



Game Design For an Environmental-themed 2D Adventure Mobile Game

**Muhammad Adhithyas Prasetyo¹, Chandra Gelar Pamungkas²,
Gayuh Budi Luhur³**

¹Departemen Desain Komunikasi Visual, Universitas Komputer Indonesia, Indonesia

Email: *adhithyas.51919182@mahasiswa.unikom.ac.id

Abstract. Game is a game based on technology media, which is currently one of the entertainments today. The development of games has become a technology that can be felt, through computers to cellphones. One of the game media, namely mobile games, is an attraction for gamers (people who play games) now. Game makers are competing to make games interesting and useful for game lovers. The genres presented are also diverse, such as RPG, Open World, Horror, Puzzle, Sport, and others. At this time the design of the mobile game focuses on the slide type game, where the camera in the game moves right and left, and the illustrations presented are 2D. This game takes the topic of the environment, which through the game tries to invite players to preserve, learn, and understand about the environment, presented with the spices of RPG (Role Playing Game) games as well as a strong story presentation.

1. Introduction

Videogames are problem-solving activities with a fun approach through video media, videogames themselves are a form of multimedia, multimedia itself is a combination of text, sound, images, animation and video using computer technology so that users can interact, create, navigate and communicate [1]. Video games are grouped from the machine they run, such as PCs that are played through computer media, consoles that are played using specific machines, and Androids that use cellphone media. Then based on the visual representation of the game, it is divided into 2, namely 2D and 3D. 2D games are currently a game that is still much awaited by gamers. A 2D game is a game that mathematically only involves 2 elements of Cartesian coordinates, namely x and y , so the concept of a camera in a 2D game only determines the image in the game that can be seen by the player [2]. Although the development of 3D games is also considered very fast, 2D games still have their own fans because the art style is quite pleasing to the eye. One aspect that supports 2D games is still one of the types of games that are awaited, is the storyline that is delivered. Through the storyline that is presented, some games will include educational elements for players. One of them is learning about the environment, which aims to increase awareness of environmental conditions, fauna and flora.

The environment is the unity of space with all objects, forces, conditions, and living things, including humans and their behavior, which affect the continuity of life and the welfare of

humans and other living creatures. This environmental concept will be an important element in the development of this Mobile Game. The topic of the environment is a topic that is quite often raised and discussed everywhere. Due to the high level of interest in environmental topics, it is necessary to have a suitable media to discuss this topic. According to Azhar Arsyad, explaining that the media is a tool to convey or deliver teaching messages [3]. Then, by delivering through game media, the combination of game elements such as missions to work on, game items, challenges and others and environmental topics will be considered more fun and not boring. Online games are often featured with in-game items for players to acquire, quests or missions for players to complete, and loose structures created by open fiction stories. One of the cases is in children who have a higher curiosity than adults, which will be because most children at an early age have a high curiosity about everything in the surrounding environment [4]. But it is not possible for adults who have a special interest in complex stories. To make the game interesting, it requires a deep and complex storytelling, as well as illustrations that spoil the eye. When players explore a game that is presented with a complex story, the player's eyes will dissolve more easily and enjoy the game more. Most people, as described in previous studies found that people play online games for various reasons such as overcoming challenges, relieving tension, making friends, and passing time, but the most basic goal is to enjoy games [5,6]

The goal of this research is to create a 2D adventure game based on Android (if possible, PC) with environmental themes, starting from discussion to solutions to problems in the environment presented through game media. In making this game, the Waterfall Life Cycle methodology which is commonly used in software development will be used. Waterfall is one of the models of the system development life cycle or known as SLDC. The System Development Life Cycle, also known as SDLC, is a general methodology used to develop information systems. SDLC consists of several phases which starting from the planning, analysis, design, implementation to system maintenance phases [7]. when designing games, will use 7 stage SDLC. there are 7 stages in this method, namely, Planning, Define requirements, Design & Prototyping, Software Development, Testing, Development, Operations & Maintenance.

2. Method

The design of this game will use the Waterfall Life Cycle Paradigm methodology which has 7 ways or steps that will later achieve the desired goals of this game. The method starts from Requirements (Terms) emphasizing the process of collecting materials in accordance with the purpose of this game design, Specification (Specifications) the results of the analysis of materials that have been collected and then formulated into game product specifications, Architecture (Architecture) formulation of game descriptions from engine to game. user interface, Detail Design (Detailed Design) Detailed design of every detail that will be made, Coding (Coding) the process of all game components assembled so that they are ready to run, Testing & Debugging (Testing & Debugging) the process of checking if there are errors, Ship (Launch) the product ready to release online.

