Mobile 2D platform historical game: god's commandments

By

Chang Jia Zheng

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONS)

Information systems engineering

Faculty of Information and Communication Technology

(Perak Campus)

JANUARY 2019

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DECLARATION OF ORIGINALITY

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ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to my supervisor, Mr Lim Ean Heng who has support and guide me in this game development project. This is my first time to lay my hand on game creation. Despite all the mistakes and errors, we still manage to get through all the obstacles. A million thanks to you.

Finally, I must say thanks to my mom and my family for their love, support and continuous encouragement throughout the course.

ABSTRACT

This project is an historical educational game design based on bible's god commandment. It will provide a mobile application environment for the users to learn god's commandment. It will be demonstrated in the game levels associate with the commandments. Nowadays, people intend to use mobile application more compare to reading a bible because they find it bored. Thus, the youths do not know much about god's commandment. The objective is to develop a 2d mobile platform historical game to attract the youths in order to deliver to them the knowledge of god's commandment. The primary game design is in 2d platform which similar to the design of super bros Mario and granny smith. In short, the game require player controls a player model and go through tough obstacles, earn points, gain achievements after completion of one level and proceed to next level. The existing effort now is reality game like playing hula-hop and mobile applications that only permit user to read the commandments not application-based game. This is the first god's commandment application-based game in a nut shell. The god's commandment game exists now yet to have a place in mobile application platform or any web-based application platform. To summarize it, the god's commandment needs to be developed in an attractive way in order to carry out the goal which is to let people know about god's commandment.

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UX	User experience

Chapter 1 Introduction

1.1 Background information and motivation

This aim is to deliver 10 commandments moral values through 2d platform game. According to Minkkinen Toni 2016, platformers which can also be called platform games are the games which primarily circle around a character with the player controlling it, travelling through obstructions and find ways to avoid it with running and jumping. Also, historically platform games are well-thought-out to be counted as first game genres games (Toni, 2016). Toni wrote that there are two types of platform games, single screen platformers and scrolling platformers.

Figure 1.1 Single screen platformers (BEN BERO BEH 1984)

Chapter 1 Introduction

Figure 1.2 Scrolling platformer (Mario and luigi 2000)

The most distinct characteristics between both is single screen platform games presents single still screen in every level, the whole level is visible at all times refer to figure 1.1.1 whereas scrolling platform game is consistently changing .Once the character approaches the edge of the game screen (Toni, 2016), the screen follows the character and move its x and y axis according to players movement. However, Toni mentioned there are similarity between both of them may include multi and boss levels with higher difficulty after each level.

Platform games had evolved from stairs climbing move to more content rich game (Toni, 2016). According to tony, the objective was to kill all enemies and finish approaching the end of the level by climbing up to the peak of the level. But the 2d platform game currently in progress that had proposed will differs from the traditional method slightly by converting enemy killing or boss killing levels to puzzle solving and thinking levels. It also

Includes an interactive story line so the players knew and understand the moral values (god commandments) better compare to pure text reading.

Chapter 1 Introduction

The benefits of this proposed solution will bring is to provide a graphical and interactive platform in learning moral values for the pupils, younglings or students. This project will give contribution in bringing more people to learn about moral values through mobile 2d platform game and enhance their understanding in moral value. The proposed solution contains interactive graphical interface that's able to pull younglings attention and it suits the current generation because nowadays even 9 years old children owned a phone. Hence, this makes the delivery method sound and motivating.

This mobile 2d platform game must be deliver to the audience because it will get users interested in understanding moral values which is able to indirectly bring down the crime rate. Consequently, by having such mobile 2d platform game, the younglings can visualize and understand how the commandments can be performed (ex. take care of your parents when they are sick (honour thy parents)).

1.2 Brief historical background of god 10 commandments and its definition

Moses, the author of book of exodus and Deuteronomy, was considered a vital prophet of God and a law giver who god gave him the commandments face to face (Mark, 2017) at Mount Sinai, Israel. The bible known as exodus contains many chapters and each chapter have its own numbered sentences refer to figure 1.3. The 10 commandments are shown in Exodus chapter 20:1–17 as well as Deuteronomy chapter 5:6–21 (Adam,2017) authorized in king James version which converted into English version.

Figure 1.3 The tablets of god's 10 commandment

Table 1.1 The 10 commandments definition

Exodus 10 commandments	definition
"I am the LORD your God, who brought you out of Egypt, out of The land of slavery. "You shall have no other gods before me. (exodus 20:2-3)	I am the Lord your God, You shall have no other gods before me.
You shall not make for yourself an image in the form of anything in heaven above or on the earth beneath or in the waters below. you shall not bow down to them or worship them; for I, the LORD your God, am a jealous God, punishing the children for the sin of the parents to the third and fourth generation of those who hate me, but showing love to a thousand generations of those who love me and keep my commandments. (exodus 20:4-6)	You shall not make idols. (Bennett, 2017)
You shall not misuse the name of the LORD your God. (exodus 20:7)	You shall not take the name of the Lord your God in vain.
"Remember the Sabbath day by keeping it holy. Six days you shall labor and do all your work, but the seventh day is a sabbath to the LORD your God. On it you shall not do any work, neither you, nor your son or daughter, nor your male or female servant, nor your animals, nor any foreigner residing in your towns. For in six days the LORD made the heavens and the earth, the sea, and all that is in them, but he rested on the seventh day.	Remember the Sabbath day, to keep it holy. Dedicate or set aside a regular day each week for rest and worship of the Lord. (Fairchild, 2017)

Therefore the LORD blessed the Sabbath day and made it holy. (exodus 20:8-11)	
Honor your father and your mother, so that you may live long(exodus 20:12) in the land the LORD your God is giving you.	Honor your father and mother.
You shall not murder. (exodus 20:13)	You shalt not kill.
You shall not commit adultery. (exodus 20:14)	You shalt not commit adultery.
You shall not steal. (exodus 20:15)	You shalt not steal.
You shall not give false testimony against your neighbour. (exodus 20:16)	You shalt not bear false witness against your neighbour.
You shall not covet your Neighbour's house. You shall not covet your neighbour's wife, or his male or female servant, his ox or donkey, or anything that belongs To your neighbour. (exodus 20:17)	You shalt not covet your neighbour's house.

1.3 Problem statement

1.3.1 Lack of interactive and graphical contents

According to Subadrah, most teachers are subjected to make use of the conventional method to preach moral education to the students. However, pupils needed to analyse and reserve a space in their brain for the content taught by their teachers using the 'chalk and Talk' method as well as reading textbooks. This modus operandi is often hinge in teacher him/herself and uninteresting which ultimately results in the student being moodless when comes to learn moral values (Nair, et al., 2014). The medium of delivery is often through text and test. Furthermore, there are reports from education minister Malaysia (2000,2005) experimented by zarin (1990) points out application of moral education difficulties arise especially in primary and secondary schools. This is cause by the conservative way of teaching and mind-numbing lessons conducted by the teachers (Nair, et al., 2014). In a nutshell, the method of delivering moral values (like god commandments) are often boring, inefficient and ineffective. In order to eliminate boredom, measures must be taken to solve this by visualizing moral values (god's commandments) and transform it into an interactive mobile 2d game.

1.3.2 Physical player amount dependent

The method of delivery currently needs physical players to involve which if there weren't any physical players to participate, the game will not work. Furthermore, it also requires players that have certain understanding in 10 commandments to conduct the game.

1.4 Project scope and objectives

1.4.1 Project scope

I will develop a 2d mobile platform historical game that includes interactive and interesting graphical contents to pull the interest of the youths and let them understand all basic commandments with limited design resources to younglings age between 8-18.

1.4.2 Project objectives

To move historical biblical reading platform into mobile application platform with high graphical interaction to create a new way to promote historical facts that attract youths and abolish boredom.

To create a physical player independent platform for god commandment game which players can learn the 10-commandment independent of the social environment (conducting the game with others).

1.5 Contribution

Firstly, instead of reading the bible, people can learn biblical moral values through 2D game. Next, the game shows picture of commandments which tell its meaning deeper than pure words from bible. Lastly, the game serves as a framework (game idea) for other mobile game development that interested in delivering moral values.

1.6 Report organization

Chapter 1 serve the purpose to introduce 2D platform games and the brief origin of god's 10 commandments. Next, Chapter 2 detailed on prove to the problem statement which reveal why traditional classroom method will be obsolete and other similar approaches to deliver 10 commandments. Chapter 3 reveals the design of the game system and its overall architecture. Chapter 4 details on the system methodology which include the initial, pre-production and production phase. Chapter 5 focuses on the testing including test cases from alpha and beta testing. Chapter 6 will conclude all the parts and discussion on further improvement of the project.

Chapter 2: Literature review

2.1 Medium of delivering morale value and its obsolete approaches

Mobile game-based learning allows engagement as well as encourages transformational enthusiasm in a varied reality situation (Schwabe & Göth, 2005). For moral education is taught, teachers yet find it difficult to teach values and attitudes while pupils find moral lessons boring (Cheung, n.d.). Furthermore, reading a bible can be boring as Wes mcadams sermons once said mindlessly scrolled through social media is more enjoyable than Bible study (sermons, 2017). In this particular age of pupils, mass media exposed seems to be crucial as the medium of learning moral values. But yet, moral values are delivered through pure text or simply other extra-curricular activities (Cheung, n.d.). Such way of delivering moral values will dampens the mood and will of learning for a youth and proved ineffective. To back this evidence, a study is conducted in Faculty of Dentistry, Alexandria University, Egypt, and the College of Dentistry, University of Dammam, Saudi Arabia. With n=199 from Alexandria as well as Dammam's student n=146, the corresponding reply rates is 99.5% and 73% separately. ECA participation reveal that only 27.1% and 43.8% which is less (Al-Ansari, et al., 2015). Therefore, this proved that although measures have been taken to teach moral values through extra-curricular activities, yet it is not effective and efficient in terms of quantity.

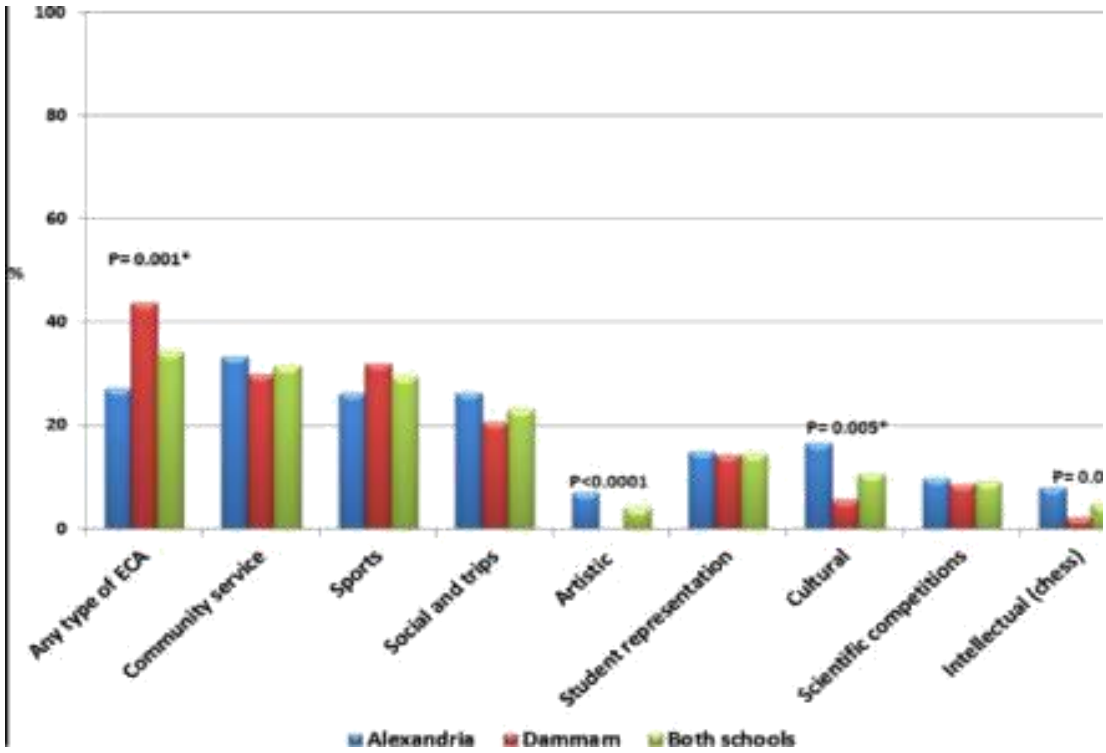


Figure 2.1 Results in curricular involvement

The Eca of both schools does not reach 50%, in short, the method provided to spread moral value through extra-curricular activity is simply weak solution.

