Manik angkeran storytelling based on android mobile tap gameplay

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Abstract. This research objective was to structure a presentation of a Balinese popular folk tale as an educational strategy through a mobile game with easy-to-play gameplay. This study had 3 (three) main objectives: (1) building the Manik Angkeran story, which is the famous folk tale circulating in Balinese society, Indonesia; (2) realizing the Manik Angkeran game that highlights Balinese characteristics; (3) implementing easy-to-play gameplay. In developing the original story of Manik Angkeran, the strategies carried out were: (1) building a new story with the main character, Manik Angkeran; (2) highlighting Balinese characteristics in character design, game background, and background music in fighting scenes; (3) choosing tap-mode game considering the simplicity and efficiency. The result of this study was Manik Angkeran Game with Tap Game genre based on Android. The game requires players to tap on the screen to move Manik Angkeran, with a mission to defeat the enemy/monster to collect gold coins (Pis Bolong Mas). Later, these coins can be used to buy building materials, which will be used to build dormitories (Pesraman). The test results using the BlackBox Testing method showed that the functionality of the navigation buttons and the entire functions of the game were running well as desired. For the results of testing the game on several different screen resolutions, showed that the display of this game was able to adjust on different screen resolutions and the image display remains sharp. This game was also capable to run on a minimum Android device v.3.0 HoneyComb, until the latest version at this time is v.9.0 Pie. Research disclosure starts with the Introduction, which reveals the background and purpose of the study. Furthermore, the discussion swooped over to the research method used. The process of pre-production, production to post-production was model or technique used in making games. The results revealed the evaluation of the black box to test the readiness of the system.

1. Introduction

Designing digital games is a collaborative activity that synergizes the capabilities of game designing, game programming, and digital art creation for game assets [1][2][3]. Various motives of need certainly trigger the initial motivation in making games. These needs can be in the form of financial obligations (getting money from games / monetizing), creating games to educate, and the need to research or work (creating something new) [4]. If it is combined, it could be accommodated in a game project. For example, the plan of a game starts from conducting research on game development, which aims to educate. In the end, the money will also be generated from games that can be obtained from advertisements or in-game purchases. Digital games can also facilitate the need for storytelling. Kreminski and Wardrip-Fruin in [5] discuss the discourse on storytelling and the construction of...
stories/enacting stories in the game. Submission of stories through games does not only transmit ideas or conceptual stories, but also delivers educational and traditional values [6]. The traditional values are always contained in folklore from nations in the world, including Balinese folklore. This study tried to uncover aspects that play a role in delivering messages through storytelling style in a digital game format. The selected story was the story of the Bali Strait origin. Manik Angkeran is a central figure in the folklore. The moral value/message from Manik Angkeran's story is the negative impact of gambling. There has been a development of the story with a creative style carried out by the YAPS Animation and Visual Expert Animation team (2017) in its animation entitled Manik Angkeran (the origin of the Bali Strait). The animated video was uploaded on Youtube. The creative strategy that was carried out opened up opportunities for further development of the story of the origin of the Bali Strait.

Submission of good folklore should always supported by the appropriate visual and audial elements [7][8]. Manik Angkeran story was set in Java and Bali. However, since the story is more popular among Balinese people, the visual and audial elements chosen used a Balinese style. The gameplay must be created as simple as possible to facilitate the achievement of game messages [9][10]. This paper presents the development of Manik Angkeran mobile game. In summary, this study embarks the following objectives: (1) building the Manik Angkeran story originating in Balinese society, Indonesia; (2) realizing the Manik Angkeran game that highlights Balinese characteristics; (3) implementing the developed online game as an easy-to-play gameplay. The rest of this paper is organized as follow: section 2 presents our proposed method; section 3 presents pre-production results; section 4 presents production results; section 5 presents final results; and section 6 concludes this work.

2. Proposed Method

This research used the method of the creation of digital games that begins with Pre-production stage [11][12][13]. In the Pre-Production stage, the activities carried out were: (1) References Study; (2) Construct Concept Art for the Game; (3) and Designing Game Levelling. The reference study refers to studying all references, both visual, audial, and literature references regarding material related to game projects. The stage after pre-production was the production stage. The principle of the production stage is to provide the assets needed for the game. It is depicted in Figure 1. The asset category in question is audio assets and visual assets. The audio assets refer to sound effects and background music, meanwhile, the visual assets refers to character designs, character move set sprites, game icon/button, and typeface.