The waterfall method is a method that is widely used because of the many advantages obtained in designing software [8]. The Pros are:

- Clear requirements before starting the design
- Each phase will be completed within a certain period of time after that move to the next phase. which will make the work will have a clear flow
- As a linear model, it is easy to implement.
- Amount of resources required to implement this minimal is the model.
- Each phase of clear documentation is followed for software development quality

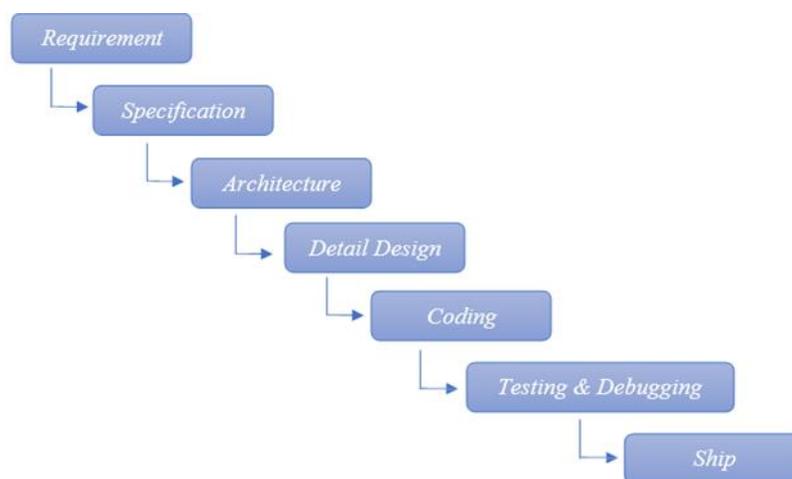


Figure 1. Research Methodology

These all steps must be mutually sustainable because if one step is not completed or there is an error in the calculation, the results that occur in this design will be chaotic and the game will not be able to be made.

3. Results and Discussion

3.1. Requirement

The Game titled is "For My World" designed for people from all type of peoples, and ages, which aims to raise awareness of the importance of the environment. Game "For My World" takes references from various environmental problems that exist around them and these problems are designed in such a way as to become objects in the game.

3.2. Specification

The results of the analysis of the materials that have been collected are then formulated with game product specifications according to the needs of the intended market.

- Game Description
The game designed is an educational type game that is compiled and presented in the form of RPG and adventure in a fantasy world. At the end of this game, it is hoped that the audience can understand and sympathize with the environmental damage that is currently or has occurred. The game will be in the form of story

telling, where every level in the game is completed, a cut scene will be presented which will tell about the results of the adventure from the completed level.



Figure 2. Main Menu Screen

On the main game page will be displayed the atmosphere of the world that will be played in the game. the color of the soil is bright brown which symbolizes polluted land and there is mud from factory waste, plastic waste scattered on the left symbolizes a dirty environment. The title of the game reads "For Your World" on the letter O in the word World, there is an earth logo which is the background of the current game. There is also a start button to "start" and "Load" to continue the previously saved game. The bottom right corner has settings for the game

- Game Storyline

The storyline of the game For My World begins with a Eco, a young man who suddenly wakes up from his long sleep. When he looked out the window, the world he lived in was almost destroyed due to the severe environmental damage. This time, Neo has a mission to prevent the world he lives in from being destroyed.



Figure 3. Eco, Main Character Design

- Game Rules

The game has 4 different levels, starting from easy, medium, moderately difficult, and difficult. Each level has different puzzles, gameplay mechanics, obstacles,

enemies that will add to the fun. Players will be given a mission to defeat several enemies which will be a requirement to complete the level.

Players will also be given puzzles that must be solved to pave the way to the next level. The life system will also be used to add challenges to the game. Players can earn lives from successfully completed challenges. In addition to challenges, lives can also be obtained from obstacles that are blocked by several enemies or located in areas that are less visible or hidden from the player's view.



Figure 4: Monsters Sampah

In image 4, an example of a monster can be seen which symbolizes the garbage scattered in the environment. This monster is the first monster to appear in the game and will appear in each level. Monsters of this level are monsters with easy difficulty.

Image 5 also shows one of the missions that must be done to complete the level. Figure 5, symbolizing illegal logging, when the player encounters this monster, the player is required to use his skills to save this dying tree. If the player doesn't save this tree, the level won't be cleared and the player is forced to save this tree again.



Figure 5. Illegal Logging

3.3 Architecture

In designing this game, the game architecture needed for development is formulated.