2.2 Traditional classroom method

Traditional classroom method is defined as teacher-centered delivery of instruction to classes of students who are the receivers of information (Huson, n.d.). Traditional schools usually emphasize on fundamental educational teaching style with the expectation of good result orientation of in the core subjects such as math, reading, writing, science and social studies (Huson, n.d.).Huson also emphasize that non-private schools typically let this educational model to be carried out .In contrast, contract schools used to be adaptive and elastic in terms of educational tactic .The interpretation here review that this traditional educational model is a constraint type. Meanwhile, Huson also mentioned that traditional teaching approaches depends heavily on textbooks which in oppose of it the modern way be dependent on hands-on resources and highlights on root abilities. With old way of teaching, assignment is conducted and observe as a distinct exercise and followed by some challenging tasks.

2.3 Graphical organizers vs traditional text-based teaching methods

According to Ellis and Howard, graphic organizer is defined as visual devices that depict information in a variety of ways. Normally, it takes the form of lines, circles, and boxes aggregated and to construct an understandable image. There are four usual ways information is organized which are hierarchic, cause/effect, compare/ contrast and cyclic / linear sequences. Such images often aid as visual signs intended to make communication process easier and apply higher understanding into certain materials by presentation how important this information is being organized. In terms of graphical method, graphic organizer is used as a method of teaching which permits students to concentrate on specific ideas (Myrick & Siders, 2018) which ultimately fortified student's process of learning. The research done by Myrick & Siders on Make sense Strategies(MSS)which uses graphical organizer endeavours is to enhance the clearness of materials which what teachers wanted the their subjects to learn(students), consciously hope their students realize the ultimate aim of the lesson compared to traditional text-based teaching styles which often require students to memorize (Myrick & Siders, 2018) as such does not concern the meaning of the contents or logical structure of the teaching contents.

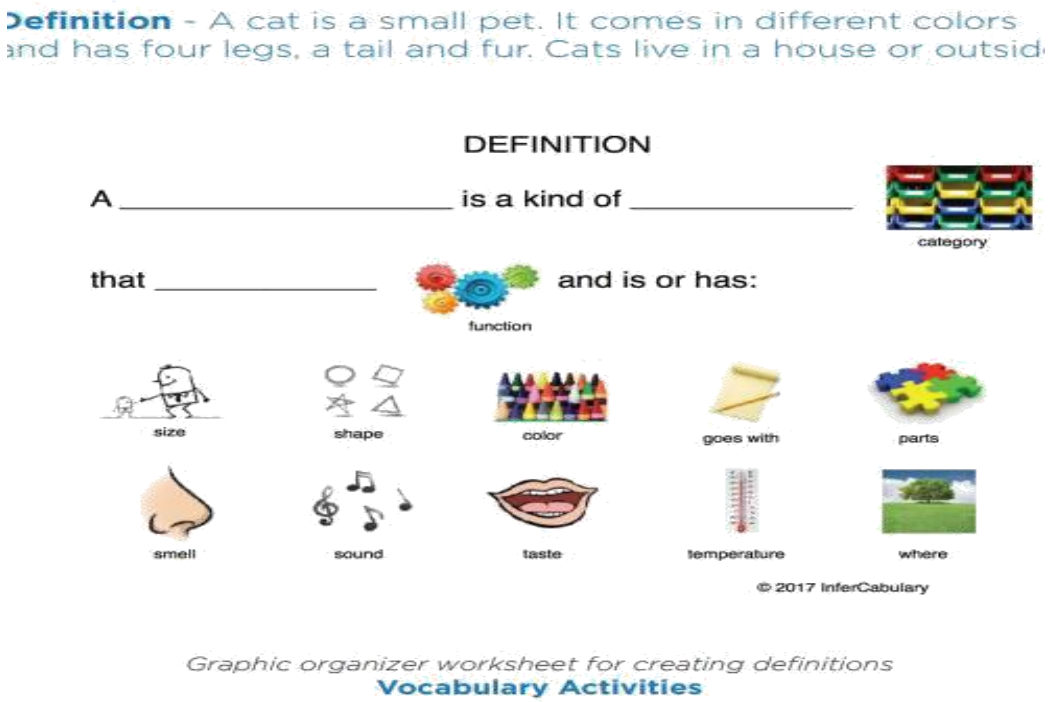


Figure 2.2 Example of graphical organizer

In figure 2.2, it shows interactive graphical interface to the students and it is proven to be effective in learning process because visual displays represents a segment of graphic organizers let students to open a connection to preceding knowledge to fresh learning, therefore it increase the students level of understanding to its peak (Myrick & Siders, 2018).Graphic organizer makes a complex information wrapped with a simple display that could lead sense into students learning engines. Conclusively, the interactivity of a study content should be organized and encourage involvement of graphical images.

2.4 Review on similar approaches

As a method of delivering moral values, there are many types of system platform that the game can be develop into. One of them will be application software, it is a program or group of programs designed for end users such as database programs, word processors and spreadsheets (Anon., 2017).Mobile games are games that designed for mobile devices, such as smartphones, feature phones, pocket PCs, personal digital assistants (PDA), tablet PCs and portable media players (Anon., 2017).

2.4.1 Come on Up, Moses!

(Come on Up, Moses! 2011) required players to set up a racing route and players must run to the end (Mount Sinai) and retrieve a commandment then race back to original point and arrange the commandments correctly. The players are divided into groups and given a set of numberless commandments and each player will have the chance to participate by tagging on to get another commandment. First player or team to receive all ten commandments and place them in correct order wins (S.A. Keith, 2011).

Strengths

- The game makes students active and exciting
- The game allows students to train their reflexes like exercising
- All 10 commandments are involved
- The students will be taught the original arrangement of the commandments
- High participation rate and improve teamwork

Weakness

- Need physical player involvement
- Can only be conducted if the number of students is >=4
- The game only tells the students to arrange their commandment but not understanding them.
- No interactive contents are being view to the students

2.4.2 Ten Commandments File Folder Game

The main aim of the game is to recognise which of the one out of ten commandments the sin violates. Similar with the snake board game which users needed to roll a dice and climb up to the top; whoever that reach the top first, wins. Shown in Figure 2.3, when the players stop their pace on the question mark, question will be asked whether this action violates the commandment rule.

Strength

- Provide questions that enhance the players understand on 10 commandments rules
- Teach whether such action goes against the commandment.

Weakness

- Lack interactive designs
- Can be played only three or more players is involved (one holding and creates the question, another two play through the game)
- The player that creates question might lack knowledge on how best to ask the questions so that the other players understand.
- Low portability

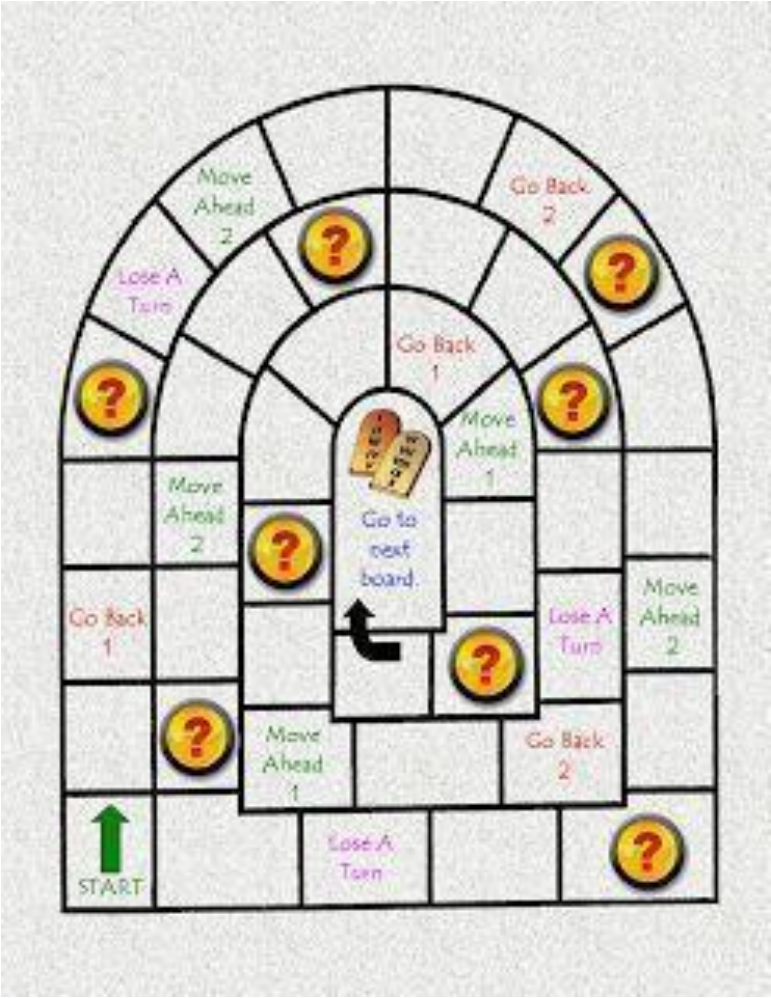


Figure 2.3 The 10-commandment file folder game 2018

2.4.3 The Greatest Commandment?

In (The Greatest Commandment? 2002) by Sarah A. Keith in sundayschoolnetwork, the objectives of the game are to understand the importance of commandments. To set up the game, the written 10 commandments will be distributed to the players and the players will cut the commandment out line by line to place mix them up. Then each player (in turn) can list what they consider as the most important commandment in ascending order and allow them to explain their choices.

Strengths

- High social involvement
- Develop understanding in their choices
- Improve players communication capability

Weakness

- If there are no physical players involvement the game won't work.
- Need more players to participate

2.4.4 The Ten Commandments

As shown in figure below, (The 10 commandment 2017) requires player to name all the 10 commandments in a given time limit. Once the limit is over it will calculate the scores how much did the player enter correctly.

Strength

- Trains players to remember the commandments
- A warmth reminder will be displayed to the user if they lost the challenge or simply score less (encourage them to try again)

Weakness

- Lack attractive graphical contents
- Some user might not know any commandment at all which makes the game meaningless
- Users have to key in the commandments without any hits or reminders

Figure 2.4 The 10 commandment 2017(10 commandment quiz)

2.5 Comparison of several god commandment games

Table 2.1 Summary of researched games

Themes name of game	Provide deep understanding	Easy to understand and play	Include all commandments	Graphical contents	Need more than one player	Application based
Come on Up, Moses!	No	Yes	Yes	No	Yes	No
Ten commandment file folder game	Yes	No	Yes	No	Yes	No
The Greatest Commandment?	Yes	Yes	Yes	No	Yes	No
The Ten Commandments Game	No	Yes	Yes	No	No	No
Mobile 2D platform game: god commandment	Yes	Yes	Yes	Yes	No	Yes

In the comparison above, the proposed game has several disadvantages that can be listed out. Firstly, the proposed game doesn't need the involvement of physical players but this brought a disadvantage that player is not able to socially interact with other people and confess or share their ideas upon what they thought about the commandment. Next, this game only contains one level and once player successfully collected all the coins and reach the red flag that will unlock all commandment stories, there will be no more contents to participate in. So, the proposed game is discontinuous in a way. Lastly, some players might think that 2D games are obsolete compare to 3D first person or third person games which doesn't want to participate in the game at all.

Chapter 3: System Design

3.1 Brief coding idea and guidelines

Initially the game is written in c# language which makes it similar to java, but compare to (ex. food ordering application) coding style, it is completely different. To explain how the program is written, one must have the basic knowledge of gaming coding concept.

- **Game objects**
  - These are the objects that is used in a/any game scene, it can simply be a tree sprite, camera or anything that will affect the game logic. The game objects are often equipped with properties (refer to figure 3.1.1) such as box collider 2d, scripts, layer, tags, canvas (UI) and more that makes the object exist with a purpose.
  - A game object can also be a combination of multiple game objects.

