Design and Build Desktop-Based Educational Game Save The Wildlife "With Game Engine Construct 2

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ARTICLE INFO	ABSTRACT
	Educational Games are digital games that are designed for enrichment and education. One of the benefits of the game is as entertainment and to get players' inner satisfaction from the game. Games can also be used as a fun educational delivery tool. Educational games have other positive values in them, by supporting teaching and learning. In order to obtain the essence or additional knowledge for players of the game. Indonesia is a country that has a very high level of biodiversity and endemism. One of them is the diversity of fauna (animals) in Indonesia. The problem faced by animals in Indonesia today is the rampant hunting and trade of animals. If not further addressed then it is not impossible that the next few years these animals will become extinct. This is due to a lack of awareness of the importance of protecting nature and caring for protected animals. Understanding of environmental and animal care needs to be educated as early as possible. In this final project, a product in the form of the game "Save the Wildlife" is created which aims to introduce and provide information about protected animals in Indonesia. An arcade game created with the game engine Construct 2. The design method used is Collision detection, which is a method used to detect collisions or collisions between an object and other objects. It is hoped that by making this game, players, especially children, will get to know more about protected animals in Indonesia and better protect and preserve the environment of these animals.

1. Introduction

Advances in information technology have a positive impact with the increasingly easy of humans in doing their daily work. In addition to facilitating human work, technological developments are also used as entertainment media. This is seen from the many games or games played by many people. Games are computer games created with animation techniques and methods. If you want to explore the use of animation, you must understand game making. Or if you want to make a game, then you must understand the techniques and methods of animation, because the two are interrelated (Augustine, 1998). While Educational Games are digital games that are designed for enrichment and education. As explained above, the game has the benefit of gaining inner satisfaction or entertaining players from the game. It's just that a number of games made today actually put too much emphasis on the entertainment element behind other things that can be conveyed through the game. So that players will only get entertainment without getting other benefits in the game. While this type of educational game has value other positives in it, by supporting teaching and learning. In order to obtain the essence or additional knowledge for players of the game. Judging from the definition of the game and its development, there are currently many builder applications that can be used to design a game. One of them is Game Engine Construct 2. Construct 2 is an HTML5-based game developer application dedicated to 2D platforms. This HTML5 based game has the advantage of Multiplatform Export, which means it can be exported to various media or other devices.

Indonesia is a country that has a very high level of biodiversity and endemism. One of them is the diversity of fauna (animals) in Indonesia. The problem faced by animals in Indonesia today is the rampant

hunting and trade of animals. This has an impact with the depletion of the animal population. If not further addressed then it is not impossible that the next few years these animals will become extinct. This is due to a lack of awareness of the importance of protecting nature and caring for protected animals.

Understanding of environmental and animal care needs to be educated as early as possible. It's just that when there is still lack of socialization or delivery media that can provide information about protected animals in Indonesia, especially to children. Animal recognition can also be conveyed by learning media in the form of games. But now there are still very few games that raise the theme of protected animals. One of them is the game Saves Punyu, this game raises the turtle as the main character as a hunted animal. The goal is the same, namely to protect and free the turtles from the hunters. Because it is only limited to one turtle character, this game lacks the variety of fauna found in Indonesia. Specifically protected animals in Indonesia. Some other games including originating from outside Indonesia, so it does not show some animals that come from Indonesia.

Judging from the development of game technology and the problem of lack of understanding, awareness and concern for the environment and animals in Indonesia, the solution that can be taken is to make an educational game as a learning media about protected animals, especially for children. Learning with educational game media is expected to attract children's interest in learning. The game shows some protected animals in Indonesia along with the animal population areas. So that players can get to know the protected animals in Indonesia and its population areas. Through the pattern of the game the player is expected to be able to resolve other matters concerning the problems experienced by protected animals. Players are required to learn so that they can solve existing problems. Game status, instructions, and tools provided by the game will actively guide players to explore information so that they can enrich their knowledge and strategies while playing.

2. Theoretical Basis

Theoretical foundation explains the theories and literature used in research.