- Hardware Requirement
 - (1) PC with core 2 or equivalent
 - (2) Minimum 2 GB RAM
 - (3) Minimum windows 7
 - (4) 250 GB Hard drive
 - (5) Soundcard
- Software Requirement
 - (1) Game Maker

Game Maker is an instant game creation application that uses minimal coding. Game Maker makes it possible to create games using simple drag-and-drop, so users don't need to use or have programming language skills. this includes a choice of programming languages to add advanced features to the games created [9]



Figure 7. Game Maker

- User Manual Control
 - (2) → to move to the right
 - (3) ← to move to the left
 - (4) ↑ to jump
 - (5) A to attack
 - (6) X to parry
 - (7) Skill 1 to use skill 1
 - (8) Skill 2 to use skill 2

3.4 Detail Design

In designing the game, this game style will use pixel art styles on the background, characters, and monster designs. There are also several additional objects to support the progress of the game. The cutscene also uses pixel styles and a few camera effects to improve the mood and emotions of players when viewing the cutscene. In RPG games, the addition of cutscenes is something that can't be missed. The use of cutscenes aims to show conversations between characters, showing the situation of the game. They can be an indicator of when a new game level begins or ends by setting the stage for the action that follows or signaling to the player that they have reached the goal of a certain level or section, lastly cutscenes can help the player to take a break from the difficult levels he has completed. Other uses of cutscenes include their usage in marketing to gain viewer excitement [10]

3.5 Coding

When designing this game, all components and content of the For My World game will be created and assembled into a game that is ready for release

3.6 Testing and Debugging

Before releasing the game, the necessary testing and debugging will be carried out to check whether during gameplay, there are bugs or other problems that might affect the experience while playing.

3.7 Ship

In the last stage, after all the checks have been made on the game, the game will be ready to be released on the mobile platform and will likely be released on PC. but the place where the main release target remains on android.

4. Conclusion

The results of the research using the Waterfall Life Cycle Paradigm methodology are in accordance with the " Game Design For an Environmental-themed 2D Adventure Mobile Game" as an educational game. The result of game development is centered on a character who wakes up and finds the earth has been polluted so that the main character goes to eradicate the monsters so that the earth returns to its former good. And also the test results from each steps passed can be categorized as good so that it meets the criteria as an educational game. This is what gives the purpose of the game "For My World" as an educational game that can have a good impact on the players later as a reminder that a healthy environment is very, very important for all.

Acknowledgement

We acknowledged Bangdos, Universitas Pendidikan Indonesia. This study is a part of community service program (Program: community service program Thematic Literacy 2022 (11 July-10 August 2022 group 6) Institute for Research and Community Service (LPPM), Universitas Pendidikan Indonesia.

References

- [1] Bodzin, A., Junior, R. A., Hammond, T., & Anastasio, D. (2021). Investigating engagement and flow with a placed-based immersive virtual reality game. *Journal of science education and technology*, 30(3), 347-360.
- [2] Krekhov, A., Cmentowski, S., Emmerich, K., Masuch, M., & Krüger, J. (2018, October). GulliVR: A walking-oriented technique for navigation in virtual reality games based on virtual body resizing. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play* (pp. 243-256).
- [3] Nurcholis, M. T., Suyanto, M., & Sofyan, A. F. (2016). PERANCANGAN GAME EDUKASI 2D" GARBALIEN INVASION" DENGAN TEMA KEBERSIHAN LINGKUNGAN. *Respati*, 11(32).
- [4] Rahman, R. A., & Tresnawati, D. (2016). Pengembangan game edukasi pengenalan nama hewan dan habitatnya dalam 3 bahasa sebagai media pembelajaran berbasis multimedia. *Jurnal Algoritma*, 13(1), 184-190.
- [5] Iida, H., & Khalid, M. N. A. (2020). A Paradigm Shift from Optimal Play to Mental Comfort: A Perspective from the Game Refinement Theory. *International Journal of Informatics, Information System and Computer Engineering (INJIISCOM)*, 1(1), 47-78.
- [6] Wu, J., Li, P., & Rao, S. (2008). Why they enjoy virtual game worlds? An empirical investigation. *Journal of electronic commerce research*, 9(3), 219-230.
- [7] Wahid, A. A. (2020). Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi. *J. Ilmu-ilmu Inform. dan Manaj. STMIK*, no. November, 1-5.



-
- [8] Balaji, S., & Murugaiyan, M. S. (2012). Waterfall vs. V-Model vs. Agile: A comparative study on SDLC. *International Journal of Information Technology and Business Management*, 2(1), 26-30.
- [9] Sibero, I. C. (2010). *Membuat Game 2D menggunakan game maker*. Penerbit Mediakom.
- [10] Kontio, N. (2020). Creating an in-game character cutscene animation: Case study of the game Skábma-Snowfall.
- [11] Mulyana, A., Rusmana, D., & Rafdhi, A. A. (2021, February). Application platform for e-reservation system in traditional show. In *Journal of Physics: Conference Series*. 1764, (1), p. 012197.
- [12] Atin, S., Mutia, S., Widayanti, A., Yatawa, H. S., Rafdhi, A. A., & Afrianto, I. (2022). Perancangan Sistem Informasi Bank Sampah Berbasis Website. *IJIS-Indonesian Journal On Information System*, 7(1), 59-70.
- [13] Ramdhani, R. M., Nurrahman, A. D., Affendi, P. H., Hasugian, L. P., & Rafdhi, A. A. (2021). Gamification Implementation in Health Service Website in 5.0 Society Era. *International Journal of Research and Applied Technology (INJURATECH)*, 1(2), 424-430.