Innovative Approach of 2D Platformer Mobile Game Development "Super Journey"

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Abstract

This study investigates the design and development process of "Super Journey", a 2D platformer mobile game aimed at enhancing user engagement and satisfaction through innovative game mechanics and design. Utilizing the Agile methodology, the development stages included conceptualization, design, implementation using the Unity game engine, and iterative testing and evaluation based on user feedback. This development process involved crafting a detailed game design document, creating initial sketches and prototypes, and integrating graphical elements, animations, and game mechanics. The game features 3 levels with simple controls, visually appealing pixel art, and progressively challenging levels. A survey conducted with 20 participants revealed high overall satisfaction (4.15 out of 5), with particular praise for level design (4.25) and game mechanics (4.2). Feedback indicated areas for improvement, such as balancing difficulty levels and incorporating more diverse obstacles and enemies. The findings underscore the importance of agile, user-centered design in game development and provide insights for future iterations to further enhance the gaming experience. "Super Journey" exemplifies the effective integration of classic platformer elements with modern innovations, highlighting its potential in the competitive mobile gaming market. The results of this research are expected to serve as a reference and inspiration for other game developers to create superior products by combining innovative technology and thoughtful design.

Keywords: 2D Platformer, Agile, Game Development, Unity

I. INTRODUCTION

In this digital era, the development of technology and mobile devices has impacted significantly on various aspects of life, including entertainment [1]. One form of entertainment that is popular and continues to evolve is mobile games [2]. The flexibility and high accessibility offered by mobile games allow users to play anywhere and anytime [3].

Based on data obtained from Statista.com, the number of smartphone mobile network subscriptions worldwide from 2016 to 2023 continues to increase and is expected to continue until 2028 as shown in Figure 1 [4]. This data also indirectly reflects the growing number of smartphone users worldwide. The increasing number of smartphone users is driving the growth of the mobile games industry significantly and is becoming one of the most lucrative sectors in the entertainment industry.

The development of the "Super Journey" mobile game is based on trends and mobile game user's preferences at present. Platformer 2D remains one of the most popular game types, both old and new players, cause of the simple mechanics but challenge [5]. Through "Super Journey", we want to combine classic elements from the platformer game with modern innovation to create a unique and interesting playing experience. We're confident that a combination of the intuitive mechanics of the game, creative level design, and interesting graphics will result in not only a fun game but also a challenging intellectual.

The main aim of this research is to explore how innovation in the design and development of games can improve the quality and attraction of Platformer 2D games on mobile devices. Previous research has shown that innovative level design and engaging game mechanics are essential for player retention and satisfaction [6]. However, most of these studies are still limited to analyzing game mechanics and level design without integrating user feedback directly into the development process. Sutopo highlighted the importance of intuitive mechanics and creative-level design in increasing player engagement [7]. On the other side, research by Vlahovic et al. found that high graphical quality and smooth user interaction significantly contribute to the overall play experience and player satisfaction [8].

Several popular games in this genre, one of which is "Super Mario Run" have successfully combined classic and modern

elements. However, "Super Journey" aims to bring further innovation with a greater focus on user interaction and more complex and engaging level design. In addition, "Super Journey" aims to provide a gaming experience that is not only fun but also intellectually challenging, by blending intuitive game mechanics with creative level design and attractive graphics.

Development is focused on important aspects, including level design, game mechanics, graphics, and user interaction. Feedback from users also needs to be analyzed to refine "Super Journey" and understand the elements that most influence the satisfaction and engagement of players. In the end, "Super Journey" is not only how to create a game, but also how to understand and combine the innovation of technology and thoughtful design to result in an excellent product. Through this research, we also want to share our knowledge and our experience in developing Platformer 2D games, so that can be a reference and inspiration for other game developers. With innovation and dedication, we can push the creativity limit in the mobile games industry.

