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Designing Environment Care Adventure Game Based on Android Using Construct 2

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ABSTRACT

This lack of public concern for the environment makes education important for environmental education or environmental cleanliness, especially in early childhood, is very necessary as a personality formation and care for the environment, so that our environment and nature are always maintained. To provide education today, you must use media as a learning tool because currently technology has developed rapidly and considering that there are so many smartphone users that can be used and used as educational media tools. So that in this study an educational adventure game based on android has been developed with a short level, easy control and an increased level of difficulty. This game aims to provide education by picking up trash and sorting organic, inorganic, and hazardous waste properly. The method used in the development of this game is the Rational Unified Process (RUP), which includes several phases, namely Inception, Elaboration, Contruction, Transition. While the data collection method uses the method of observation, interviews, and literature study. The result of this research is an adventure game application that cares for the environment towards waste which is expected to be a medium of learning and education for the community, especially for early childhood so that they can find out how important it is to keep their environment clean and to preserve it and develop children's character who is sensitive to environmental cleanliness.

1. Introduction

Cleanliness is the most important thing in human life and cannot even be separated and is a fundamental element in health science. Maintaining cleanliness is the responsibility of all human beings including cleanliness in the environment. One of the efforts to maintain cleanliness is to dispose of garbage in its place. Garbage is often found on the road, home page, room and even in the environment. Waste is the result of something that has been used, ranging from plastic, metal, organic and inorganic waste. The impact of littering is very large, especially to the surrounding environment, causing flooding, disease and so on. One way to protect the environment is to dispose of garbage in its place. The awareness of throwing garbage in its place is still lacking even though there are many slogans, invitations and even sanctions for those who violate or for those who throw garbage inappropriately. Each school has taught its students to dispose of garbage in its place, but there are still many who do not care about the environment by throwing garbage in its place. Children's habits in protecting the environment and maintaining cleanliness must be instilled from an early age but it is not easy to get used to being applied to the environment. The fact of waste handling mentioned above also shows the behavior of the people who do not care about their household waste, especially towards the environment. This is reflected in the culture of our society which is still very fond of littering carelessly. Therefore there must be efforts to prevent and instill a caring attitude towards the environment from an early age. Based on the CNN Indonesia article (2018) from the Ministry of Health's research data, it is known that only 20 percent of the total Indonesian people care about hygiene and health. This means, of the 262 million people in Indonesia, only around 52 million people have a concern for the cleanliness of the surrounding environment and its impact on health. Apart from having an impact on health, a dirty environment also makes the scenery worse. The results of a survey conducted by the Ministry of Environment (KLH) of the Republic of Indonesia at the end of 2012, found that the index of Community Care for the Environment Behavior is

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low, in general it can be concluded that public concern for the environment is still low. From these various indicators, it has a score of 0.57 from a range of 1-10, which means that the level of public awareness of environmental hygiene is very low.

ICT-based learning system, namely learning that is interactive, interesting, independent and uses technology assistance. Conventional learning requires students to listen to a teacher's explanation. A teacher teaches an outline of the teaching material slide by slide. Meanwhile, practical educational multimedia applications can be used more actively and independently [1].

Technological developments lead to many variations of learning media. Computers used in learning are technological developments in education. The tools that can be used are tutorials, simulations, and games. Game as a computer-based technology provides a pleasant learning atmosphere. Game users can learn independently and reduce boredom [2].

Adventure games are one type of a wide variety of games. Perceptions of Adventure Games based on several authors among them : And adventure game is a type of package where group of children have a problem to solve which usually involves an element of fantasy [3]. Adventure game refers to a coputerized, branching series of textual segments that take the player through some kind of adventure [4]. The game consist of a logically connected network of locations which must be explored and travelled trough [5]. Computers and adventure game together have generated a rich, creative and imaginary world, one that is difficult to provide in any other way, a world in which the players can manipulate, make decisions, discuss and simulate [6]. An advemture game is a program which simulates a small universe and puts the pplayer inside it. The program first describes the scene, then the player types in a sentence, then the program describes what has happened in the world as a result of doing what the player asked, or why what was asked is impossible [7]. The world can be real or imaginary. It can be placed in the past, present, or future. The variety of worlds that can be modelled is unlimited. Users are allowed a glimpse into an otherwise unaccessible learning environment [8]. In a computerized simulation, the computer propgram functions as the facilitator by presenting situations, supplying vocabulary and information, and creating unanticipated or situations to which the users must react via the keyboard [9]. Adventure games are a type of simulation in which the student is invited to take part in an imagiary adventure. They are designed to provide a stimulus for creative activities in the classroom [10].

