Design and Development of "Fright Hour" A Horror Game Utilizing Unreal Engine 5

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2022 8th International Conference on Education and Technology (ICET) | 978-1-6654-9214-0/22/$31.00 ©2022 IEEE | DOI: 10.1109/ICET56879.2022.9990769

Abstract*—Playing games is an activity that has several purposes such as finding entertainment facilities, filling spare time, and sometimes being used as a means of education. Games can be created using various types of Game Engine Software. Unreal Engine 5 is one of the Software Engines used to create Game products. The author will make a game titled "Fright Hour" based on Windows with the survival horror genre made with Unreal Engine 5 technology. The method used in the manufacture and design of this game is the Game Development Life Cycle, it consists of six phases: initiation, pre-production, production, testing, beta, and release. The authors also use an evaluation method called cognitive walkthrough where this method is used to evaluate problems that occur when players are testing games. This game was successfully developed using Game Development Life Cycle. The results of the cognitive walkthrough test were successful in identifying the problems in the game.

Keywords*— Game; Fright Hour; Survival Horror; Unreal Engine; Game Development Life Cycle (GDLC)

I. INTRODUCTION

The internet has changed the way of life and habits of most humans by helping facilitate various activities of human life [1]. There are many activities that can be done using the internet, not only for communicating, the internet can also be used in the field of education such as E-learning [2]. The number of activities that are facilitated by the internet has made the number of internet users increase and become massive, in Indonesia the number of internet users is very large, even reaching 73.7% of the total population [3].

As the number of Internet users in the world increases, so does the number of users of social media and digital games. This is evidenced from the fact that both product sales and the number of game users in the digital game industry are growing year by year. According to Steam [4], the number of active users of digital games on computer devices has increased from 90 million active players in 2018 to 95 million active players in 2019 and becomes 120 million in 2020. In addition, according to data obtained by the author, The global revenue of the digital gaming industry in 2018 is said to be US$137.9 billion. At this time, video games have become a part of people's lives. Games not only can be used to fill spare time it also sometimes used as a means of education because it can train cognitive abilities to learn or train memory [6]. Several studies have shown that video games can affect cognitive performance, particularly visual attention and visuospatial processes [7], [8]. Video games can indeed train cognitive abilities and train memory, but if it is too long it can cause negative effects [9]. Can be seen at Figure 1.

Fig. 1. Global Games Market [5].

A study conducted by Nik Yee [10] said that there are 3 main types of components that motivate someone to play digital games. One of them is the immersive aspect of a digital game. The immersive value in a digital game consists of elements such as graphics, gameplay or plot, level design, and sound.

In our digital game product this time, the author wants to develop an interesting digital game product by applying immersive value to our digital game product with the horror genre [11] One can enjoy playing horror games because of the

experience of fear that results from the game genre. Mark Grimshaw also said that fear and anxiety mixed with mystical things are an expected part of the framework of the virtual world [12]. Players who play survival horror games may experience extreme dread and anxiety. Therefore, these emotions can be used as a tool for both emotion elicitation and emotional training, as well as a source of enjoyment [13]. Additionally, this type of game can be used to train stress management and treat anxiety disorders and phobias [14]. Therefore, the author decided to make a horror game product.

The method the authors will use to develop our game products is the GDLC (Game Development Life Cycles) method. The GDLC method has been used by various digital game product development teams. From previous research, we can conclude that the game product development process involves four main activities: pre-production, production, testing, and release [15]. From there, the author found that the most widely used GDLC method consists of his six stages of development: initiation, pre-production, production, testing, beta, and release [16].

In the research examples that the author found earlier, it was explained that the testing method used was the Whitebox and Blackbox method [17]. One of the many methods we can use to conduct a testing phase in our game is a cognitive walkthrough. The advantage of using the cognitive walkthrough method is that it's very easy to do, doesn't cost a lot of money, and can be done in a very short amount of time. This method only identifies major usability issues, especially from the interface side [18].