- **2d Sprites**
  - Images that are used in the game scene.
- **Scripts**
  - Named script that contain c# codes which will give any game objects a purpose for instance, returnToMenu method in a script is equipped to a game object (back to menu button). As the user press the menu button, the game will return to the menu.
  - Each script is pre-occupied with two function which are void start () (Use for initialization) and update (called once per frame).
- **Game scene**
  - An infinite space that game coders used to develop and design the game.
  - A game can contain many scene (main menu, level 1, level 2 and boss level).
- **Prefabs**
  - Combination of multiple game objects equipped with purpose that will be used in the future again.
- **Canvas**

- A holder of UI elements (ex. buttons, text)

- **Tag**
  - A label that describe what the game object is. (ex. game object with enemy tag indicates the game object is an enemy)

- **Layer**
  - Layer are most commonly used by Camera to render only a part of the scene , and by Lights to illuminate only parts of the scene (Anon., 2018).

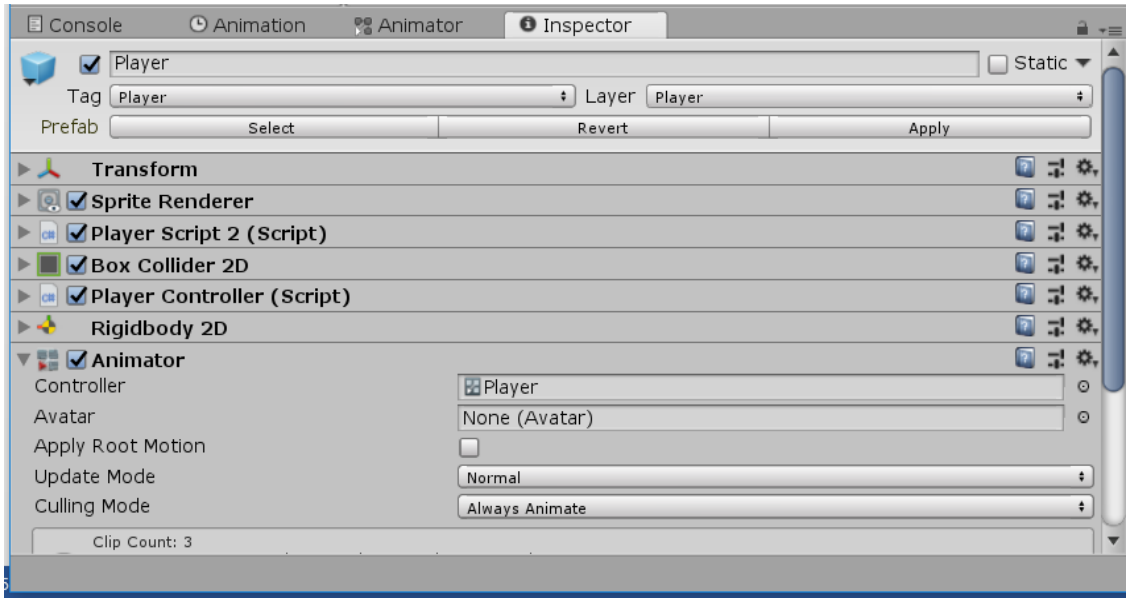


Figure 3.1 Game object and its properties

Referring figure 3.1, the game object which is Player have multiple properties which are Sprite Renderer, Player Script 2, Box Collider 2D and so forth. C# scripts (ex. Player Script 2) are equipped as a property to player game object.

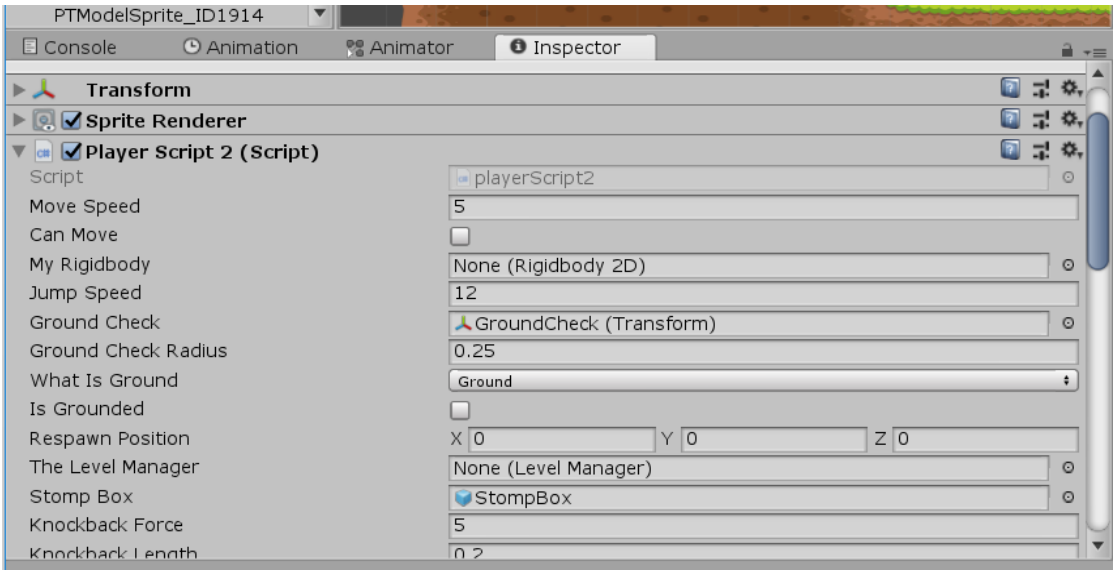


Figure 3.2 C# script equipped to player game object

Figure 3.2 shows that a C# script attached to player game object and each variable (ex. Move Speed) can be set to a desirable value to alter the game objects movement, smoothness and other developer desirable outcome.

After getting the basic knowledge, create a 2d platform which the player can walk on, is essential to create prefabs to ease the development process. The prefabs included various design of ground platform which allow user to stand on later. This require some combination of multiple created ground prefab and later combine them into a larger ground platform. After the prefabs are created, then the drag on drop process will take place. To make the game operate, there are three major components needed to be taken into consideration which are player, camera and the level manager script. So, these three vital components are designed and developed to make the game works and all of them must be equip with a script. However, each script is coded with their own purpose which will be shown below.

- Player script
    - Used to control the players movement and how to interact with other game objects in the game.
- Camera script
    - Used to control the camera's movement, velocity, its follow target and the smoothing effects.

- Level manager script
    - Used to control the overall game logic.
    - Manage essential game objects like coins collected, hearts and lives.
    - Coordinate with other game objects that act opposite to the player (enemy).

The player is designed in the way it can take a form in any position of the game (refer to figure 3.3)

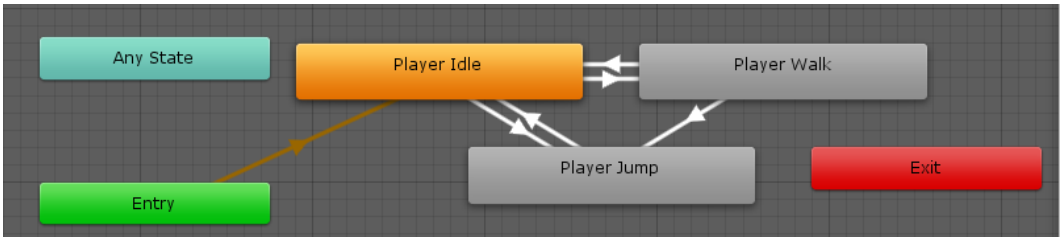


Figure 3.3 Player logic

The player can enter three state which are idle, walk and jump. Each state can occur more than once. The player can simultaneously walk while jumping for instance, leap off a platform by left jumping. Also, is essential to assign a 2D rigid body property to the player game objects that indicates this game object is able to interact with other game objects in the game. After that, it should have a collider 2D property, to signify the collision between one game object and the other. Once the scripts are equipped to the player game object, the game enters pre-production phase. The game is able to operate as normal like other 2d platform games which allow the player to jump, walk and move in the designed ground platform that is dragged into the game scene.

The camera script must code in a way that it follows the player all the time and keeping the camera view wide enough for player to see where they are.

The manager script controls the overall game logic which include counting the coins incrementally whenever the player grabs them, managing lives and hearts.

Next step will be the enemy AI design and its image selection. This was a tricky part which how enemy will interact with the player and of course, multiple enemy script needed to be developed and tested to ensure it works as expected. There are several types of enemy in the game which require their enemy AI to be develop and categories differently.

Table 3.1 Enemy logic and design

Enemy	**Characteristics**	**Codes idea**
-Boss enemy	-Not killable -Chase player	-Imply a kill plane tag to the boss enemy game object (shown in figure 3.4)
-Normal enemy	-Killable -Trigger only when player is near	-Imply enemy tag to the normal enemy game objects.

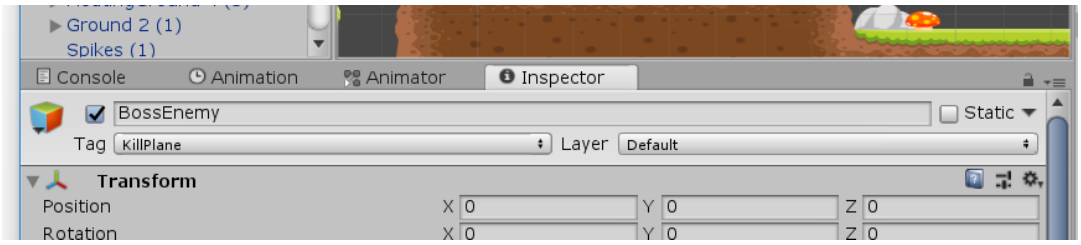


Figure 3.4 Game objects tag

Figure 3.4 indicates that whenever the player interacts with game objects that tagged with KillPlane, it will automatically kill the player. Same as other objects in the game, game objects will define its purpose by assigning a tag to it.

Lastly, it is important to create and test the necessary UI. The UI in level1 segregate to several parts. The movement UI needed will be left, right and jump button. Other important UI is to tell players their progress such as coins, lives and heart. Also, there are several scenes also required UI such as main menu and pause scene. These UI must adjust well to its suitable resolution in order to cope with the phones graphic which players are using. So, the properties of resolution and size of the game objects are set scale with screen size so it won't go off the screen when the game is installed into any mobile phone.

Chapter 3: System Design

3.2 Overall design

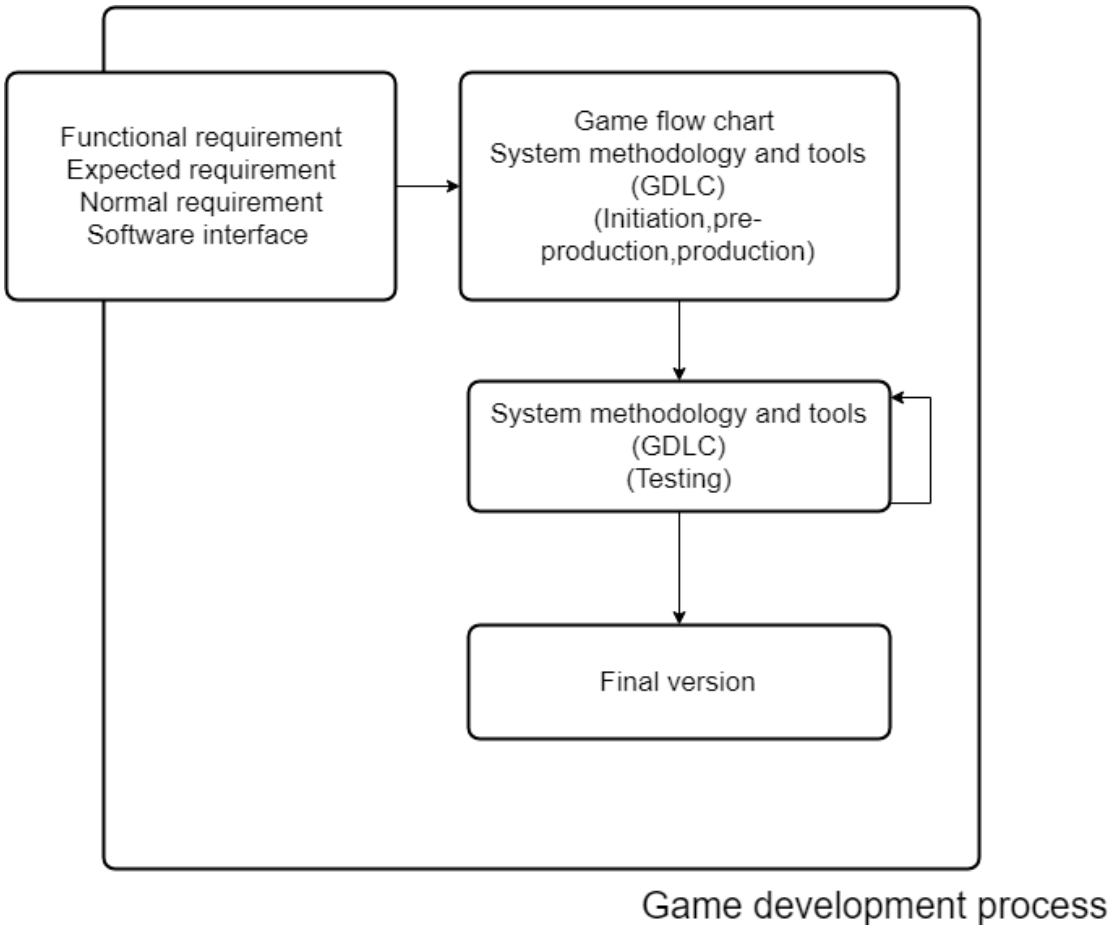


Figure 3.5 Shows the Game Development Process

There are multiple requirements that needs to take into consideration are functional, expected and normal requirement.