This sophisticated technological development must also be supported by the latest operating system. One of them is the Android operating system. In 2018, Android users in Indonesia increased by 73%. Android-based operating system (OS) devices are now starting to appear and increasingly diverse in the market, this is because Android is an open platform, so it can be run on various mobile & Internet devices (MID) devices. In addition, Android has several advantages, including the number of vendors who adopt the Android operating system on their devices, an open source operating system, an available application market. Another advantage is the ease, interactivity and user experience that Android provides through its application, one of which is the type of game. The majority of children really like games. The number of games on Google Play is 59,205 Puzzle Games, 50,555 Casual Games, 59,028 Arcade Games, 27,421 Action Games, 30,238 Educational Games, 24,167 Adventure Games, 24,013 Simulation Games. This shows that the type of adventure game is still lacking compared to other game genres [11]. The game that was created is hoped to provide knowledge and create awareness to children of the importance of protecting the environment. This instilled pattern of loving the environment begins with small things in everyday life, namely disposing of garbage properly.

2. Research Methodology

The research methodology used in the development of this system is the RUP (Rational Unified Process) method which has the following mechanisms :

a. Inception. At this stage the developer defines activity boundaries, analyzes user requirements and performs initial software design including analysis of existing systems, target system formulation, target global architecture determination, identification of requirements, formulation of requirements (functional, performance, security, GUI, etc.) formulation testing needs (unit level, integration, system, performance, functionality, security, etc.), UML modeling (use case diagrams and activity diagrams) and documentation.
b. Elaboration. At this stage, software design is carried out starting from specifying software features to releasing a prototype beta version of the software. Activities carried out at this stage include making a subsystem architectural design (architecture patent), system component design, data format design (communication protocol), database design, display interface design, display flow map design, determination of the design pattern used, diagram modeling. UML (sequence diagrams, classes,

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components, deployment, etc.), and documentation.

c. Construction. Is the stage for implementing the design results and testing the implementation results. At the initial stage of construction, it is better to re-examine the results of analysis and design, especially the design in the behavioral domain (sequence diagrams) and the structural domain (class diagrams, components, deployment). If the design is in accordance with the system analysis, then implement it in language Certain programming activities can be carried out at this stage, including testing the results of analysis and design (for example using a collaborator class responsibility for object-oriented programming cases), data collection on complete implementation needs (guided by identifying needs at the analysis stage), determining the coding pattern used , programming, testing, program optimization, data collection on various possibilities for further development / improvement, and making documentation.

d. Transition. The deployment installation and software socialization is carried out at this stage. It is a step towards submitting the application system to consumers (roll-out), which generally includes the implementation of training to users and beta testing of the application against user expectations.

3. Discussion

At this design stage, an adventure game application flow is made to care for the environment against waste that describes the access made by the user, in general the flow of the game application system created is as follows :