Developing games based on the GDLC method by using Unreal Engine 5 as the game engine is still rarely used by researchers, especially if the testing method is using cognitive walkthroughs. Therefore, the author took this advantage to make a game named "Fright Hour" and hoped that the game could be a part of the development of horror games that are based on the GDLC method.

II. Fundamental Theory

A. User Experience

User experience is the experience of a person using a system, service, or product. User experience in the aspects of experience, level of convenience, usability, and efficiency and effectiveness of a system. All of these things are included in the User Experience [19].

B. Usability Evaluation

Usability evaluation can be done with two different types of approaches. These include empirical evaluation and analytical evaluation. Empirical evaluation is to include knowledge from users as research subjects, which is commonly referred to as a usability test. While analytical evaluation does not require in-depth knowledge of the user and knowledge from users will not be included as research subjects [20].

C. Cognitive Walkthrough

A cognitive walkthrough is a usability testing method that focuses on the ease of user comprehension associated with exploration or exploration. Respondent or user is given tasks to complete based on the existing Cognitive Walkthrough template [18].

D. Game Development Life Cycles

Game Development Life Cycles also called as GDLC is a guideline or method used to develop a game product [21]. Game Development Life Cycles consists of 6 stages of development [16], namely at Figure 2:

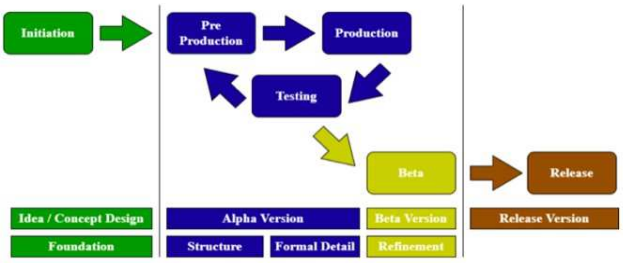

Fig. 2. GDLC Stages [16].

1) Initiation

The first step in creating a game is to get a rough idea of what kind of game you're creating. The output of the initiation is a simple game concept and game description.

2) Pre-Production

Pre-production is the post-initiation phase. This is the most critical stage in the production cycle. At this point, the author explains everything related to creating the game and revising the game design concept. The game design concept here focuses on defining the game genre, gameplay, and storyline.

3) Production

The production phase is the process where asset creation, code generation, and the merging of the two are carried out to create the flow mechanism of a game. In this phase, they have also started to make prototypes and decide what features will be used in the game. After that, at the end of the production phase, repairs and finishing touches will be made on the game mechanism that has been made.

4) Testing

In this phase, there will be 2 phases in conducting trials, namely Functional Testing and Refinement Testing. In functional testing, internal testing is carried out by the developer. In this phase, the developers ensure that all the mechanisms and functions of the features in the game can be used properly. Then the last phase of refinement testing is the testing phase of the gameplay. In this phase, testing is carried out by other people who are not the developers or core team of the game development project. In this phase, what is being tested is the element of how interesting the game is if it is played and how difficult the game is to play.

5) Beta

Testing that is still being carried out is called Beta Testing. The measurement method or value that becomes the assessment reference is still the same as in the previous testing phase. However, this phase will be divided into 2 waves, namely, close beta testing and open beta testing. In the Close Beta phase, the testing is carried out by several people who are officially invited to do the testing, while in the Open Beta Testing phase, the participants who can do the trial are all those who have registered or officially registered, which can be accessed by the public.

6) Release

The release phase here has involved product launches, project documentation, and planning for the maintenance and expansion of the content of the game going forward.

III. METHOD

A. Frames of Thinking

This chapter will explain the research methods used in the preparation of the research. Several stages were carried out in this research. Starting from data collection, data analysis, design, and application creation, until the last stage in the form of testing. Here are the steps to take is provided in Figure 3.

