2D animation, which is a bonus feature of the game.

Figure 30: Developers

It shows the infomations about the game developers. Further information can be viewed by clicking each respective developers.

Figure 31: Options

It is the settings menu that shows the sound activation/deactivation button, tutorial button and reset game button.

Figure 32: Reset Gameplay

A pop-up windows the lets ask the user for his/her confirmation on resetting the game progress.

5.0 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5.1 Summary

Dr. Pepe is a 2D android game that will serve and provide better alternative learning through incorporating an interactive gameplay and more intense and difficult stages as one progressed further on the game itself.

Aside from the game itself, the developers added some trivia, from the Rizal's ancestors to his own legacy, which helps kids, students, foreigners on their researches and studies about Dr. Jose Rizal.

Furthermore, after completing this game, the lucky user will be unlocking the most special content of the developers specially made, the animation which concludes the summary, life and works, and legacy of the Philippine National Hero.

5.2 Conclusions

Developing a game that requires the user to gain basic knowledge on Jose Rizal is one of the tough capstone projects. In addition, researchers have planned every little feature and function of the game to satisfy its users and to make their way of learning more interesting and innovative. All objectives are accomplished and met, and the outcome of the game was an overall success.

5.3 Recommendations

The researchers successfully built this game from the ground up but the development is still ongoing. In the future versions the researchers will introduce new features to make the game much more interesting and enjoyable like adding moving villain, new powerups, harder terrains and platforms for a more intensive and thrilling experiences for the future users. Furthermore, it is suggested to expand its compatibility to other platforms like IOS and Windows to add more users and potentially increase the reliability and availability of the game to more users.

REFERENCES

[1] Lavín-Mera, P., Torrente, J., Moreno-Ger, P., Pinto, J. A. V., & Fernández-Manjón, B. (2009). Mobile game development for multiple devices in education. iJET, 4(2), 19-26.

[2] Khaddage, F., Lattemann, C., & Acosta-Díaz, R. (2014, March). Mobile Gamification in Education Engage, Educate and Entertain via Gamified Mobile Apps. In Proc Society for Information Technology & Teacher Education International Conference (pp. 1654-1660).

[3] Kazi, R. H., Grossman, T., Umetani, N., & Fitzmaurice, G. (2016). Motion Amplifiers: Sketching Dynamic Illustrations Using the Principles of 2D Animation. CHI.

[4] Khalid, H., Nagappan, M., Shihab, E., & Hassan, A. E. (2014, November). Prioritizing the devices to test your app on A case study of android game apps. In Proceedings of the 22nd ACM SIGSOFT International Symposium on Foundations of Software Engineering (pp. 610-620). ACM.

[5] Page, T. (2014). Skeuomorphism or flat design: future directions in mobile device User Interface (UI) design education. International Journal of Mobile Learning and Organisation, 8(2), 130-142.

[6] Schell, J. (2014). The Art of Game Design: A book of lenses. CRC Press.

[7] Cosentino, A. (2014). Identification of pigments by multispectral imaging; a flowchart method. Heritage Science, 2(1), 8.

[8] Zichermann, G., & Cunningham, C. (2011). Gamification by design: Implementing game mechanics in web and mobile apps. " O'Reilly Media, Inc.".

[9] Blackman, S. (2013). Beginning 3D Game Development with Unity 4: All-in-one, multi-platform game development. Apress.

[10] Sito, T. (2013). Moving innovation: a history of computer animation. MIT Press.

[11] Chiou, C. C., Tien, L. C., & Lee, L. T. (2015). Effects on learning of multimedia animation combined with multidimensional concept maps. *Computers & Education*, *80*, 211-223.

[12] Parent, R. (2012). *Computer animation: algorithms and techniques*. Newnes

[13] Shingade, A., & Ghotkar, A. (2014). Animation of 3D human model using markerless motion capture applied to sports. *arXiv preprint arXiv:1402.2363*.

[14] McClarty, K. L., Orr, A., Frey, P. M., Dolan, R. P., Vassileva, V., & McVay, A. (2012). A literature review of gaming in education. Gaming in education, 1-35.

[15] Vos, N., Van Der Meijden, H., & Denessen, E. (2011). Effects of constructing versus playing an educational game on student motivation and deep learning strategy use. Computers & Education, 56(1), 127-137.

[16] Watson, W. R., Mong, C. J., & Harris, C. A. (2011). A case study of the in-class use of a video game for teaching high school history. Computers & Education, 56(2), 466-474.

[17] Muntean, C. I. (2011, October). Raising engagement in e-learning through gamification. In Proc. 6th International Conference on Virtual Learning ICVL (Vol. 1). sn.