2.1. Animal Protected by Indonesia

Protected animals are animals that cannot be owned by just anyone, from most of these protected animals usually in a zoo. Currently there are some animals that are already rare. These endangered animals, if not protected can become extinct due to hunting by humans. To preserve it, these endangered animals are protected by the government. Protected animals must not be hunted, let alone killed. The hunt for endangered (endangered) animals is a violation of the law and can be subject to legal sanctions. (Saripudin, 2007)

2.2. Multimedia

Multimedia in general is a combination of three elements, namely sound, image and text (McCornick, 1996) or Multimedia is a combination of at least two input or output media of data, this media can be audio (sound, music), animation, video, text, graphics and images (Turban et al, 2002) or Multimedia is a tool that can create dynamic and interactive presentations that combine text, graphics, animation, audio and video images (Robin and Linda, 2011).

Another definition of multimedia, namely by placing it in context, as did by Hofstetter (2011), multimedia is the use of computers to create and combine text, graphics, audio, moving images (video and animation) by combining links and tools that allow users navigate, interact, create and communicate.

According to Vaughan (2004), multimedia is a combination of text, art, sound, images, animation, and video that is delivered by computer or digitally manipulated and can be delivered and or controlled interactively. From this definition, a multimedia system can be described as follows.
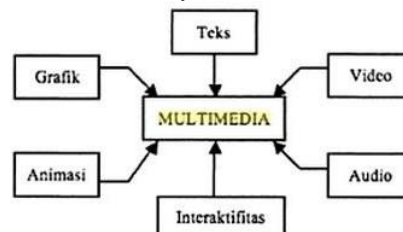

Fig 1. Multimedia Overview
Source: Binanto Iwan, Digital Multimedia - Basics and Theory of Development, 2010: 2

2.3. The game

Game is one of the multimedia that is very liked by the public. The game is defined as a structured activity or also used as a learning tool (Augustine, 1998). Games become an important role for the development of human technology. In terms of appearance, music and the application of artificial intelligence. Games also become a good educational tool for the development of apective or knowledge of young children and adolescents.

2.4. Game Engine Construct 2

Game Engine is a software created for the purposes of making and developing a game. One of the game engines that can be used to develop a game is Construct 2. Construct 2 is an HTML5-based game creation tool specifically for the 2D platform developed by Scirra. Construct 2 does not use a special programming language, because all commands used in the game are arranged in EvenSheet which consists of Events and Actions. Although it does not use program code, Construct 2 can also use commands in general programming such as using variables, arrays, loops, and others.

2.5. Design Method

In the process of application development, the method used is the method of developing multimedia applications which was proposed by Raymon Mc Leod.

a. Defining the Problem

Defining a system problem is the first thing a system analyst does.

b. Feasibility Study

The second thing a system analyst does is a feasibility study, whether the development of a multimedia system is feasible or not.

c. System Requirements Analysis

Analyzing the purpose, goals and objectives of the system is what is done at this stage.

d. Designing the Concept

At this stage, system analysis engages the user to design concepts that determine the overall message and contents of the application to be made.

e. Designing Content

Designing content includes evaluating and selecting message appeal, style in executing messages, tone in executing messages and words in executing messages.

f. Drafting the Manuscript

Designing scripts is a complete specification of text and narration in multimedia applications.

g. Designing Graphics

In designing a graph, the analyst chooses a graph that suits the dialogue.

h. Producing Systems

In this stage, the computer began to be used in full, to design the system, by combining the seven stages that have been carried out.

i. Testing the System

Testing is a step after the multimedia application has been designed.

j. Using the System

Implementation of a multimedia system is understood as a process of whether a multimedia system is able to operate properly.

k. Maintaining the System

After the system is used, the system will be evaluated by the user to decide whether the new system is in accordance with its original purpose and to decide whether there are revisions or modifications.
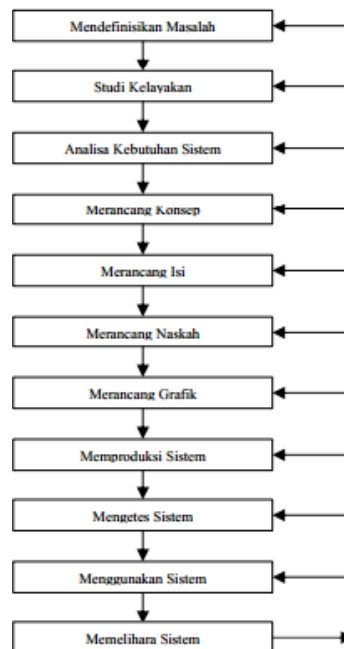
Fig. 2. Image Detailed Multimedia Application Development Cycle by Raymon Mc Leod
Source: Suyanto. M, Analysis and Design Multimedia Applications for Marketing, 2004: p. 43

3.   Analysis and Design

System analysis is carried out to obtain the definition of the problem and a precise picture of what the system will do. System Analysis aims to find out how the ins and outs of the system to be researched and built.