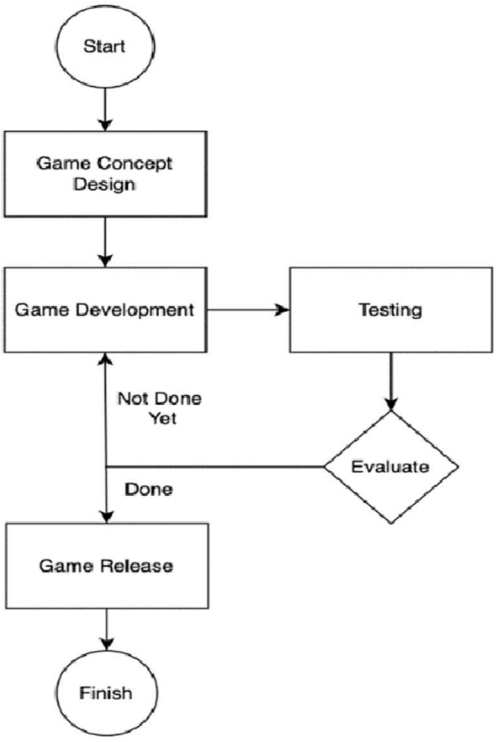

Fig. 3. Frames of thinking.

B. Data Collection Method

To obtain the data needed for the design, two data collection techniques were used, namely interviews and questionnaires. Survey data was collected by distributing an online survey to multiple respondents. The purpose of this survey is to obtain data such as user profiles, devices used, responses to the application to be developed, and the potential costs involved in buying a game product. The survey process begins with several colleagues who the authors assess meet the criteria in the research objectives to fill out the survey, namely people who have experience in playing games. In addition to filling out the survey, the author also asked the willingness of the respondents to be able to conduct interviews. From the survey conducted by the author, there were 50 survey respondents and 10 interviewees.

C. Games Development Life Cycle

The GDLC methodology consists of six development stages: initiation, pre-production, production, testing, beta, and release [16].

1) Initiation

The first phase of the GDLC is called initiation. In this initiation phase itself, this phase has the goal of creating a simple concept game.

a) Game Concept

As explained in the previous chapter, this game is titled "Fright Hour". Fright Hour itself is inspired by the origin of the word itself, which means "Hour of Fear". In this digital game product, the author took the theme of the level design atmosphere at night because the dark atmosphere at night is an atmosphere that can change the physical reactivity, perception, and behavior of most people [22]. This digital game product will take the theme of the game genre, namely Single-Player and Horror, with a game perspective of Firstperson. The storyline consists of a player who loses his friend while going camping together. Then the player will be brought into the atmosphere of the game in a forest where there is an old building. Players will explore and try to solve the mysteries of the building. The storyline will later implement a story taken from the story of the urban legend "The Rake". The Rake is the story of several eyewitnesses who said that they saw a mysterious creature whose presence often brought death [23].

b) Character Concepts & AI

The following image below consists of the concept of the Player Character (Figure 4) and the concept of the Enemy AI (Figure 5) which will later be implemented into 3D assets, rigging and animated until the asset is ready to be used in the design of this game. The image below was made using an image editing application.

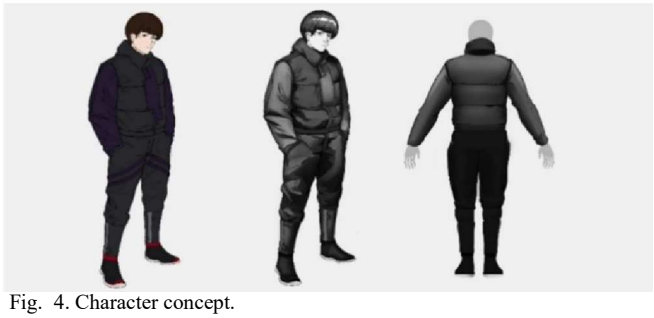

Fig. 4. Character concept.