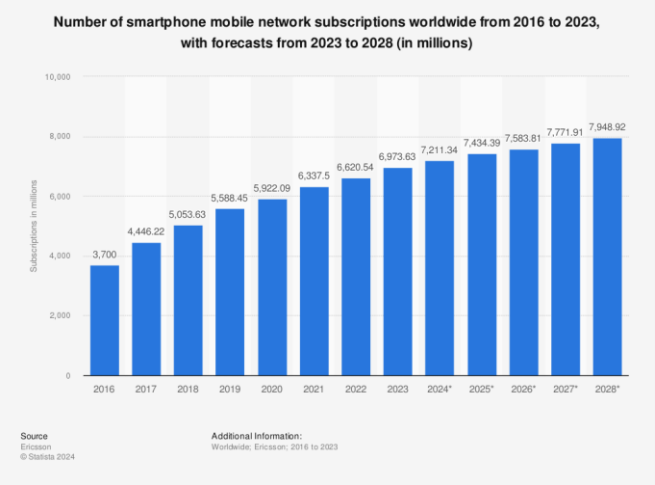

Figure 1. Number of Smartphone Mobile Network Subscriptions Worldwide (in Millions)

II. RESEARCH METHODOLOGY

This research uses a development method that focuses on the Agile approach. Agile was chosen because of its iterative and flexible nature, allowing the development team to adjust to changes and feedback quickly [9], [10], [11]. This approach is particularly suitable for game development, where user feedback and market needs can change rapidly. Agile allows changes to the product backlog based on user feedback or changing market needs [12]. This flexibility is especially important in game development, where player preferences can change over time and market trends can shift quickly.

The development process of "Super Journey" is divided into several main stages, including conceptualization, design, development, testing, and evaluation as shown in Figure 2. Each stage has a specific focus and activities that support the overall goal of the project. At the conceptualization stage, the basic ideas and concepts of the game were conceived, including the story, characters, and game mechanics [13], [14]. Market research was conducted to understand current trends and user preferences in the 2D platformer genre. Next, the technical and engineering feasibility of the project is assessed.

The design stage involves developing a detailed Game Design Document (GDD), which includes description of features, levels, characters, and game mechanics [15]. Initial sketches and prototypes of the game elements are created to test the concept and get initial feedback [16]. Unity was used as the main game engine due to its proficiency in 2D game development and extensive community support [17]. With Unity, the team could quickly create prototypes and design iterations, and efficiently integrate graphical elements, animations, and game mechanics.

The development process followed sprint planning, where the goals and tasks to be completed in each sprint were set based on a pre-sorted product backlog [18]. Development of game features and content is carried out according to the sprint plan, including the creation of levels, characters, animations, and audio integration. Code is merged continuously to ensure that any changes do not break existing functionality. Unity supports continuous integration, allowing continuous integration of code changes and automated testing to maintain build stability [19].

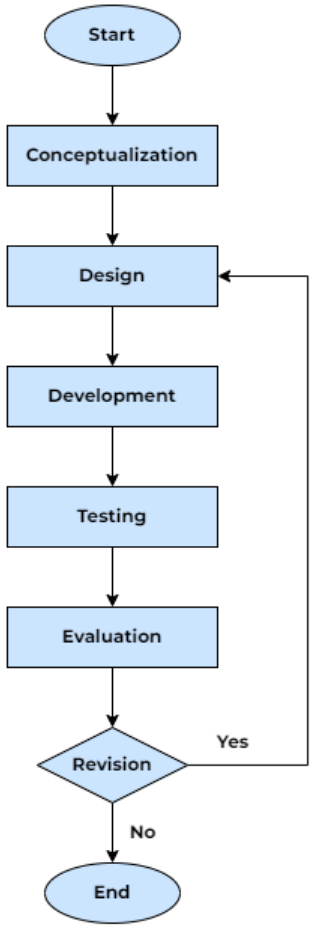

Figure 2. The Development Process of "Super Journey"

Testing is conducted in several stages, ranging from internal testing (alpha testing) to identify and fix bugs [20], to the distribution of beta builds to an external group of players to get broader feedback and discover issues that may have been missed during internal testing [21]. Beta testing is conducted to observe player interaction with the game and identify areas that need improvement [20]. The feedback data collected from players is analyzed to determine the features or elements that need to be improved or changed.

The evaluation in this research was conducted using data collected through a questionnaire distributed through Google Forms. The purpose of the questionnaire was to understand user preferences and the effectiveness of the developed game elements. A survey was conducted to collect data on user preferences regarding the features, design, and mechanics of the 2D platformer game. The results from this survey were then analyzed to identify patterns and trends in user preferences as well as to evaluate the effectiveness of the developed game elements.