3.1. Application Scope

The designed scope includes a player model which requires to save several animals with different levels of difficulty each level. Amount level in the game consists of 30 levels with 15 different animal characters. Game content consists of writing, images, animation, video and sound.

Designing Application Structures

a.   Splash Sceen

In this section contains a splash screen in the form of a game logo display a few seconds before entering the main menu display.

b.   Main Menu

This display is the main display that contains menus to start the game. The menu consists of options to start a new game or load a previous game, along with a menu of options to adjust the sound, and exit the game or exit.

c.   Prologue

This display contains videos and pictures that tell the problem of protected animals in Indonesia. Where many protected animals are hunted by hunters.

d.   Level Menu

This display contains a selection of levels to be played. The next level will open if the previous level has been successfully completed by a player.

e.   Information

This display contains general information about certain animals. This information is displayed after selecting a certain level and before entering the game to be played.

f.   Game

This display contains the game based on the selected level. The player's main mission is to save the caged animal by destroying the cage using stones. The pattern of the game is made so that the player can take the right steps to direct the stone to the cage so that the cage is destroyed and managed to free the animals.

g.   Game Completed

This display contains a video when the player successfully completes all missions in the game. This display indicates the player successfully completed the game "Save The Wildlife".

h. About

This display contains information about the game "Save The Wildlife" and information about the game maker.

3.2. Game Component Design Game

Component design explains about the components contained in the game "Save The Wildlife",including game characters and items contained in the game.

Tabel 1.
Game Educational Characters "Save The Wildife"

No	Name	Picture	Information
1	Anoa		It is an endemic species of Sulawesi.
2	Babir usa		It is an animal clan of several wild pigs found around Sulawesi, Togian Island, Malenge, Sula, Buru and islands other Maluku islands.
3	Badak Jawa		Is one of five rhinos still available. This rhino has skin resembling armor.

3.3. Storyline

Save The Wildlife game is an arcade type educational game, which is played by one player. This game tells about the mission to save protected animals that are hunted by hunters. The story begins when the rampant hunting of several animals in Indonesia.

The hunters hunt these animals and then lock them up using wooden cages. There are 15 protected animals that are hunted and locked in these wooden cages. Players must save the fifteen animals through 30 different levels. Where every 2 levels consist of 1 protected animal that must be released. Before the game starts, the game will display information about one of the animals that must be saved. Players are required to read the information displayed that will be useful to answer questions that will appear when the game takes place.

In this game, players are required to save these animals and free them from captivity by using stones. Before getting stones, players must answer a question in accordance with the information previously displayed. If the question is answered successfully, the player will get a stone. The function of the stone here is to break the cage and free the animal.

The game consists of 30 different levels with 15 animals that must be saved. Each level will have several different obstacles, the higher it will be more difficult to save these animals.

3.4. Storyboard

Storyboard is an arrangement of sequential sketches in accordance with the story line on a multimedia object.

Tabel 2

Storyboard Table Designing a desktop based educationalgame "save the wildlife with game engine contruct 2

Scene	Visual	Link	Music	Duration
1	Splash Screen [LOGO]	-	-	Duration
	Main course [LOGO]	About	Intro.wav	100 seconds (repeats)
3	Prolog [TEXT CERITA]	Level Menu	Prolog.wav	60 seconds
4.	Select Menu	Main Menu	Prolog.wav	100 seconds (repeats)
5.	Tutorial 1 [INTRUKSI]	*Game* Level 1	Intro.wav	60 seconds
6.	Level Information 1-2	*Game* Level 1-2		5 seconds
7.	*Level 1 game* [ANDA]	Main Menu	Main.wav	100 seconds (repeats)

3.5. UML Design

UML design is a design to visualize or document an object oriented based system development. System analysis is performed using UML (Unfied Method Language). The stages of system analysis using UML are Use Case Diagrams, Activity Diagrams, Squence Diagrams, and Class Diagrams.