3.2.1 System features

Functional requirement are the desired operations of a program, or system as defined in software development and systems engineering (Rouse, 2018).In order words, this requirement tells a system component what it should and suppose to do.

Table 3.2 System feature and requirements

System features	**Functional requirements**
Main Menu	- The main menu must be launching each time the player enters the game. - Whenever the player wants to view the instructions, they can just press the i button at the top corner left to view the instruction. - If the player decides to see what commandment is unlocked, they can just tap the commandments button to view the commandments - If the player decides to quit the game, tap the quit button and it will return to the app menu. - After the player completes the game (raising red flag), the game will return to menu and calculating the coins in the background. - While gaming, player can quit and this will lead the player back to menu. - If the player decides to play the game, he/she can just press the “New Game” button to initialize.

Pause scene	- The resume button must take player back to the game. - After pause scene is triggered, the player will stop and other objects should be inactive. - Quit to Main Menu
Commandments scene	- If coins are not collected enough, the stories must be locked. - The player should be able to access the stories if unlocked.
The boss enemy	- Must follow player in the entire gaming session - Must instant kill the player, if the player's distance <0 with the boss enemy. - Must not kill by player
Instruction scene	- Must display to player all collectables, boss enemy and condition unlock the commandment after the game ends.

3.2.2 Expected requirements

Expected requirement are the requirement that is implicit to the system (Nahar, 2014) which one does not need to openly disclose. There are several basic expected requirements that can be anticipate in the game.

- Medium definition
- System developed with least cost

- No hardware requirement needed
- Utilizing copyrighted images, audio and sprites

3.2.3 Normal requirements

Normal requirements are the goals and objectives state system (Nahar, 2014) stated by the relevant peoples who gives their opinion during meeting.

- Develop the game in a stimulating and interesting manner
- Easy to play
- Easy to understand and provide utter pleasant UX
- Must include achievements that able to be unlock

3.2.4 Software Interface

Adobe Photoshop CC 2017

Adobe Photoshop is an indisputably powerful tool that capable of editing and creation of complex images designs and variety of effects merge. It is an image editor in short as it is also capable of simple retouching and 3d designs and illustrations. The software consists of variety of tools to assist users in editing their desired images. It is used to modify some characters and create story boards in the game.

Unity engine

Unity is a game development platform developed by unity technology, Apple Inc. This gaming platform requires major coding in C# language. The game primary logic flows are developed with this software.

3.2.5 Game flow chart

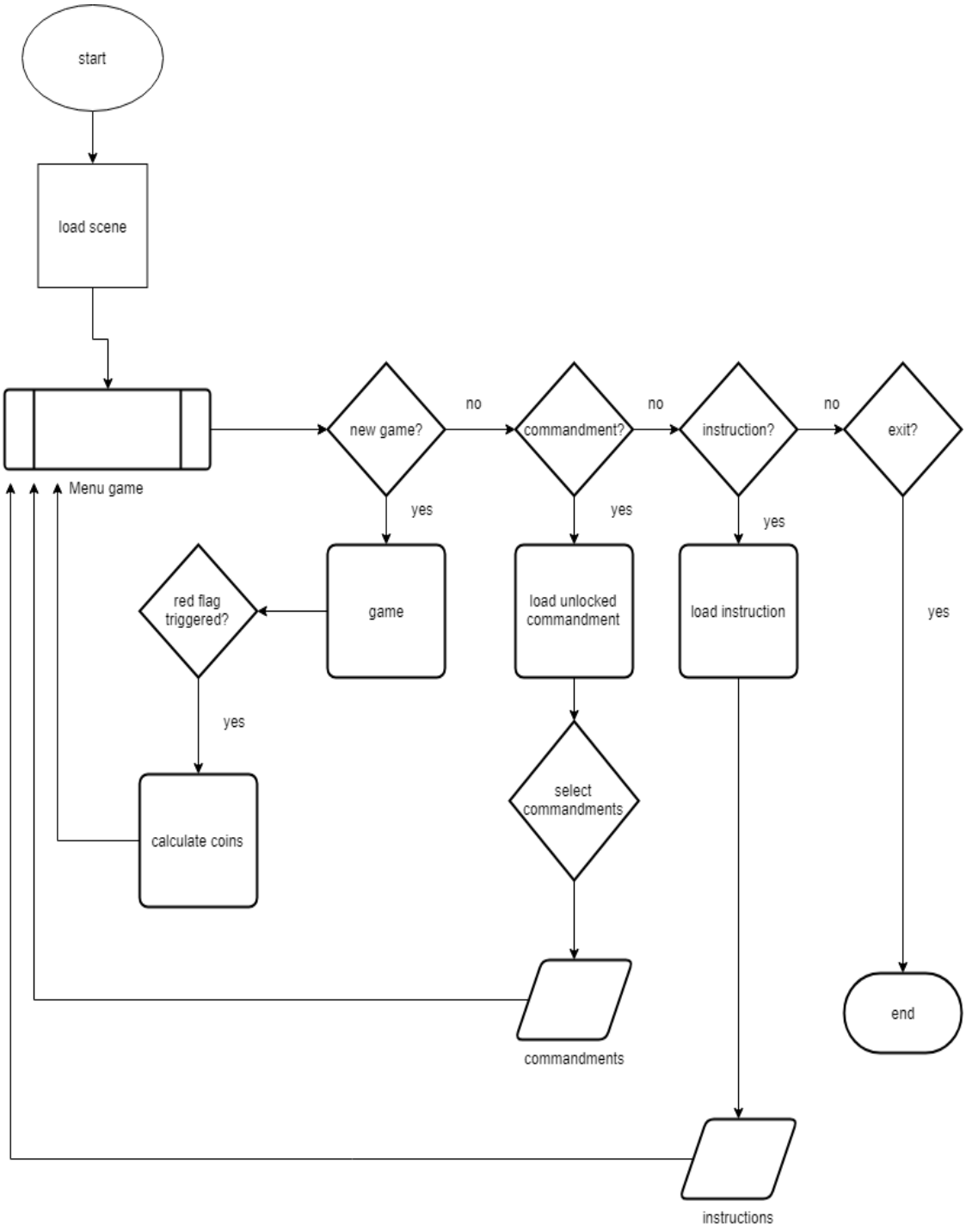


Figure 3.6 Game flowchart

Chapter 4 System methodology and tools (GDLC) (Initiation, pre-production, production)

Game Development Life Cycle (GDLC)

GDLC is a guideline which encompasses the game development process (Ramadan & Widyani, 2013). This proposed GDLC by Ramadan and Widyani will be used in the development of this mobile game.The development cycle consists of six phase which are initiation,pre-production,production,testing,beta testing and release(refer to figure 4.1).

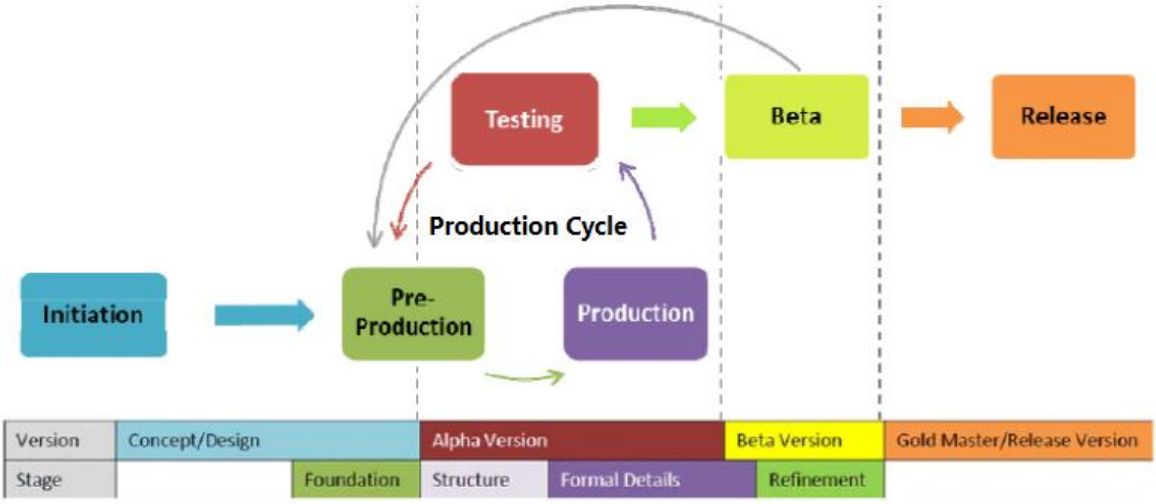


Figure 4.1 The game development life cycle model

4.1 **Initiation**

In this phase, brainstorm session is needed in order to generate the basic concept of the game along with the kind of game it should be. The game is design in a way that the user is require to collect coins, avoid obstacles (enemies) and unlock achievements with coins that they collected in the game. The game only contained one level (main level), in this level there are 50 coins in total to collect. Player can unlock the commandments with the collected coins. Each commandment requires 5 coins to unlock and each commandment bear a story (an image) that teach and let user understand what the commandment is and its meaning. The player will have 2 lives and each bear six hearts which can be damage by the enemies in the game before deducting the lives. In further game setting, there will appear a monster (immune

to any damages) chasing the player and the enemy is designed to instant take a live from player which makes it stronger than other enemy in the game. This enemy chasing player concept is to make the game more stimulating and interesting compare to other platform game which only require players to kill the boss, get all collectables and end the game (ex. Mario).Also after player collected enough coin, then the player can search for a red flag in the game to escape the map. By and large, each commandment reveals a picture with deep meaning.

4.2 Pre-production phase

After the rough ideas and concept is drafted, the development cycle enters the next phase which is pre-production. This phase emphasizes on the revision of game design and also the development of prototypes. To illustrate this, figure 4.2.1 shows the overall design of the level and figure 4.2.2 display the major components such as player, background, basic UI and enemy in game view.