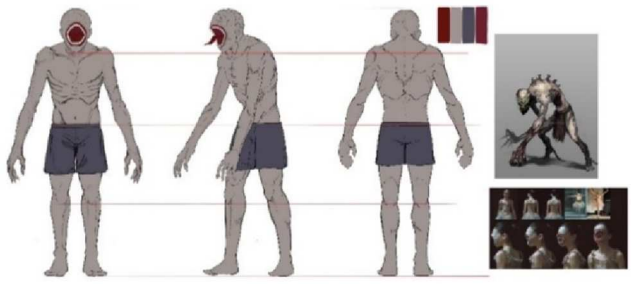

Fig. 5. Enemy AI concept.

2) Pre-production

During this phase, a game design document is created. A game design document was then created to explain the overall concept of the game to be created to the development team. A GDD is a document typically created during the pre-production stages of a video game. This document describes the detailed design of the gameplay experienced by the player [24]. The gameplay in the game "Fright Hour" consists of a

storyline where at each level the player must solve a problem, such as solving a puzzle and avoiding the traps that exist. The following is a Game Design Document from a digital game product titled "Fright Hour".

a) Core Experience

Core experience is what the authors of the game want their players, users, and customers to experience [25]. In the design of the Fright Hour Game, this game will lift the first story taken from the book entitled "He is The Rake" by Carl Soucy, which was inspired by the CreepyPasta Story. In this game, Fright Hour will deliver the horror story of a mystical creature called The Rake by combining the story into a game plot consisting of several challenges that players must complete as a condition to complete the game, including several game mechanics such as completing puzzles and trying to survive the threat of The Rake.

b) Core Loop

Core Loop is a core activity carried out by players where these activities connect and support each other so that they can create a repetition in the game. Can be seen at Figure 6.

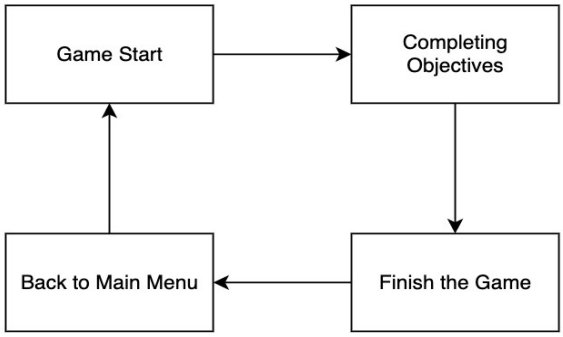

Fig. 6. Core loop.

3) Prototyping

This stage consists of making the main character design, environmental design, animations and several applications of the puzzle mechanism features used in this digital game product. Can be seen at Figure 7.

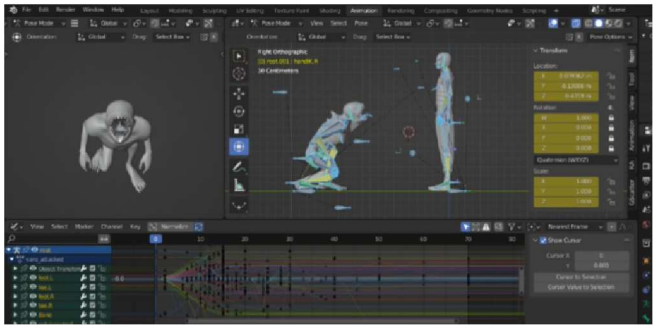

Fig. 7. Animation WIP.

4) Production

This production stage will discuss the game creation flow from start to finish, starting from the stage of making the design concept, creating, and installing assets in the game engine. This production stage will be explained at Figure 8.

a) Material Analysis

The analytical material described will consist of the production process of making products based on the type of software used for each type of work of team members.