Use case diagrams are constructs to describe relationships that occurs between actors with activities contained in the system. The purpose of modeling use cases is to define the functional and operational needs of the system by defining usage scenarios agreed between the user and the developer. Use case diagrams for the game "Save The Wildlife" can be seen in the following picture:
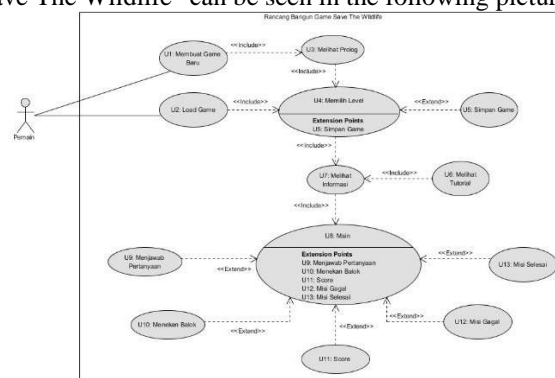

Fig 3. Image of Use Case Designing a Desktop Based "Save The Wildlife" Educational Game with Game Engine Construct 2

The case scenario scenario describes the sequence of steps in the process carried out by the actor against the system and that carried out by the system against the actor.

Tabel 3.
Use Case Scenario Table Starting Game

Identification	
Name Use Case	U1: Starting the Game New
Actor	Player
Use Case concerned	-
Main Scenarios	
Initial Conditions	Main Menu Display
Actor Actions	System Reaction
	1. Showing main course
2. Push the button start playing	3. Loading games new
Final Conditions	New game was made

The table above is one of use case scenario that explains the sequence of steps taken in the process of starting a new game.

Class diagram or class diagram illustrates the structure of the system in terms of defining the classes that will be made to build the system. Classes have what are called attributes and methods or operations. The connection of each class is described using inheritance and generalization as shown in the following figure:
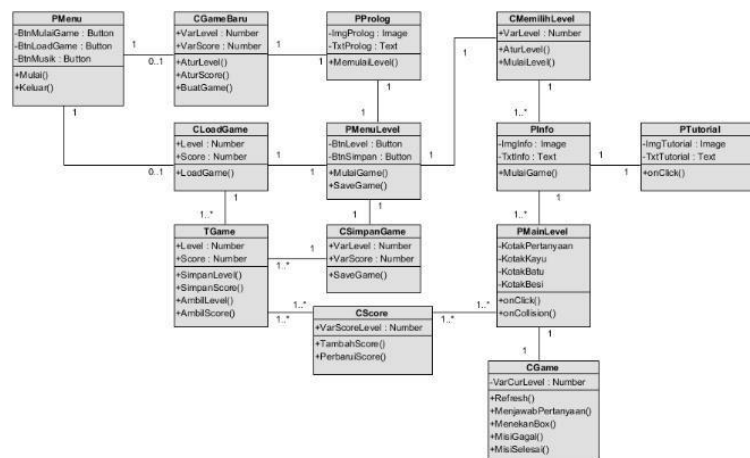

Fig 4. Picture of Save The Wildlife Game Class Diagram

Sequence diagrams illustrate the interactions between each object in each use case in chronological order. This interaction takes the form of sending a series of data between objects that interact with each other.
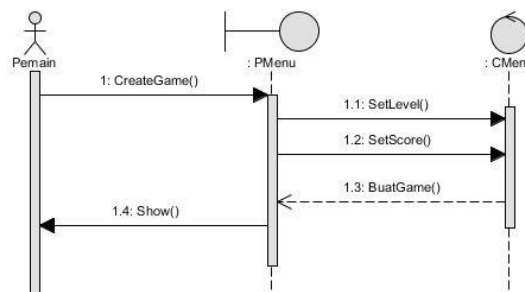