Figure 4.2 Basic design view of the prototype

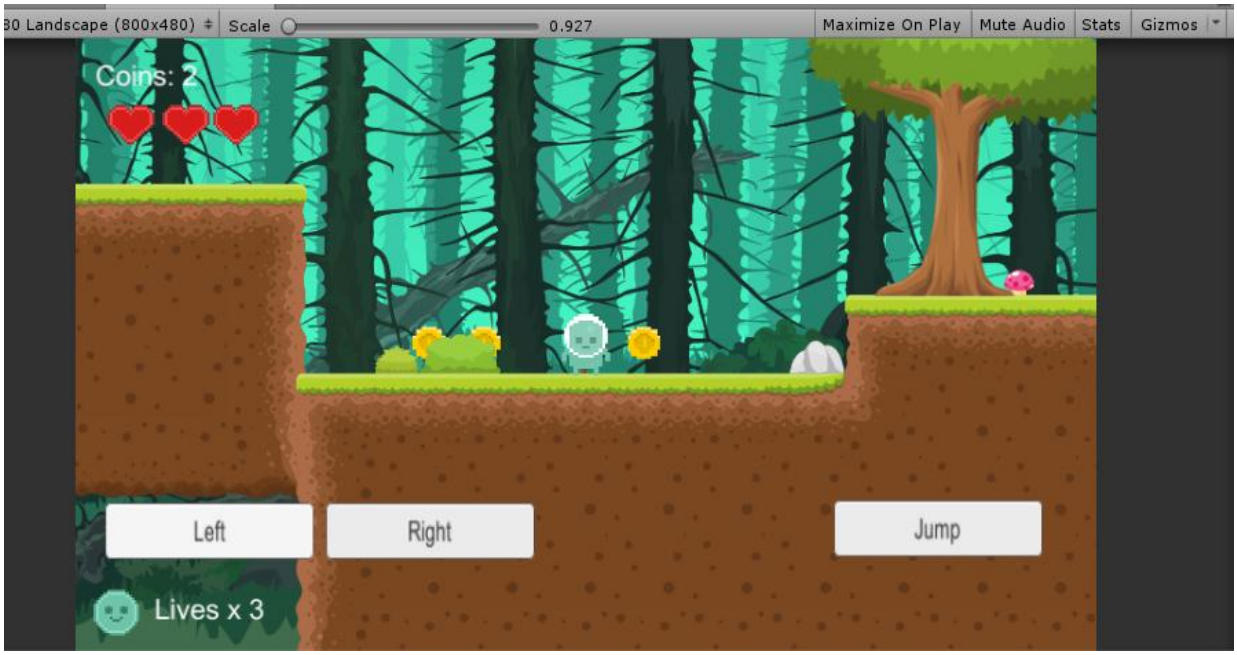


Figure 4.3 Game view and UI of the prototype

The UI consist of coins view, lives view, heart view, left, right and jump button. The basic design of the game level contains some bushes, rock, mushroom, trees and some combination of ground platform.

Figure 4.4 Concept art of commandments(you shall not steal) unlocked

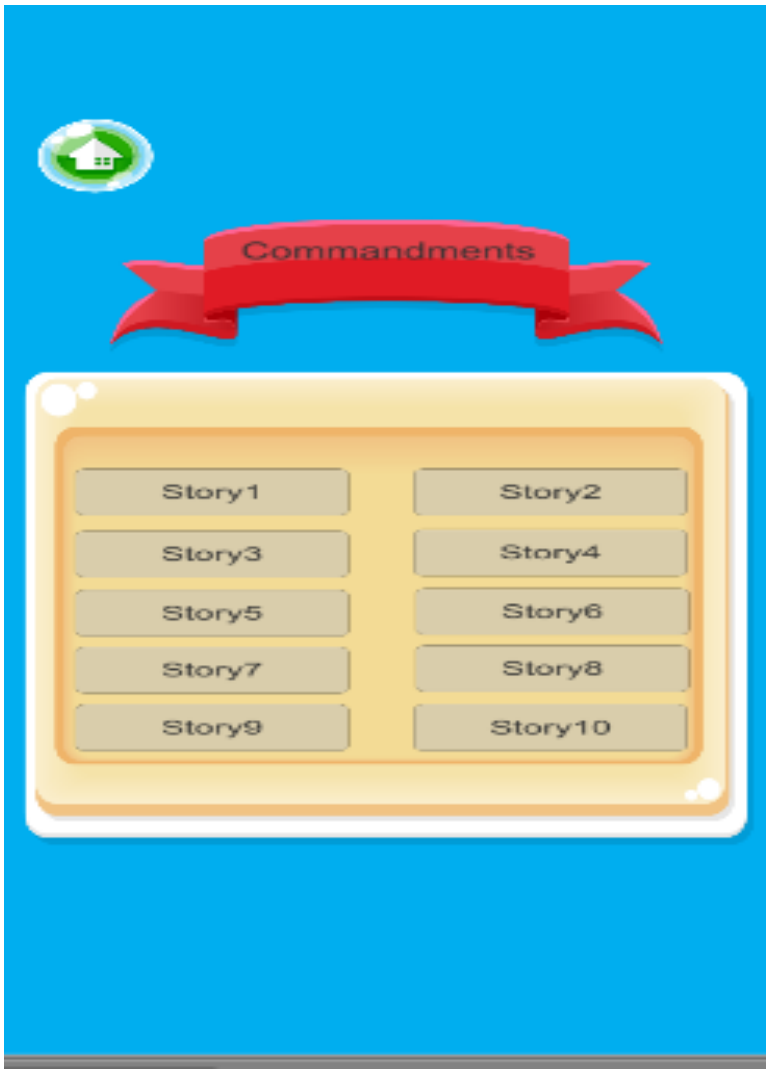
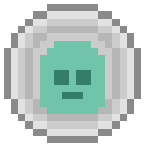
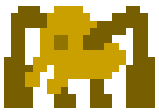
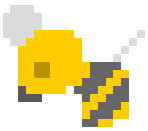
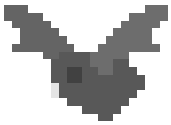


Figure 4.5 Commandment selection scene

This scene will put player's collected coin to use which 5x coins will unlock one story that will display the commandment story to the player.

Table 4.1 All game objects that used in main level

Characters and game objects	Functionality	Name and purpose
	-Move left -Move right -Jump -Stomp enemies	-Main character of the game
	-Instant take a live from user -Follow user	-Boss enemy
	-Refill players heart -Collectable	-Heart -Player will spawn with six hearts -All six lives deducted means 1 life taken from player -Every enemy can deduct from player half of a heart
	-Collectable by player for after game use	-Coin -The game includes 50 coins and each 5 coins unlock one commandment story
	-Collectable by player -Refill players live	-Extra live -Players start with three lives

	-End the game which concludes the coins collected that used to unlock commandment stories.	-Game over flag -Situated in a random place of the level -Requires player to find it
	-Deduct half heart from player if interact with player	-Spider enemy -Damage player
	-Deduct half heart from player if interact with player	-Hornet enemy -Damage player
	-Deduct half heart from player if interact with player	-Bat enemy -Damage player
	-Deduct half heart from player if interact with player	-Spin saw enemy -Damage player
	-Deduct half heart from player if interact with player	-Green gloo enemy -Damage player

4.3 Production

Production phase is the core process which involves the generation of all necessary assets in a game and the source codes (Ramadan & Widyani, 2013). Now the game assets (game logic and maps) are developed completely which shown in the figure below.

Figure 4.6 Complete map of main level (part 1)

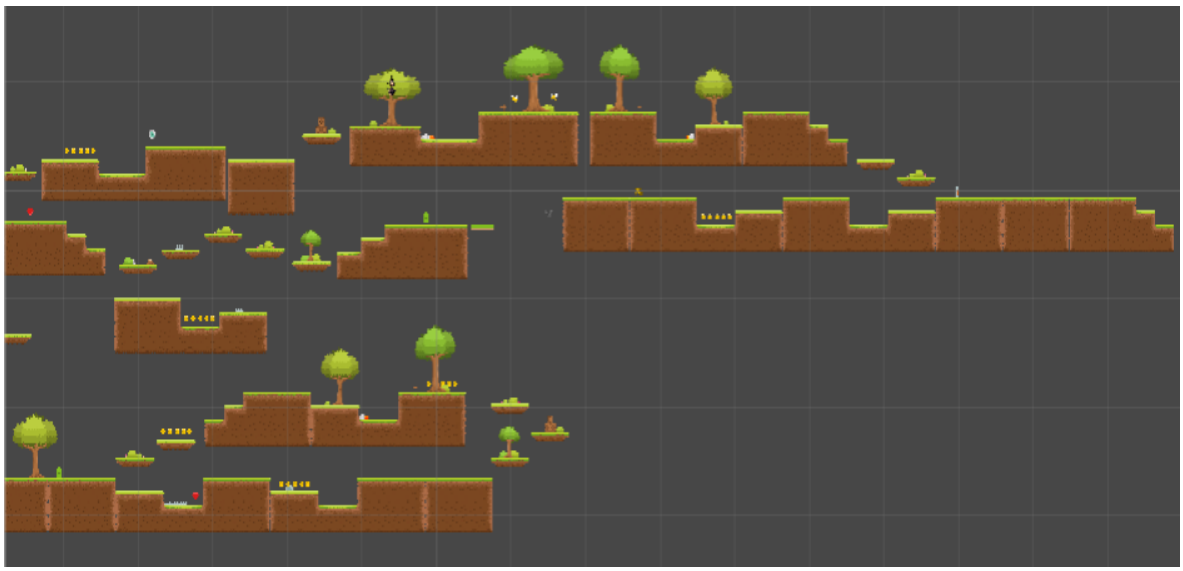


Figure 4.7 Complete map of main level (part 2)

Figure 4.8 Instruction of the game

The game is designed to easily understand and play. As seen in figure 4.3.3, player only require to collect coins, avoid boss enemy and interact the red flag to win the game and unlock commandments.

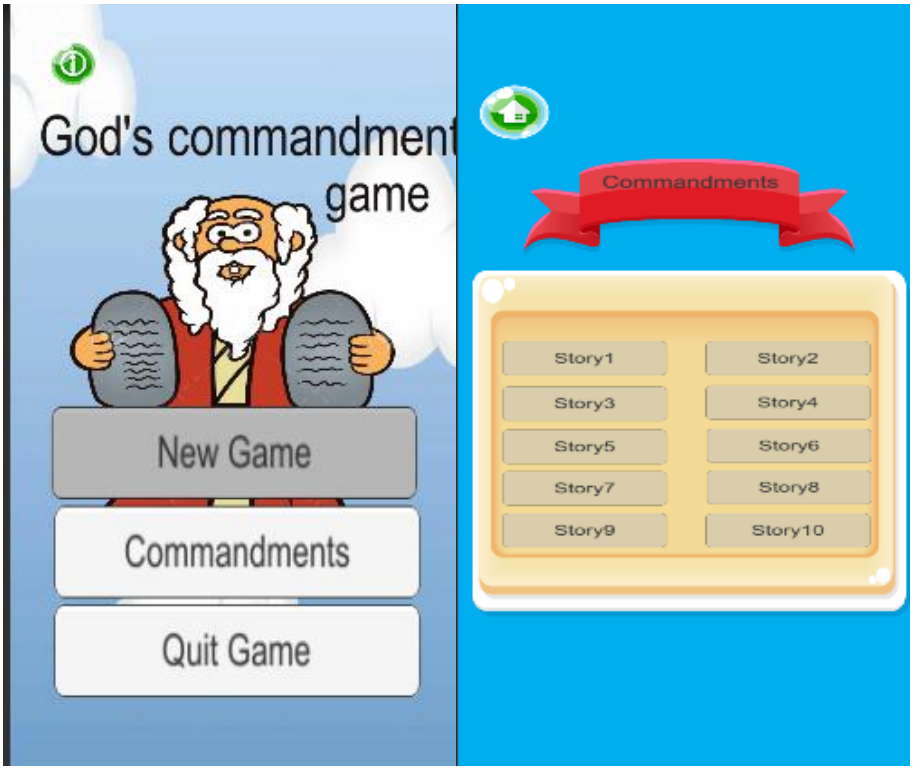


Figure 4.9 Main menu and commandments scene of the game

The buttons and description are design and written that is easily understandable by user.