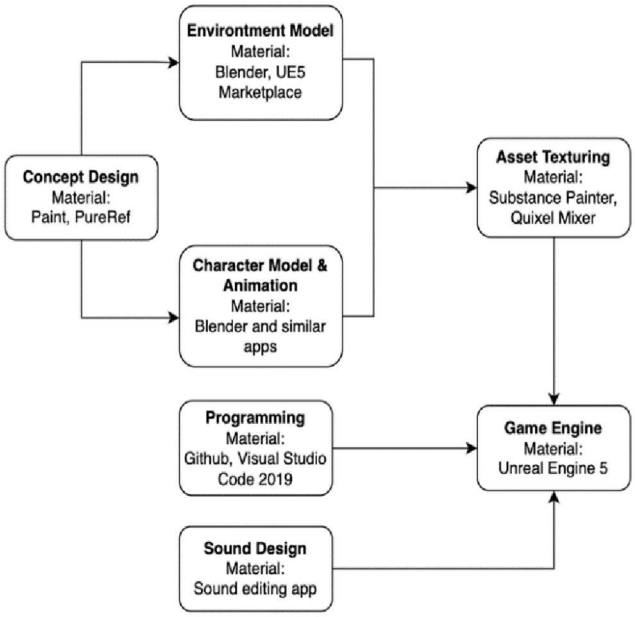

Fig. 8. Material Analysis.

5) Testing

Testing method or evaluation method used is the Cognitive Walkthrough method. This method is done by giving some Ttaskpoints to several people, which will later be done by them in playing. This task consists of completing the objective of the game from start to finish, then testing the user interface in the game, such as trying the option menu, interacting with objects, reading the mission path, and so on. Each task given will be evaluated whether it is easy to understand, whether it is confusing, whether it is functioning properly, roughly from all the objectives given, which is the most difficult objective to understand and so on. This testing and evaluation method will be described in full in the form of flowcharts, tables, and diagrams in Chapter 4: Evaluation Methods.

6) Release

In this phase, game products will be released. First the game will be released in an early phase called Early Access. This phase still allows for glitches and bugs to occur in game products. In this phase, every member of the development team will do an update or new development if a glitch or bug is found by the players.

IV. RESULT

A. Application

Here are some screenshots of this game. Figure 9 is environments of the game. The environments of this game are set in the forest, because the storyline of this game is about to find the character's friends who went missing while camping. While the player solve the puzzle the player needs to run away from the enemy because the enemy will show up sometimes to chase the player as seen in Figure 11. To solve the puzzle the player needs to use some features that are available in this

game such as the flashlight and the UV light feature as seen in Figure 10.

Fig. 9. Game Environment WIP.

Fig. 10. Enemy Appearance in The Game.

Fig. 11. UV Light Feature.

B. Task Selection and Ranking

The first step in preparing research using the cognitive walkthrough methodology is to determine which tasks will be evaluated. In Table 1 and Table 2, the grade level for each task is stated. Number 1 means the task is the most important. If the task is not executed, the game will not be able to start or continue. Number 2 is a task that is as important as Number 1, but can only be done after completing tasks with priority 1. Number 3 is a task that is less important, but helps the player complete the game.

Answer Ranking

These values will describe the level of success of the respondent when doing the given task and become an indicator to see the level of seriousness of the problems that arise (Problem Seriousness) as in the table below. Can be seen as the table below. The number 5 is the number with the highest probability of success and then continues with lower numbers with a lower probability of success. Author will use the numbers 1-5 as a reference in the result analysis.

TABLE I. TASK RANKING

No	***Task***	***Ranking***
1	Start Fright Hour	1
2	Open Options	4
3	Enter Floor 1	2
4	Enable Flashlight	3
5	Activate UV Flashlight	2
6	Complete the Objective on Floor 1	2
7	Enter the 2nd Floor	2
8	Removing Barrel obstacles	3
9	Successfully Opened the Gate	2
10	Complete the Objective on Floor 2	2
11	Interact with Lore Object	4

C. Problem Seriousness

TABLE II. PROBLEM EXPLANATION

Value	***In Words***	***Explanation***
5	Yes	Almost certain success
4	Yes, maybe	Maybe it works
3	Don't know	Balance between the percentage of success and not
2	No, uncertain	Small chance for success
1	No	Very small chance of success