Fig 5. Image Sequence Diagram of a New Game

The picture above is one sequence diagram that explains the interaction between player objects with the class concerned in the New Game process. Starting with the Player who starts the Game on the PMenu Interface. Then the system will set the level to 1 and the score to 0. Activity diagram models the

work flow or workflow from the sequence of activities in a process that refers to the existing use case diagram.
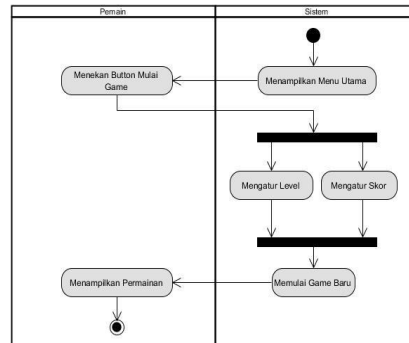

Fig 6. Activity Diagram Starting a New Game

The picture above is one activity diagram that explains the work flow or sequence of activities in the process of starting a new game.

3.6. Interface Design

Interface design is a game interface design that will be created. Interface Design explains the workflow of the program in accordance with the menu structure that has been created. Here is the interface design of the game "Save The Wildlife
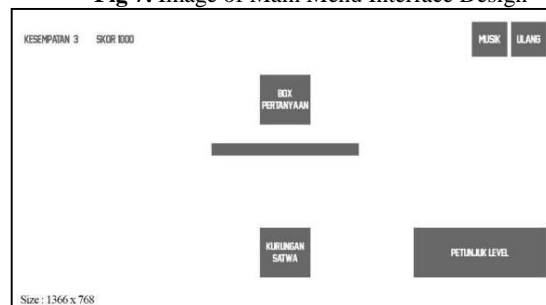

Fig 7. Image of Main Menu Interface Design

Fig 8. Image of Game Interface Design

4. Implementation

The implementation phase can be applied if the software system and the hardware have been prepared.

Fig 9. Game Interface Implementation

Fig 10. Game Interface Image

4.1. Questionnaire

To find out the user's steps to the game that has been built, questionnaires have been distributed to 10 respondents. Questionnaires that have been distributed are then processed to be converted into data. Respondents were chosen randomly, male or female, could read well, and were children aged 6 years and above. The questionnaire calculation uses a Likert scale. Where there are five statements namely, strongly agree, agree, neutral, lacking, and very lacking. Based on the results obtained, the conclusions can be drawn as follows:

a. Respondents strongly agree that the idea of the game game "Save The Wildlife" is interesting.
b. Respondents strongly agree that the level of difficulty of each level of the game "Save the Wildlife" is appropriate.
c. Respondents strongly agree that the method of operating and controlling the game "Save The Wildlife" is easy to use.
d. Respondents strongly agree that the instructions or game tutorials on the game "Save The Wildlife" are easy to understand.
e. Respondents strongly agree that the appearance of the game design "Save The Wildlife" has a good display.
f. Respondents strongly agree that the characters and components (images, animation, sound, and video) in the game "Save The Wildlife" are good.
g. Respondents strongly agree that the text or information in the game "Save The Wildlife" is easy to understand.
h. Respondents strongly agree that with the game "Save The Wildlife" children can play while learning.
i. Respondents strongly agree that the game "Save The Wildlife" can help in the learning process.
j. Respondents strongly agree that after playing the game "Save The Wildlife" more get to know protected animals in Indonesia.

5. Conclusion

From the results of research, design and implementation that has been done, the author can conclude several conclusions as follows:

a. Conservation of protected animals in Indonesia needs to be socialized to the wider community. Especially in children as the next generation of the nation. Therefore learning about protected

animals in Indonesia needs to be taught to children from an early age. One of them is through the game "Save The Wildlife" which supports learning about protected animals in Indonesia.

b. This type of educational game is effective enough to attract children to learn. In addition to games, educational games have a positive value in them, by supporting teaching and learning. In order to obtain the essence or additional knowledge for players of the game. Likewise in the game "Save the Wildlife" children can easily play and get additional knowledge about protected animals in Indonesia.

c. Through the game "Save the Wildlife" this can be used as a medium for delivering information to introduce protected animals in Indonesia.

d. Based on the results of the previous questionnaire, the game "Save The Wildlife" has a very good assessment in terms of education. This is expected to foster a sense of awareness of the concern for the environment and protected animals in Indonesia for players.

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