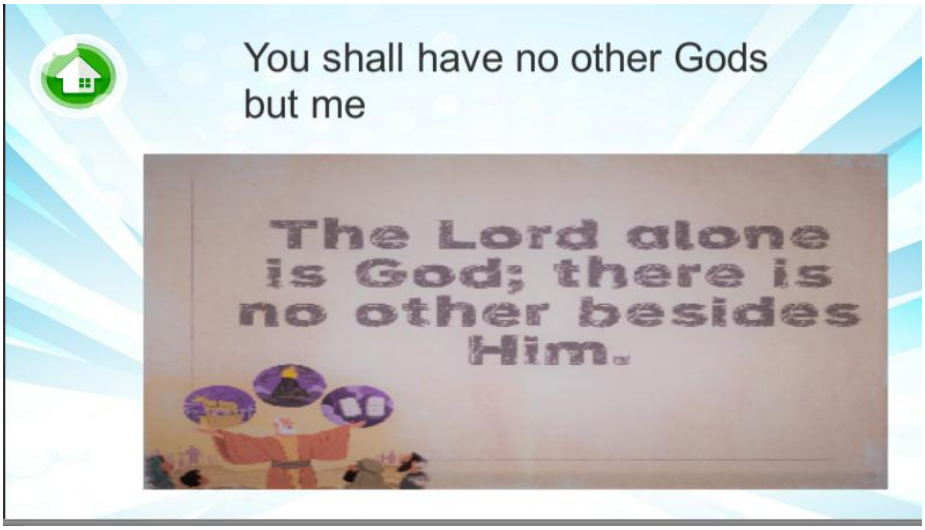


Figure 4.10 First commandment of commandments scene

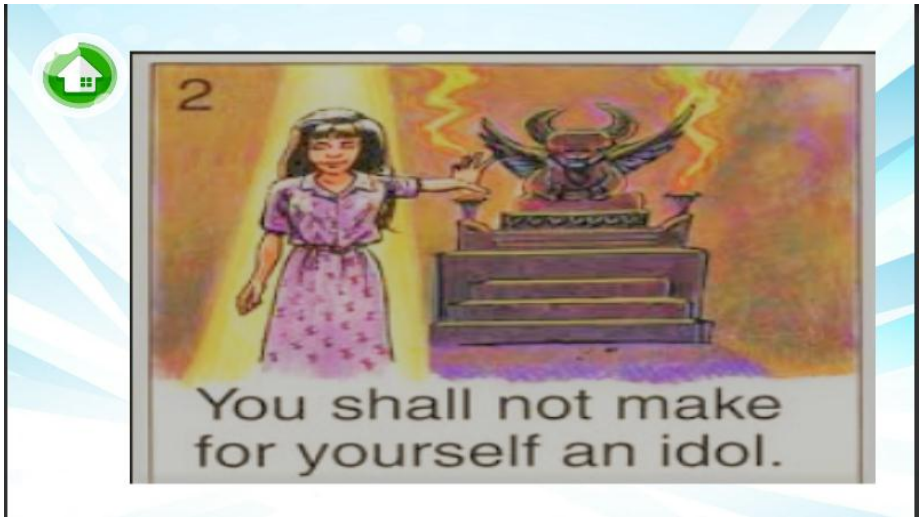


Figure 4.11 Second commandment of commandments scene

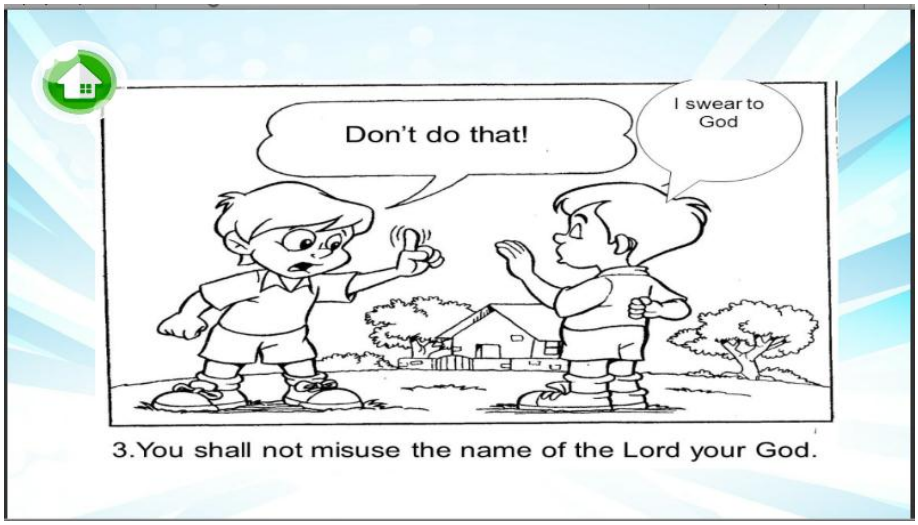


Figure 4.12 Third commandment of commandments scene

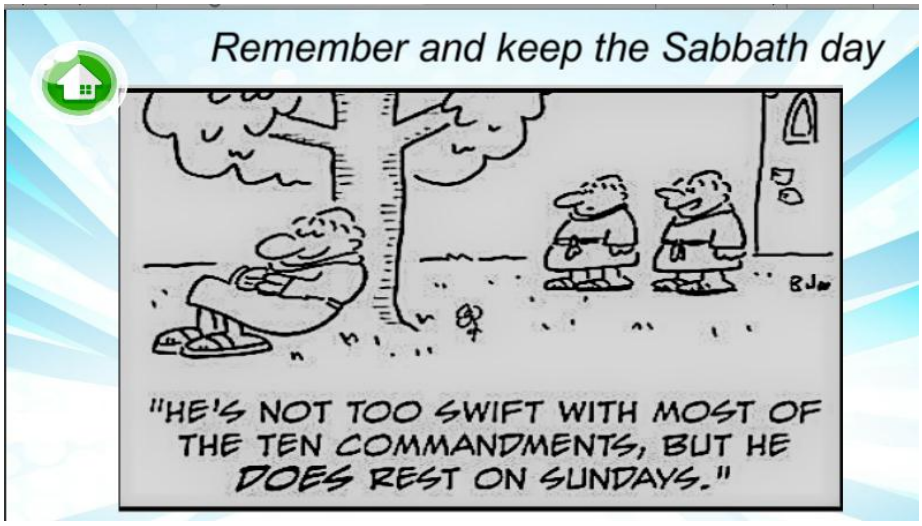


Figure 4.13 Fourth commandment of commandments scene

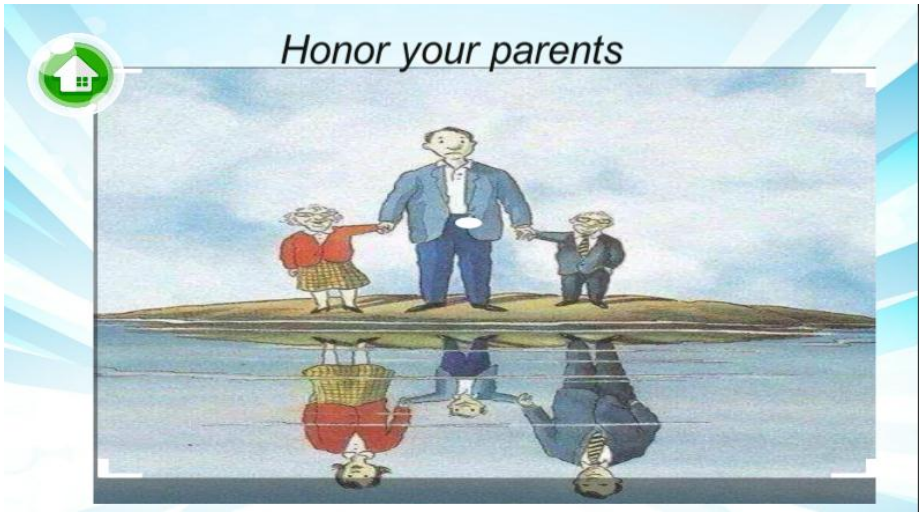


Figure 4.14 Fitfh commandment of commandments scene

Figure 4.15 Sixth commandment of commandments scene

Figure 4.16 Seventh commandment of commandments scene

Figure 4.17 Eigth commandment of commandments scene

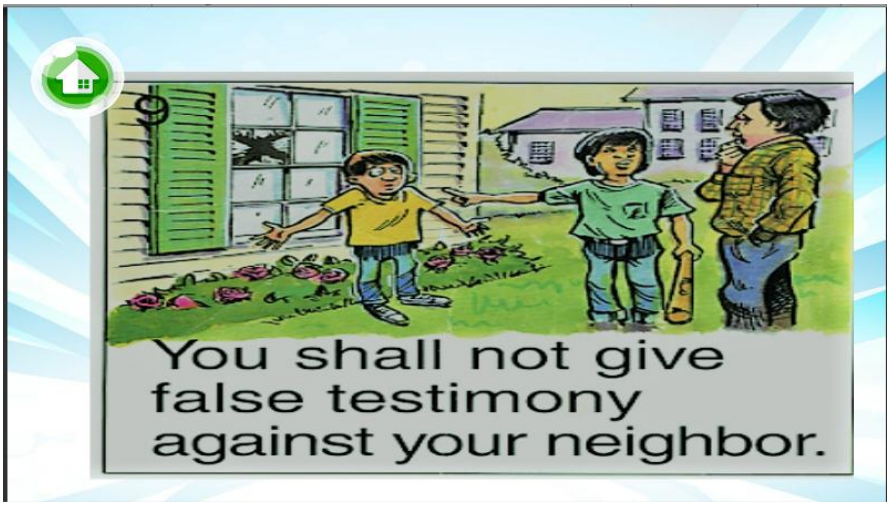


Figure 4.18 Nineth commandment of commandments scene

Figure 4.19 Tenth commandment of commandments scene

Figure 4.20 Game over scene

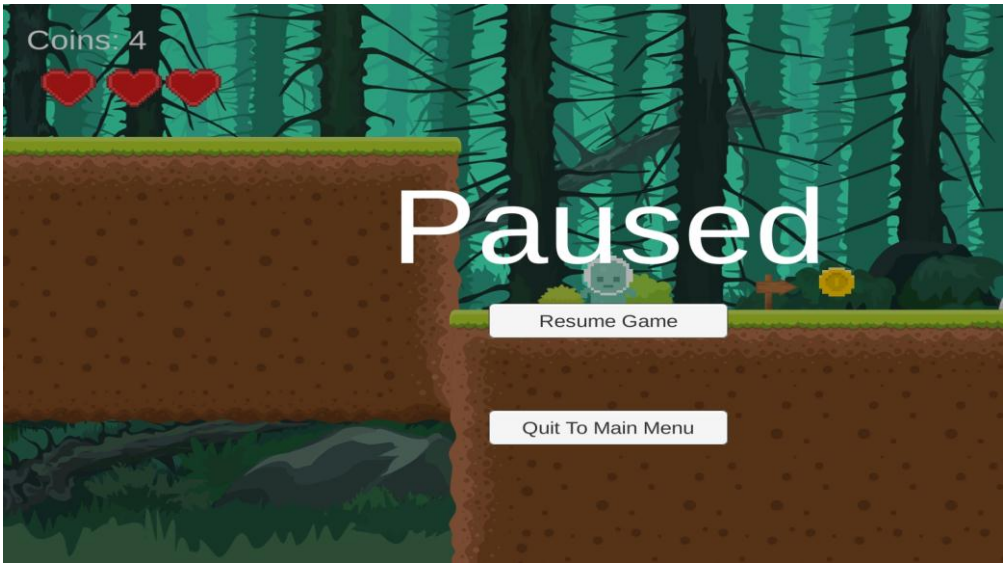


Figure 4.21 Pause scene

Chapter 5 System methodology and tools (GDLC) (testing) and final version

5.1 Alpha testing

Alpha testing is a type of acceptance testing; performed to identify all possible issues/bugs before releasing the product to everyday users or the public (Anon., 2019). This test is often carried out by the programmers or internal developers of the system. To identify all possible bugs, this test is needed because it predicts user's movement simply what will they do while playing the game. Consequently, this gives prediction on what user will do and what possible bug that will encounter.