![Figure 1. Manik Angkeran game production stage.](image)

2.1. Pre-Production Result

2.1.1. Development of Manik Angkeran Story for Games. Manik Angkeran, as the main character in the story, got more exposure. The development of the story in this game tells about Manik Angkeran who served Naga Besuki because Manik Angkeran stole Naga Besuki gemstones in the past. In the story of this game, it was told Manik Angkeran had to roam to eradicate giants and evil spirits that disrupt the
peace of the Balinese people. Manik Angkeran would get gold coins from every giant and evil spirit that was defeated. Naga Besuki would give Manik Angkeran two choices in utilizing the gold coins that were collected. The first choice was to double the number of gold coins by gambling. The second option was to use the gold coins to build a place of worship or pesraman as a school where people could study virtue.

2.1.2. Game Design. The genre/game style of this game was the Idle Game category, which refers to a game created only to be seen because all forms of the game occur automatically [14]. To interact with this Idle game, the user tends to only click/tap on the screen. It makes this genre also known as Tap Game, because the player does not need to memorize different functions of buttons. This game genre only requires patience and determination to click/tap. Some similar examples of Idle genre games are Tap Titans, Tap Tycoon and Tahu Bulat, in which the players of the game are generally only need to click/tap the screen to get prizes such as money, skills or weapons that can be used to continue the game, buy goods, weapons or boost rankings. As for this Manik Angkeran Game, the Manik Angkeran's character would fight and defeat enemies/monsters to get the gold coin (pis bolong mas). Later, the accumulated coins would be used to buy raw materials to build a dormitory (pesraman). The players of this game are required to click/tap on the handphone screen to move the Manik Angkeran's character to defeat their enemies. This click/tap activity is done when the power of each of their enemies is gone.

2.1.3. Mechanical Design. The mechanical design involved in this Manik Angkeran game had several characters involved. These characters are Manik Angkeran, Naga Besuki and several monsters’ who were the enemies of Manik Angkeran. The standard movement possessed by Manik Angkeran's character was an ordinary weapon movement. However this game provides 5 special powers that can be used to against enemies/monsters, namely the power of Fire, Water, Wind, Land, and Ether. Each of these forces has the power to hit with a different amount of energy to against the enemy. All of this special power has limited time for its use, so this special power requires time to charge. Each of these strengths will make vary movement animation of Manik Angkeran depending on the strength used. From the enemy/monster side, the enemies/monster has different amounts of energy as well. The indicator of the amount of energy from the enemy/monster is in the upper position on the screen. Every time Manik Angkeran hit the enemy, the power indicator of the enemies will decrease according to the amount of the force that Manik Angkeran uses. If the enemy power runs out, then the enemy animation appears to be defeated, and followed by Manik Angkeran’s animation get coin prize. The amount of this coin prize is random, so that the player cannot predict how many coins are earned. Every coin collected will be used to buy building materials used to build a dormitory (pesraman).

2.1.4 Key of Mechanical Design. As for the key of the mechanical design of the game Manik Angkeran is to defeat the enemy / monster to collect gold coins (Pis Bolong Mas). Later on, these coins can be used to buy building materials to build a dormitory (pesraman).

2.1.5. Level Design. In terms of the level design of the game, at each level, the Manik Angkeran's character will face different enemies with different amounts of energy. The bigger the level, the further the character moves in the game and the enemy will be more difficult to defeat. Besides, at each level, the players also will get different amount of coins. In the shopping session, the spent coins will increase in each level. The higher the level of buildings available to buy, the more coins player have to exchange to buy them.
2.1.6. Character Design Concept. The main character’s design refers to the image source of ancient Balinese fighters. The main character design for tap gameplay appears in back-view. However, the turnaround design for the character is also provided to strengthen the character’s details. It shows the front and back looks (see Figure 2). The design of the opponent's (enemy) character represents the characters of ghosts, spirits, and demons that develop in the traditions of Balinese society.

![Figure 2. Main Character Design (left); Enemy Character Design (right).](image)

2.1.7. Background Art Concept. The art style for the background uses the artistic style of Young Artist Ubud, combined with a realist style. The making of background image assets is done by using digital painting techniques using watercolor brushes preset.

2.2. Production Phase Result

2.2.1. Visual Asset-Character Sprites. The creation of sprites uses images/frames, totaling multiples of 4. All character movements, both the main characters and enemy characters, are made with frame by frame animation techniques with some multiples of structures 4. Sprites for default attack movement characters can be seen in Figure 3.

![Figure 3. Attacking movement sprites.](image)

2.2.2. Visual Asset-Background Art Assets. There are 9 (nine) sets of backgrounds design presented by each district in the province of Bali.