The questionnaire was designed to gather comprehensive information regarding user preferences for various aspects of the "Super Journey" game. The questions in the questionnaire covered areas such as satisfaction with graphics and animation, overall play experience, and specific aspects such as level difficulty and game mechanics. The questionnaire was distributed online via Google Forms to a diverse group of users within Universitas Tarumanagara to ensure a broad representation of user preferences. Participants were asked to play a beta version of the game before filling out the questionnaire so that they could provide feedback based on first-hand experience.

The data collected was analyzed to identify trends and patterns in user preferences. This analysis included frequency counts, averages, and response distributions, as well as correlation analysis to understand the relationship between different aspects of the game experience and user satisfaction. The results of the analysis were used to identify areas that required improvement and further iteration in game development. Feedback from users helps the development team to make better decisions about changes and additions to in-game features, ensuring that "Super Journey" meet the user expectations.

III. RESULT AND DISCUSSION

The "Super Journey" game development process was carried out using the Unity game engine with the C# programming language. For the graphical assets, we used the Pixel Adventure assets available at https://pixelfrog-assets.itch.io/pixel-adventure-1 and Pixel Adventure 2 available at https://pixelfrog-assets.itch.io/pixel-adventure-2. These assets provided a consistent and attractive visual style for the game, including character sprites, background elements, obstacles, and collectible items.

"Super Journey" is structured as a level-by-level platformer game, consisting of three levels, where each level presents unique challenges and objectives. The player must complete the earliest level to get to the next level. The player can only control the character with three basic movements, namely forward, backward, and jump. The game starts with the main menu as shown in Figure 3 which offers two options, namely start to begin the game or quit to exit the game.

Figure 3. Main Menu Interface

The game starts with the character having a reserve of three lives. In the first level shown in Figure 4, players can collect cherries, which add points, and hearts, which add lives. However, hearts cannot be taken if the player already has a reserve of three lives. The obstacles in this level are a stationary spike and a moving saw. If a character is hit by an obstacle, the character will lose one life, but will be invulnerable for five seconds. The player wins the first level by reaching the finish line marked by the flag, regardless of whether all the cherries have been collected. If the player loses all lives, the game will restart on the same level within three seconds.

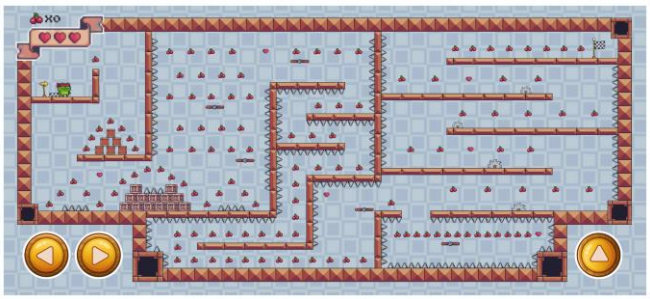

Figure 4. Level 1 Interface

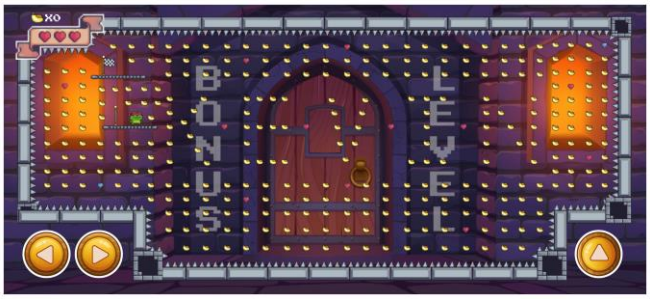

Figure 5. Level 2 Interface

The second level is a bonus level to collect all 308 bananas and reach the finish line marked by a flag, as in Figure 5. If the player reaches the finish line without collecting all the bananas,

they cannot proceed to the next level. The only obstacles in this level are stationary spikes. Players can also collect hearts to increase their lives and diamonds that restore up to three full lives.

The final level introduces obstacles and enemies, adding to the difficulty of the game. Players must reach the trophy to complete the game. The obstacles in this level include a stationary spike and a moving saw, while the enemies include a moving mushroom, a stationary peashooter that shoots bullets, and a moving angry pig. Players can collect strawberries that add points, with a maximum of 170 strawberries in this level. The level is complete when the character reaches the trophy, as shown in Figure 6.