5.1.1 In-game session

Table 5.1 In-game session alpha test cases

Testing action	Bug encounter	Status
-Push jump button twice	-Jump twice. -Does not jump at all.	Fixed
-Push left button	-Went in opposite direction -Button not working, no action performed.	Fixed
-Push right button	-Went in opposite direction -Button not working, no action performed.	Fixed
-Press back button to trigger pause menu	-Back button not working, no action performed.	Fixed
-Perform a left jump (left + jump button simultaneously)	-Left button not working, only jump button worked or vice versa.	Fixed
-Perform a right jump (left + jump button simultaneously)	-Right button not working, only jump button worked or vice versa.	Fixed
-Collect coins	-Not collectable. -Coin indicator UI does not	Fixed

	show any sign of coins collected despite main character interacted with the coins.	
-Collect extra lives	-Not collectable. -Extra live indicator UI does not show any sign of coins collected despite main character interacted with the coins.	Fixed
-Collect hearts	-Not collectable. -Hearts indicator UI does not show any sign of coins collected despite main character interacted with the coins.	Fixed
-Stomping an enemy	-Enemy still survive. -Player took damage while stomping the enemy.	Fixed
-Approach and pass through the red flag	-The game does not end. -Coins are not calculated and sum up. -Red flag does not raise.	Fixed

5.1.2 Menu

Table 5.2 Menu alpha test cases

Testing action	Bug encounter	Status
-Press new game button	-Button not working, no action performed. -go to wrong scene	Fixed

-Press commandments button	-Button not working, no action performed. -go to wrong scene	Fixed
-Press quit game button	-Button not working, no action performed. -go to wrong scene	Fixed
-Press instruction button	-Button not working, no action performed. -go to wrong scene	Fixed

5.2 Beta test case

Beta test is a type of testing period for a computer product prior to any sort of commercial or official release (Beal, 2019). Also known as UAT (user acceptance testing), it involves the users that will test out the system to make sure the requirements are fulfilled and bug fix are completed before the final release. For this test, several gamers (who had experience in 2D platform games) had tested the product and the result is as below.

Table 5.3 Beta test cases

Test cases (Require user to perform following steps)	**Expected result**	**Possible bug**	**Same with expected result**
Tap jump button	-Jump once	-Jump twice -Does nothing	Yes
Tap left button	-Move left	-Does nothing -Move any direction instead of left	Yes
Tap right button	-Move right	-Does nothing -Move any direction instead of right	Yes
Tap go back to menu button	-Go back to menu	-Does nothing -Go to the wrong	Yes

		scene	
Tap commandment button in main menu	-Go to commandment selection scene	-Does nothing -Go to the wrong scene	Yes
Tap Quit game button	-Quit the game	-Does nothing -Go to the wrong scene	Yes
Tap instruction button	-Display instruction scene to the player	-Does nothing -Go to the wrong scene	Yes
Tap new game button	-Start the game -Go to main level scene	-Does nothing -Go to the wrong scene	Yes
Tap back while in the process of game	-Pause the game -Go to pause scene	-Does nothing -Go to the wrong scene -Enemy still able to hurt player	Yes
Kill by boss	-Take one live from the user and destroy player object	-Does nothing -Does heart damage to the user -Take >1 live from user	Took 2 lives from player, bug fixed by readjusting to 1 live damage
Collect coins and approach the red flag	-Calculate coins collected and user pass through the red flag and go back to menu scene -Able to calculate how many coins collected and unlock	-Coins not collectable -Red flag does nothing after player approach it -Coins doesn't appear correct with the amount that user	Yes

	right number of commandments	collected	
Collect extra live	-Play extra live audio and +1 on the life's indicator UI	-Does nothing -Extra live not collectable -Live UI indicator does not change -+>1 live	Yes
Collect heart	-Play heart audio and +1 on the heart indicator UI	-Does nothing -Extra heart not collectable -Heart UI indicator does not change -+>1 heart	Yes
Damage by an enemy	-Receive damage from the enemy and take half heart from the player	-Enemy does nothing to the player -Enemy took >half heart from the player	Yes
All ground platform is working	-Player do not fall of ground when standing on it	-Player fall of ground when standing on it	Some platform is not labelled as ground, player felt through the ground. Bug fixed by relabeling it to ground property.

5.3 Final version

The final version can also be define as final updated version of the game. Some scene are modified and improved in terms of UI.

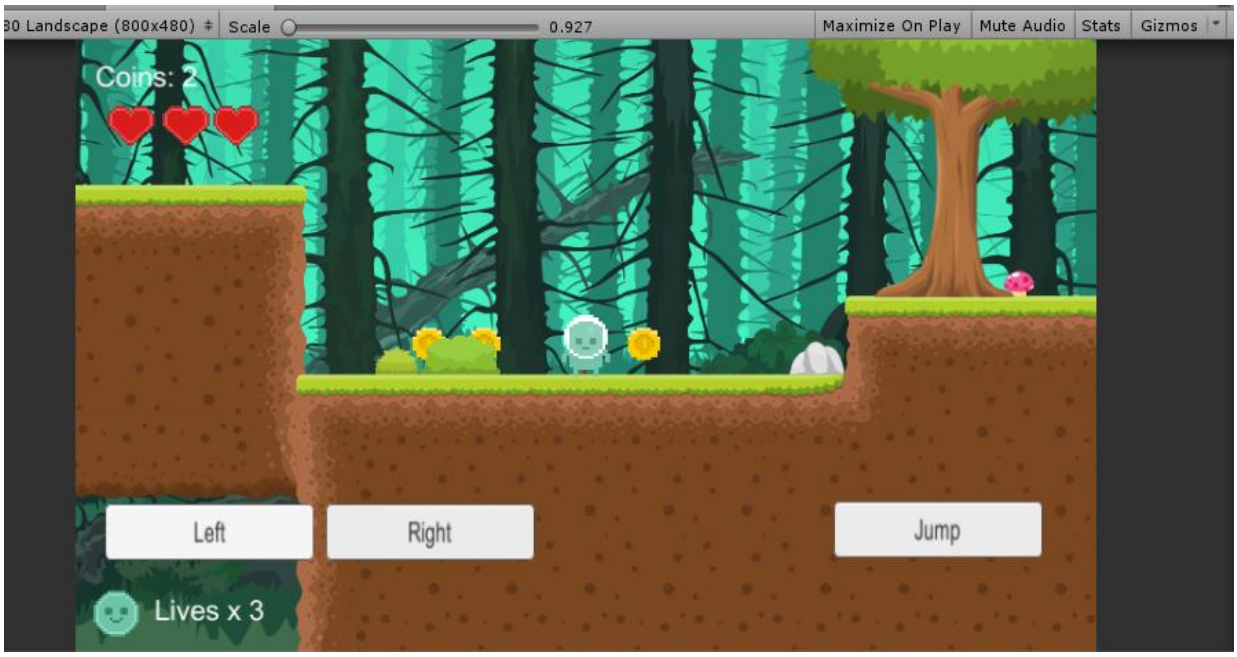


Figure 5.1 Production/prototype version(game scene)

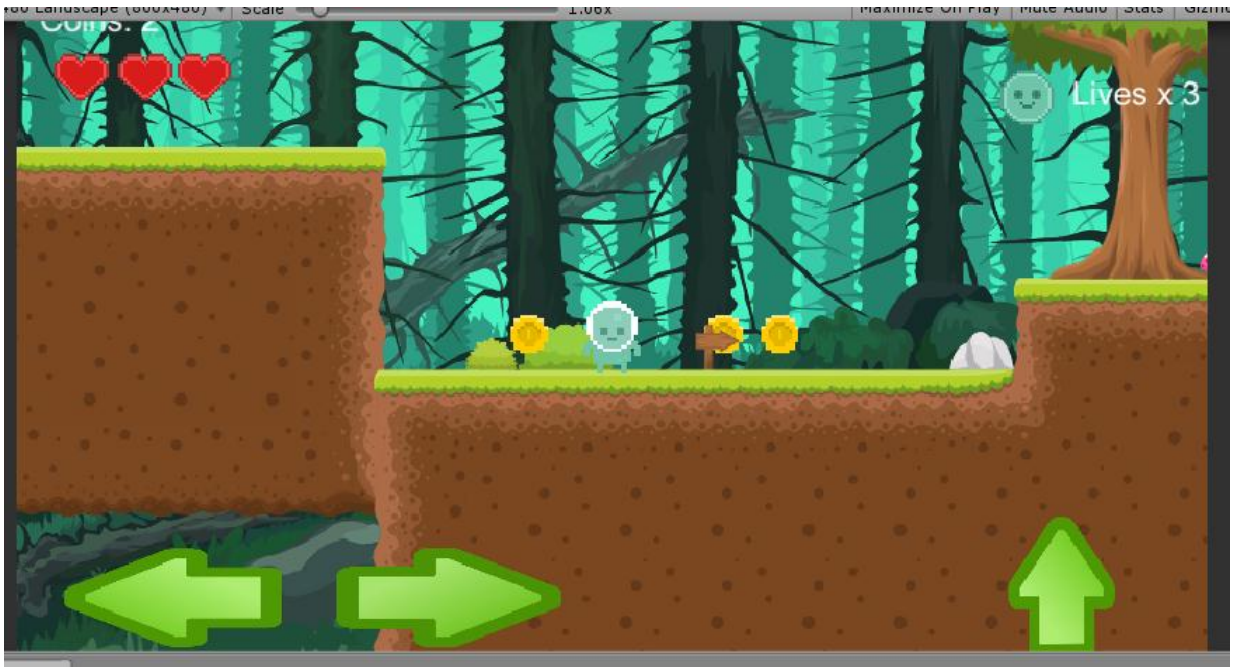


Figure 5.2 Final version(game scene)

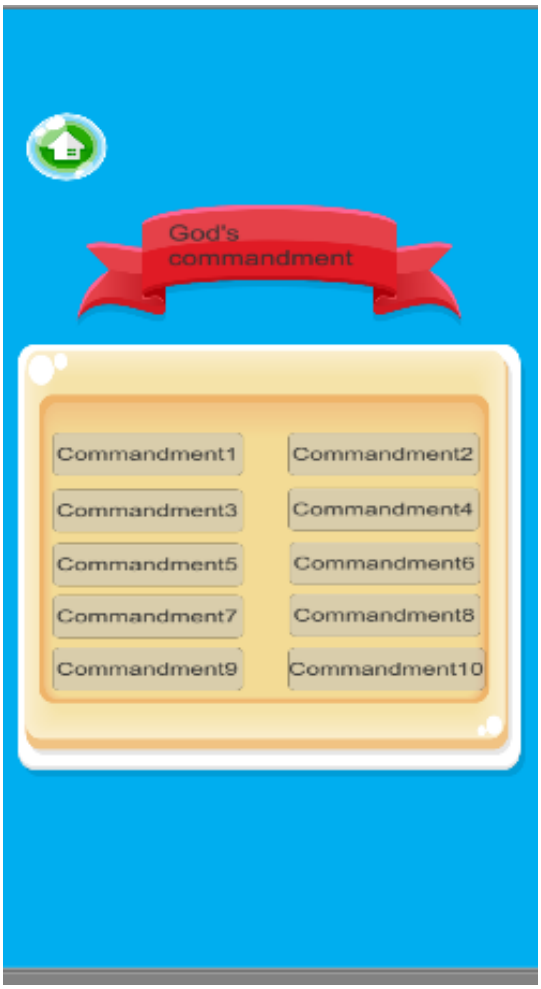


Figure 5.3 Final version(Commandment selection scene)

This modification is to make the UI more user friendly.Other scene remained same as in production.

Chapter 6: Conclusion

6.1 Project review

Table 6.1 All possible components that affect the success and failure of the project

Components	Description	Status
-Cost	-Use less than $100 to develop the game	-Cost <$25
-Time scheduled	-Complete within 12 weeks	-Able to meet the time scheduled
-Key risk 1	-Game design completely different than fyp1	-Able to adapt and alter the requirement of fyp1 to fit to fyp2 game design without modifying objectives
-Key risk 2	-Changing from drag and drop to full coding game development platform	-Able to adapt to the technology used
-Key risk3	-Include all commandments which fyp1 only include 3, widen scope	-Able to include all 10 commandments

6.2 Summary

Conclusively, classroom method and other traditional medium of delivery doesn't provide the best effect of learning to the younglings. Mobile games had proven to pull their interest and is a more effective learning environment for the younglings. Subsequently there's a need to visualizing moral values (god's commandments) and transform it into an interactive mobile 2d game.

In all similar approaches, many of the research games are developed in physical form which needed to involve real life players and the quiz are often asking about the spelling of commandments, not understanding them. Nevertheless, in analysing the app store, the understanding and source of god commandments are delivered in text forms and quiz. It will

be essential to move traditional text form into 2d gaming platform as a method of delivering 10 commandments as to abolish the lack of graphical interaction that might dampens the mood of study of the younglings.

So far, all the requirements are fulfilled that all the scenes and objects functionality had been created accordingly. The novelties of making this game is exciting and interesting due to the fact it is the first 2D platform game that regarded to god 10 commandment. Furthermore, the main contribution of this game is that players now have a new way to learn god 10 commandment without reading a bible.