2.2.3. Audial Assets. The type of music chosen for background music (BGM) is Balinese music. Music is produced by traditional pentatonic Balinese music instruments. Balinese people know it well as cungklik.
2.2.4. **Code Implementation.** This Manik Angkeran game was built using the game engine Corona SDK with the LUA programming language. Corona SDK is able to build mobile-based applications and games on various platforms such as Android, IOS and Windows Phone. In this game, coding implementation will combine images, sounds and sprite image animations according to game design. The first step starts with making display menus starting from Splash screen, Main Menu, Gameplay Menu, Shop Menu, Setting Menu, and About Menu. Next step, each button is given different function according to its use. On Gameplay's Menu, several sprite animated images will be displayed from all characters. Where on this page will be determined a number of things from each character such as the amount of power and any movement that will be displayed at a certain time. The animation's movement of Manik Angkeran has several variations of movement such as idle motion, normal hitting motion, and 5 special movements when using 5 different special powers (water, fire, wind, earth, and ether). Meanwhile, the motion animation on the enemy character has a variation of idle movement such as the got hit movement and the disappear movement. Each enemy's character will have a different amount of power on each level. Every time Manik Angkeran hit the enemy, the enemy will show the got hit movement and the enemy's energy will decrease. The indicator of energy's amount is placed at the top of the Gameplay's area and shown as a bar that will move from full energy to empty. If the enemy's energy runs out, the disappear animated movement will appear and it will be followed by the appearance of new enemies. Gold coins prizes (pis bolong mas) will also appear every time the enemy is hit, the coding will randomize the amount of gold coins that come out each time the enemy’s got hit and will automatically increase the number of gold coins that collected by Manik Angkeran. In addition, on the Gameplay's Menu, there is also a Shop Menu to do shopping. Coding will automatically reduce the number of gold coins every time a player purchases item. However, if the number of coins is not enough, then the player cannot buy the selected item and a notification of not enough gold coins will appear. Later, all items purchased by player will be collected to build a dormitory (pesraman). At the end of the implementation, the game will be built into the Android platform and tested for its suitability with the existing design.

All moving animated images of all existing characters are processed with sprites on the Corona SDK engine. With this engine, the movements of each character can be arranged according to the design. It will process the number of pictures will be displayed, which character will be moved first and also adjust the movement's speed. Besides, the sprite facility on this engine makes it possible to adjust the size of the image to be displayed through a scale and whether the movement will be repeated or not (loop). It is also can set the pictures to be displayed only once or in a certain number of repetitions. The following is an excerpt of the coding from Corona SDK to create and arrange animated of sprite images. In the excerpt of the code above, a sprite animated motion for the Manik Angkeran's character is made. In the variable "heroData", it is explained the arrangement of image files from the Manik Angkeran's character named "ManikAngkeran.png", which is stored in the "IMAGES/CHARACTER/" folder. This file has a total size of 540×300, in which there are 3 picture frames with a size of 180×300. Furthermore, in the "seqHero" variable, it is explained how the sprite animation will be displayed later, which will display the image movement starting from frame 1 (start=1) by 3 frames (count=3), with the duration of 1 time complete animation movement for 0.6 seconds (time=600), which will be repeated continuously (loopCount=0). Next, a sprite animation is created by code "local hero = display.newSprite(sheetHero,seqHero)",while to play the animation, coding "hero:play()" is used.

3. **Final Result**

3.1. **Tap Gameplay**

The final result of this game is Manik Angkeran Game, which genre is Tap Game, can be played on various Android device, best view in resolution 2048 × 2732 pixel (See Figure 4).
The game is capable of representing the Tap Game genre, where in the gameplay of this game, the players simply has to tap on the smartphone screen to move Manik Angkeran's character to defeat any existing enemies and gain gold coins (pis bolong mas). If the enemy's power is depleted, then the disappears enemy's animation will appear and replace by a new enemy. The player is possible to tap on most existing screens as well as in Manik Angkeran's character. If the player taps on one of 5 special power buttons (water, fire, soil, wind, or ether), then an animation of their respective strengths will appear. If the player presses the navigation key such as Home and Shop, the view will shift to the selected menu page. The more players tap to hit the enemy, the more gold coins players gain. Later, this gold coin could be used to buy items on the Shop Menu, which would later to be used to build dormitories (pesraman).

3.2. Evaluation
In order to test this game, the Blackbox Testing method is used. This testing method focuses on the functionality contained in the game. The tests include checking whether the button functions are in accordance with the one designed. It includes whether the game displays animation movements, displays certain menu, moves to another page, activates / deactivates sounds, add certain items, buys certain items, and more. The results of the testing using the BlackBox Testing method, show all the functionality of the navigation buttons and the entire functions of the game go well as desired.