D. Categorizing Problem

TABLE III. PROBLEM TYPE

Problem Type	***Explanation***	***Source***
User (U)	The problem comes from the experience of playing the game of the player or the respondent himself	Emerged from Questions 1 and 3
Hidden (H)	No information or Instructions about these functions/features	Emerged from Question 2
Text & Icon (T)	Appearance & content can easily be misinterpreted or understood	Emerged from Question 3
Sequence (S)	Functions are performed in an unusual order	Emerged from Question 1
Physical Demands (P)	Display requires expertise from its respondents. Such as reflexes, and problem-solving skills	Emerged from question 4 (Operation Level)
Feedback (F)	Display requires expertise from its respondents. Such as reflexes, and problem-solving skills	Emerged from question 4 (Function Level) and question 5

The problems are then sorted into different categories. Different types of questions can be defined based on the tasks performed and appearance of respondents in the walkthrough. As shown in Table 3 above.

E. Predicting Usability Problems

The first step in preparing research using the cognitive walkthrough methodology is to determine which tasks will be evaluated. In obtaining usability problems using the Cognitive Walkthrough method, players will be given two types of questions, namely questions that focus on function analysis and operations analysis. In the type of function analysis question (Level 1), it is used to evaluate the function. Meanwhile, the type of operations analysis question (Level 2) is used to find out whether the system is clear enough to assist players in using the function properly.

Level 1 Question: Functional Analysis

- Does the player know the function exists?
- Does the application provide clued proving that the functionality exists?
- Can repondent's expectations with in-game indications meet?
- Does the game provide information that the function has been selected?
- Can the application provide feedback or response that is clear enough that the function has been completed/skipeed after the player has performed the action correctly?

Level 2 Question: Operations Analysis

- Has the player tried to achieve the desired goal of the operation?
- Does the player know that the operating instructions exist?
- Has the player performed the operation correctly?
- Can the player link the operation hint to the desired goal?
- Have players received feedback or responses by the application, that the operation has been carried out correctly?

F. Result Analysis

To make it easier for researchers to sort and attach data, researchers use the following table help:

- Comparison of Cognitive Walkthrough Problem Seriousness (PS) with Task Importance (TI)

TABLE IV. PS RESULTS ANALYSIS VS. TI

Task Importance (TI)	***Problem Seriousness (PS)***				
	1	2	3	4	5
1	-	-	-	-	5/5
2	-	-	2/5	3/5	-
3	-	-	-	-	5/5
4	-	-	-	-	5/5

In Table 4 shows the average results of Problem seriousness with Task Importance respondents 1 to 5. Where the average is mostly in Task Importance (TI) number 2.

- Comparison of Cognitive Walkthrough Problem *Seriousness (PS) with Problem Type (PT)*

TABLE V. PS RESULTS ANALYSIS VS. PT

Problem Type (PT)	***Problem Seriousness (PS)***				
	1	2	3	4	5
User (U)	-	-	2/5	-	-
Hidden (H)	-	-	2/5	3/5	-
Text & Icon (T)	-	-	2/5	1/5	-
Sequence (S)	-	-	-	2/5	-
Physical Demand (P)	-	-	2/5	3/5	-
Feedback (F)	-	-	2/5	1/5	-

In Table 5, it shows that the average Problem Seriousness (PS) with Problem Type (PT). The average number, which is quite significant, is in the Problem Type (PT) Hidden (H), followed by Physical Demand (P). These numbers are a high average, where many problems occur related to clear indications of functions, so that respondents fail to do the given task and are mixed with their own lack of knowledge and experience.

V. CONCLUSION

This game was successfully developed using the GDLC method. Where in the GDLC method uses the cognitive walkthrough evaluation method. Overall, it can be said that the cognitive walkthrough method was able to identify and find some problems present in the game Fright Hour. The main problem that arises and must be fixed is when players want to activate Flashlight and enter the first playing area of Floor 1, because there is no indication of how to complete or activate this function. Players find it difficult because of the lack of a display that provides clear indicators that are difficult to understand (hidden).

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