For future work, the game will be design with more level and higher graphical contents. Each level will have its individual story that related to the commandments and with different main character within each level. The levels story will co-related to each other that will make perfect sense to the user what is happening and how the levels making a huge round to tell all 10 commandments are related to each other (deepen understanding).

Consequently, the objectives are completed via the proposed game that successfully replace biblical reading or classroom method with interactive graphical 2D mobile game interface and players do not have to learn god's 10 commandment dependant to environment that might requires two or more player to be involve in the game.

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Mobile 2d platform historical game: god's commandments

Abstract

This project is an historical educational game design based on bible's god commandment. It will provide a mobile application environment for the users to learn god's commandment. It will be demonstrated in the game levels associate with the commandments. Nowadays, people intend to use mobile application more compare to reading a bible because they find it bored. thus, the youths do not know much about god's commandment. The objective is to develop a 2d mobile platform historical game to attract the youths in order to deliver to them the knowledge of god's commandment. The primary game design is in 2d platform which similar to the design of super bros Mario and granny smith. In short, the game require player controls a player model and go through tough obstacles, earn points, gain achievements after completion of one level and proceed to next level. The existing effort now is reality game like playing hula-hop and mobile applications that only permit user to read the commandments not application based game. This is the first god's commandment application-based game in a nut shell. The god's commandment game exists now yet to have a place in mobile application platform or any web-based application platform. To summarize it, the god's commandment need to be develop in an attractive way in order to carry out the goal which is to let people know about god's commandment.

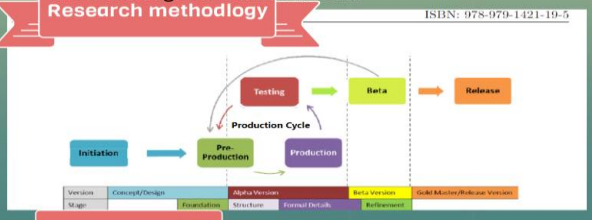
Objectives

-To move historical biblical reading platform into mobile application platform with high graphical interaction to create a new way to promote historical facts that attract youths and abolish boredom.

-To create a physical player independent platform for god commandment game which players can learn the 10 commandment independent of the social environment(conducting the game with others).

Results

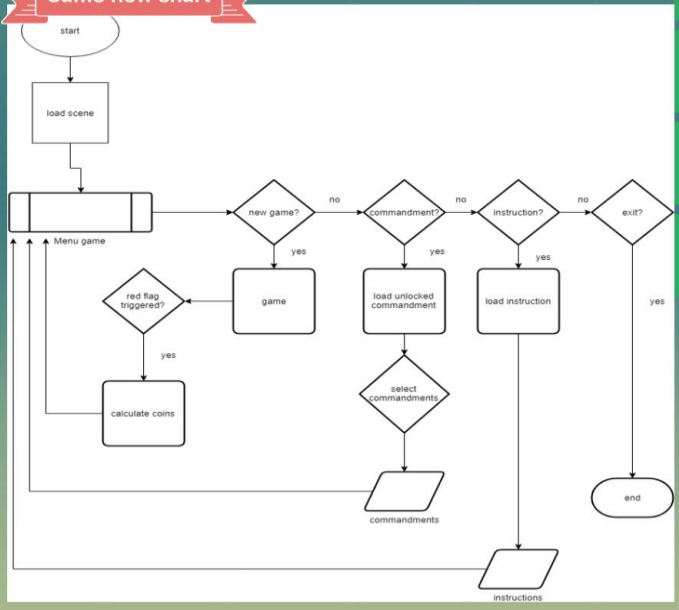
Research methodology



Design idea

The game is design in a way that the user are require to collect coins, avoid obstacles (enemies) and unlock achievements with coins that they collected in the game.The game only contained one level (main level),In this level there are 50 coins in total to collect. Player can unlock the commandments with the collected coins.Each commandment require 5 coins to unlock and each commandment bear a story(an image) that teach and let user understand what the commandment is and its meaning.The player will have 2 lives and each bear six hearts which can be damage by the enemies in the game before deducting the lives.In further game setting, there will appear a monster(immune to any damages) chasing the player and the enemy is designed to instant take a live from player which makes it stronger than other enemy in the game.This enemy chasing player concept is to make the game more stimulating and interesting compare to other platform game which only require players to kill the boss ,get all collectables and end the game(ex. Mario).Also after player collected enough coin, then the player can search for a red flag in the game to escape the map.By and large,Each commandment reveal a picture with deep meaning.

Game flow chart



Conclusion

-Requirements are fulfilled that all the scenes and objects functionality had been created accordingly.
-The novelties of making this game is exciting and interesting due to the fact it is the first 2D platform game that regarded to god 10 commandment.
-The main contribution of this game is that players now have a new way to learn god 10 commandment without reading a bible.

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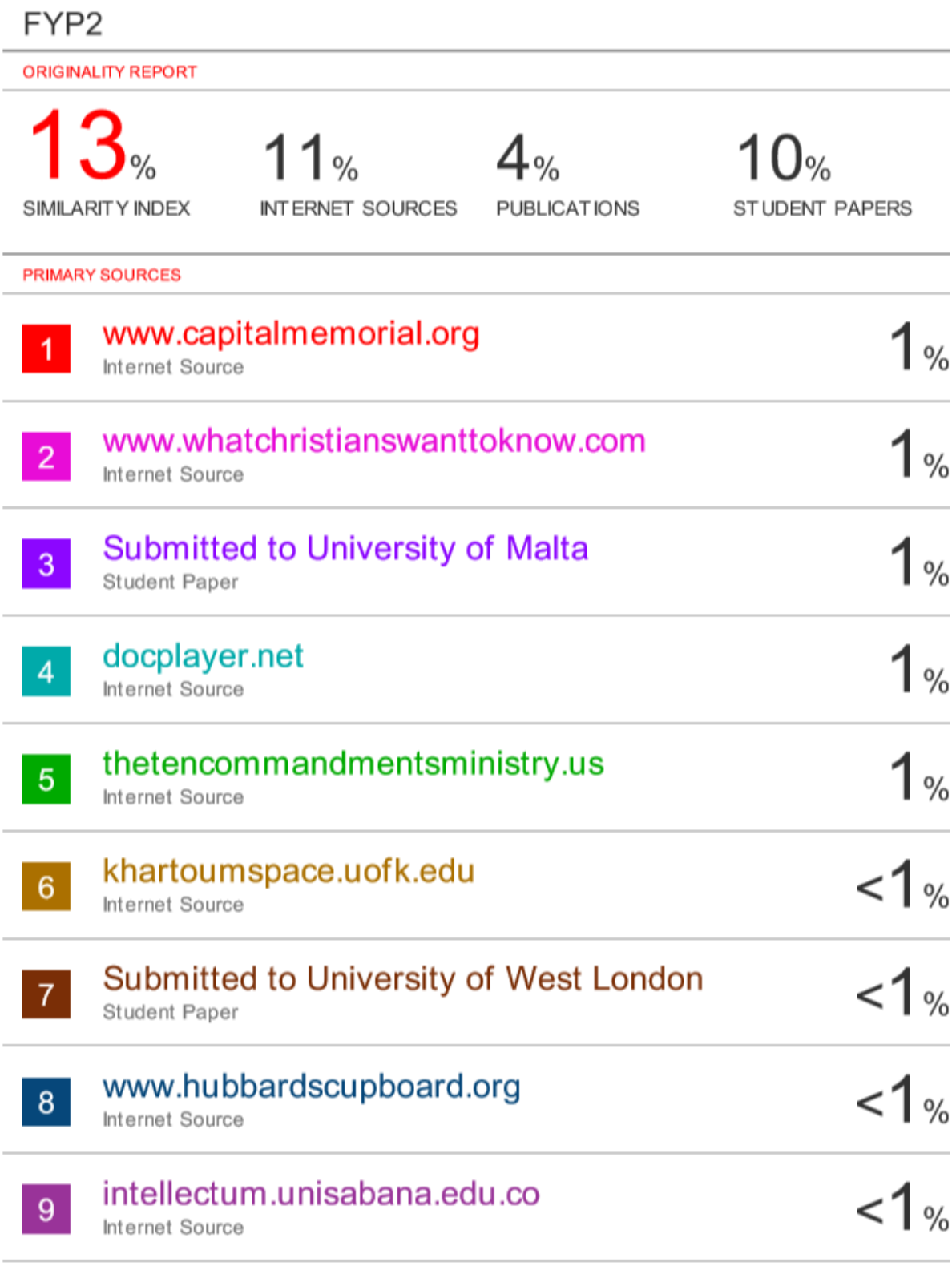

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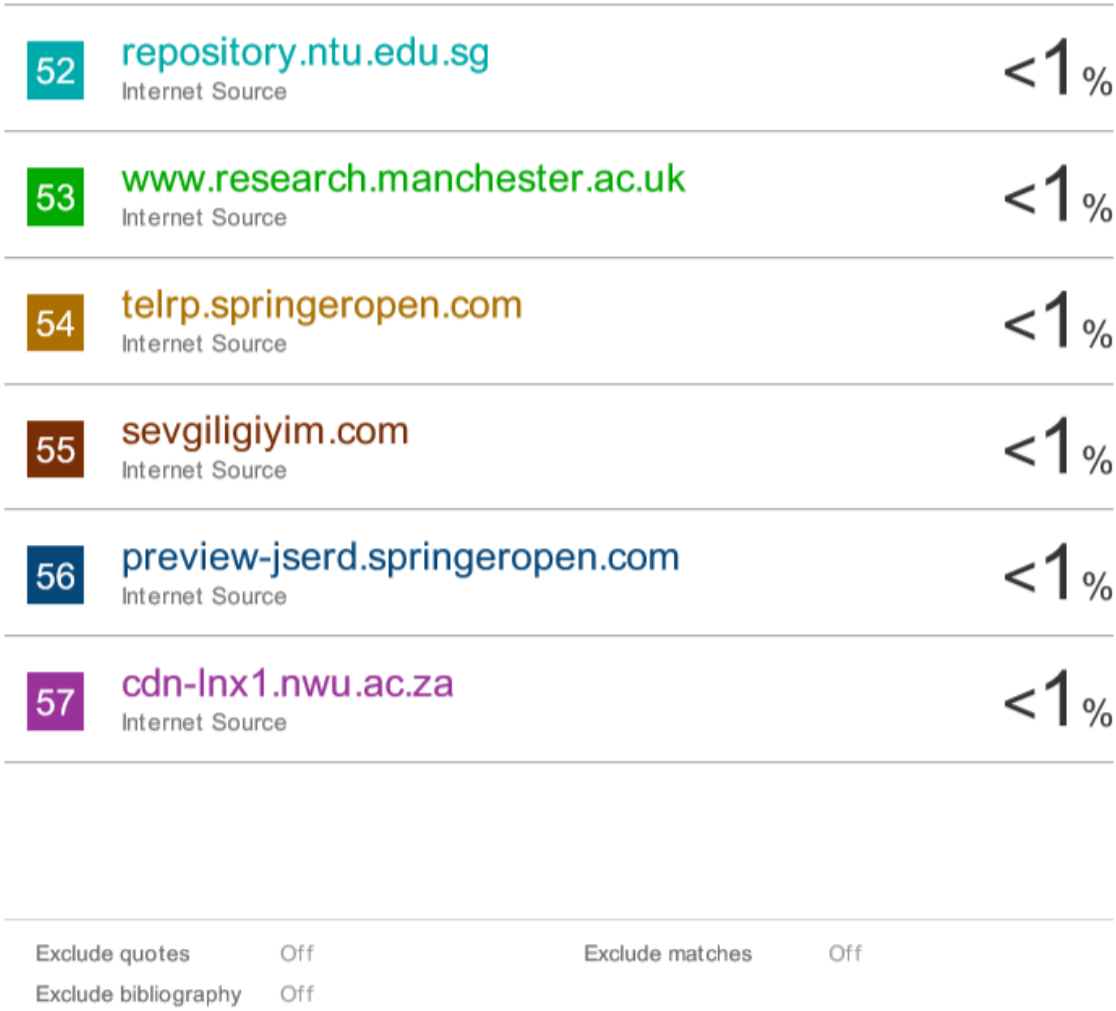
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