Table 1. Specifications of Mobile Devices for Testing.

| No | Handphone Type | Types of Specifications | Specifications                  | Size        |
|----|----------------|-------------------------|---------------------------------|-------------|
| 1  | Huawei Honor 9i| Operating System        | Android 8.1 Oreo                |             |
|    |                | Screen Resolution       | 2280 × 1080 pixels              |             |
|    |                | Screen Size             | 5.84 inch                       |             |
|    |                | Memory (RAM)            | 32 GB ROM, 3 GB RAM             |             |
|    |                | Processor               | Kirin 659 Octa- core 2.36 GHz   |             |
| 2  | OPPO A3s       | Operating System        | Android 8.1 Oreo                |             |
|    |                | Screen Resolution       | 1520 × 720 pixels               |             |
|    |                | Screen Size             | 6.2 inch                        |             |
|    |                | Memory (RAM)            | 32 GB ROM, 3 GB RAM             |             |
|    |                | Processor               | Qualcomm Snapdragon 450 Octa core 1.8 GHz | |
| 3  | Huawei P30 Lite| Operating System        | Android 9 Pie                   |             |
|    |                | Screen Resolution       | 2312 x 1080 pixels              |             |
|   | Huawei MediaPad T17.0 | Samsung Galaxy Grand Duos GT-i9082 |
|---|----------------------|-----------------------------------|
| 4 | **Screen Size**      | 6.15 inch                         |
|   | **Memory (RAM)**     | 128 GB ROM, 6 GB RAM              |
|   | **Processor**        | Kirin 710 Octa-core 4xCortex-A73 2.2 GHz + 4xCortex-A53 1.7 GHz |
|   | **Operating System** | Android 4.4.2 KitKat              |
|   | **Screen Resolution**| 1024 × 600 pixels                 |
|   | **Screen Size**      | 7.0 inch                          |
|   | **Memory (RAM)**     | 16 GB ROM, 2 GB RAM               |
|   | **Processor**        | Spreadtrum SC7731G Quad-core 1.2 GHz |
| 5 | **Screen Resolution**| 800 × 480 pixels                  |
|   | **Screen Size**      | 5.0 inch                          |
|   | **Memory (RAM)**     | 8 GB ROM, 1 GB RAM                |
|   | **Processor**        | ARM Cortex A9 Dual-core 1.2 GHz    |

Furthermore, testing the game appearance on some Android mobile devices that have different screen resolutions is also conducted. This testing purpose to test whether the display is consistent and good. For the results of testing the game on several different screen resolutions, the result shows that the display of this game is able to adjust on different screen resolutions and the image display remains sharp. Display adjustments in question are in terms of laying menus, buttons and text. Where on different devices, the display and position of the menu and other images are in accordance with the one designed. This test also obtains the results that the displayed images and animations are still good, which means it does not blurry / broken because of the lack of resolution. This test is carried out on 5 (five) mobile devices differing both in terms of Hardware (in terms of Screen Resolution, RAM, Processor) and software (Android Version), with the specifications as described in Table 1. Based on the results of the testing, the game is able to run well on the Android platform, both on older versions of the Android operating system such as the Jelly Bean version (4.2.2), KitKat version (4.4.2), and the latest versions such as Oreo (8.1) and also Pie (9.0).

Furthermore, based on the testing, the game display on several devices with different screen resolutions, namely the minimum screen resolution measuring 800x480 pixels and the largest resolution measuring 2312x1080 pixels. This game is capable of displaying clear images and does not break / blur due to poor image resolution. Meanwhile, in testing the performance of the game based on RAM and Processor specifications, testing is done on several devices with a minimum RAM capacity of 1 GB and a maximum of 6 GB, as well as on a Processor with a minimum speed of 1.2 GHz Dual-core and a maximum Octa-core 4xCortex-A73 2.2 GHz + 4xCortex-A53 1.7 GHz. In this test, the results show that the influence of device specifications such as RAM memory capacity and Processor speed greatly affect the performance of the game. The better or higher the specifications of the device, the better the appearance and loading speed of the game both in terms of displaying images and combining them with animated motion and sound as a whole.

4. Conclusion
The results of this study shows Manik Angkeran Game with Tap Game genre based on Android. This game requires players to tap on the screen to move Manik Angkeran with a mission to defeat the enemy / monster to collect gold coins (Pis Bolong Mas). Later, these coins are used to buy building materials, which will be used to build dormitories (Pesraman). The test results using the BlackBox Testing method show that the functionality of the navigation buttons and the entire functions of the game are running well as desired. For the results of testing the game on several different screen resolutions, the result shows that the display of this game is able to adjust on different screen resolutions and the image display remains sharp. This game is also capable to run on a minimum Android device v.3.0 HoneyComb, until
the latest version at this time is v.9.0 Pie. Aspects that play a role in delivering messages through storytelling style in a digital game format are: (1) strong story equipped with proper visual nuance that represents story background characteristic, (2) simple gameplay.

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