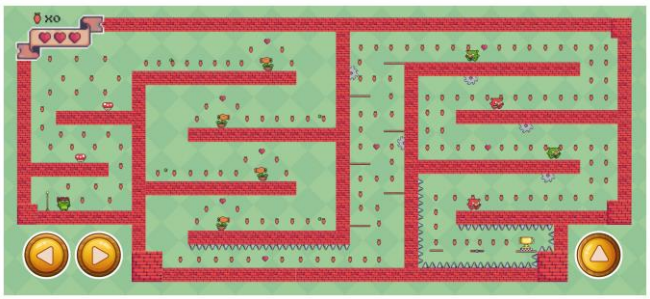

Figure 6. Level 3 Interface

After completing the third level, the player has completed the entire level and is greeted with a "Congratulations" screen as shown in Figure 7. The player is given the option to return to the main menu.

Figure 7. Congratulations Screen Interface

To evaluate the game, a quantitative approach was used by distributing questionnaires through Google Forms. This questionnaire was designed to gather feedback on various aspects of the game, including overall satisfaction, difficulty level, enjoyment of the game mechanics, visual appeal, level design, and user interface and controls. Participants were asked to rate and respond to these various aspects of the game using a scale of 1-5, where 1 indicates very dissatisfied or strongly disagree and 5 indicates very satisfied or strongly agree.

The research population consisted of Universitas Tarumanagara students and staff with different backgrounds, including from various faculties such as Economics and Business, Information Technology, Arts and Design, and Communication Science. The number of respondents of only 20 was chosen to get quick and in-depth initial feedback in the game development iteration. This limited number of respondents allowed for a more focused and detailed analysis. Table 1 is the result of the questionnaire showing the average ratings of the various aspects of the game.

Table 1. Questionnaire Results

Game Aspects	Average Score (1-5)
Overall satisfaction	4.15
Difficulty level	3.5
Game mechanics	4.2
Visual attractiveness	3.95
Level design	4.25
Game control	4.25

Table 1 provides an overview of how players rated various aspects of the "Super Journey" game. High scores in most categories indicate good acceptance from players, while aspects with slightly lower scores may be a focus for improvement in future updates. In addition, 100% of the respondents stated that the game "Super Journey" can be run properly without any problems on their devices. It shows that the game has good performance and high compatibility with various devices used by players.

Most players reported a high level of satisfaction, appreciating the nostalgic yet modern feel of the game. Based on the data collected, the average overall satisfaction score for the "Super Journey" game was 4.15. This score indicates that in general, players were very satisfied with the gaming experience provided by "Super Journey". It also shows that the main objective of game development, which is to create an engaging and satisfying game, has been successfully achieved.

Players rated the game's difficulty level with an average score of 3.5, indicating that most players felt the game's challenges were well-balanced, however, some found it too easy or too difficult. This indicates that while many players were satisfied with the difficulty level, there is room for further adjustments to achieve an optimal balance for different skill levels of players. These perceived difficulty levels are important to consider in the next iteration of development so that the game remains challenging without leaving players feeling frustrated or bored.

The game mechanics received an average rating of 4.2, indicating the most players found the game mechanics easy to understand and use. This is a positive indicator that the controls and rules of the game have been well designed, allowing players to quickly master and enjoy the game without experiencing frustration from a complicated or unresponsive control system. Intuitive mechanic design is key to ensuring players can focus on enjoying the game and overcoming the challenges at hand.

The visuals and graphic design of the game were also appreciated with an average score of 3.95. It indicates that the pixel art style used was well received by players, providing a combination of attractive aesthetics and good functionality. Attractive and clear graphics are essential for platformer games, as they assist the player in navigating the environment

and identifying obstacles and collectible items. This positive feedback indicates that the graphical assets chosen and the way they were implemented in the game succeeded in creating a satisfying visual experience.

The level design in the game received the highest average score of 4.25, indicating that players appreciated the structure and design of the levels. Well-designed levels are key to keeping players engaged and challenged, as well as providing a sense of accomplishment as they complete each level. A high score in this category indicates that the levels in "Super Journey" successfully meet players expectations in terms of variety, challenge, and fun. Good-level design also helps maintain players interest and motivates them to keep playing.

The game controls also received a very positive assessment with the same average score as the level design of 4.25, indicating that the controls were considered intuitive and responsive. Good controls are a critical aspect in platformer games, as players need to be able to quickly and accurately move their characters to overcome obstacles and enemies. The responsiveness of the game controls in "Super Journey" contributed greatly to overall player satisfaction. The ability to easily control the character allows players to focus on strategy and exploration, enhancing the overall gaming experience.

In addition, respondents were also asked about the highest level they managed to reach in the game. A total of 75% of respondents managed to complete up to level 3, while 5% of respondents managed to complete up to level 2 and the rest only managed to complete level 1. It shows that most players were able to complete the game up to the final level, although some experienced difficulties in the early levels. This information shows that most players felt motivated to continue playing and challenging themselves to complete the game. It also shows that the levels in this game are designed with a difficulty level that allows players to learn and progress as they play.

Table 2 is the result of the questionnaire regarding the difficulty level of each level in the game. The results of the questionnaire showed that for level 1, the average difficulty score given was 2.35, which indicates that this level was considered quite easy by most players. It shows that level 1 successfully fulfills its purpose as an accessible introduction for players to the basic mechanics of the game. For level 2, the average difficulty score given was 4.45. This score indicates that players felt a significant increase in challenge compared to level 1. This level is designed as a bonus level with a focus on item collection, so players are required to be more thorough and strategic in completing the level. The high difficulty of level 2 reflects a more complex challenge, which may require some effort for players to complete.

Table 2. Difficulty Level According to Respondents

Level	Average Score (1-5)
1	2.35
2	4.45
3	3.45

In level 3, the average difficulty score given was 3.45. This score indicates that players found this last level challenging, but not as challenging as level 2. Although level 3 introduced a variety of new obstacles and enemies, the level design managed to create a balance between challenge and the player's ability to adapt quickly.

The evaluation process has provided valuable feedback on the "Super Journey" game, highlighting both its strengths and areas for potential improvement. Based on the high scores in overall satisfaction, game mechanics, level design, and game controls, it is clear that the game has succeeded in delivering an enjoyable and engaging experience for players. The nostalgic pixel art style combined with intuitive controls has resonated well with the audience, making the game both fun and accessible.

Despite the positive feedback, the slightly lower score for visual attractiveness suggests that there might be room to enhance the visual elements further. While the pixel art style is appreciated, some players may prefer more variety or enhanced effects to make the game visually richer. Future updates could explore adding more dynamic visual elements, such as improved animations or background interactions, to elevate the visual appeal without losing the charm of the pixel art style.

Additionally, the feedback on the difficulty level, with an average score of 3.5, indicates that while many players found the game appropriately challenging, some found it either too easy or too difficult. This feedback suggests that introducing adjustable difficulty levels or more gradual difficulty scaling within the levels could cater to a broader range of player skills. This approach would help maintain the game's challenging nature while ensuring that it remains accessible and enjoyable for both novice and experienced players.

IV. CONCLUSION

This research successfully explores how innovations in game design and development can improve the quality and appeal of 2D platformer games on mobile devices with the case study "Super Journey". The game achieved an overall satisfaction score of 4.15, indicating that the combination of intuitive mechanics, creative-level design, and attractive graphics resulted in high player satisfaction. Nonetheless, the variation in the average difficulty score of 3.5 suggests the need for further refinement with a more balanced difficulty setting and the addition of dynamic visual elements without sacrificing the pixel art style.

The evaluation results showed that the game mechanics and game controls scored high, at 4.2 and 4.25 respectively, confirming the effectiveness of the intuitive and responsive design. However, the visual appeal which scored 3.95 still has room for improvement. Level design, which received the highest score of 4.25, demonstrates the importance of well-structured and varied levels in maintaining player interest and engagement. The flexibility of the Agile approach also allows for continuous improvement based on player feedback, ensuring the game remains relevant and interesting over time.

Overall, "Super Journey" has demonstrated that innovation in game design and development, guided by user feedback, can significantly improve the quality and appeal of 2D platformer games on mobile devices. By refining difficulty levels, improving visual elements, and continuing to prioritize user feedback, future iterations can build on this success. This research not only provides valuable insight into the field of game development but also serves as a reference and inspiration for other developers looking to create exciting and innovative mobile games.

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