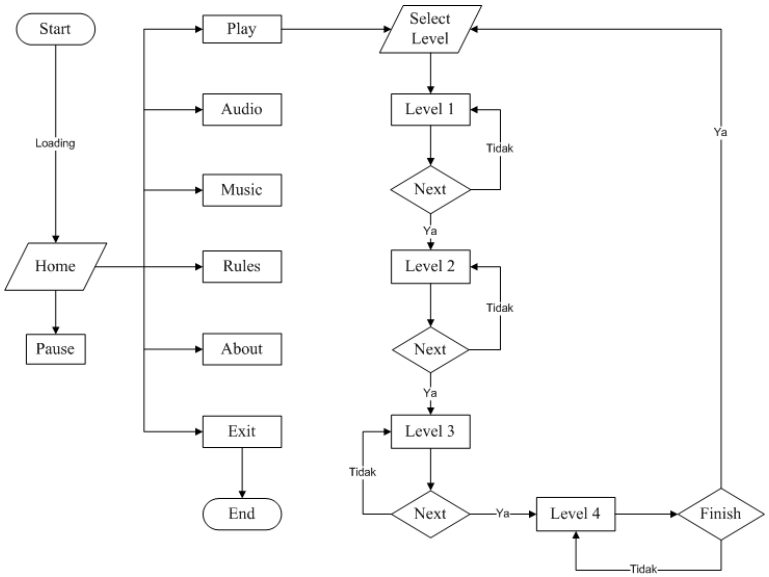

Fig 1. Flowchart of the Environment Care Adventure Game Flowchart

In the Flowchart above, it starts with the Start Loading Process form then the initial Game Home Display appears in which there is a Menu, namely Play, Audio, Music, Rules, About, Pause and Exit. In the Select Level Menu, there is a level selection that will be played before entering the game. Then when the Player clicks Play, it will be directed to the Select Level Menu to select the first level, after that the Player enters the main game at level 1. If the Player succeeds at the first level, namely level 1, the Player can continue the game to the level. the next level and if the Player fails at level 1 or does not want to continue to the next level, the Player will repeat it again at the level being played. When the Player succeeds in completing all the existing levels, the player will return to the Select Level Menu display or can return to repeat the game at level 4 and the player can also end it with Exit.

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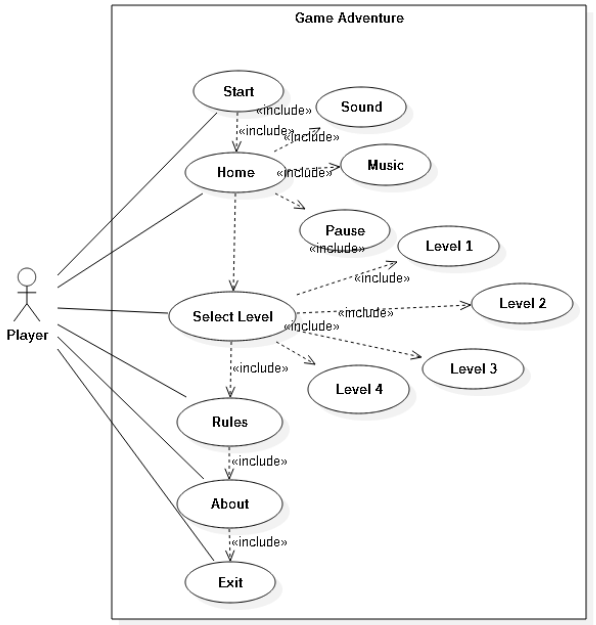

Fig 2. Use Case Diagram Game Adventure Cares for the Environment

In the use case diagram above, it can be concluded that the Player can click Start, Home, Select Level, Rules, About, and Exit. When the Player starts the game, the Player will be directed to the Home Menu, which contains the Sound, Music, Rules, About and Pause Menu. Then then the Player will be directed to the Select Level Menu in which there is a choice of level 1 - level 4. Then the Player enters the main game at level 1. If the Player succeeds at the first level, namely level 1, the Player can continue the game to level 1. the next level and if the Player fails at level 1 or does not want to continue to the next level, the Player will repeat it again at the level being played. When the Player succeeds in completing all the existing levels, the player will return to the Select Level Menu display or can return to repeat the game at level 4 and the player can also end it with Exit.

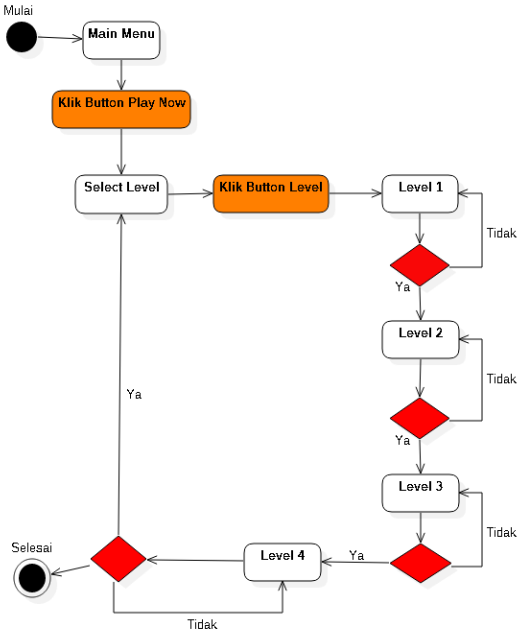

Fig 3. Activity Diagram Game Adventure Cares for the Environment

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In the above Activity, start by entering the Main Menu then clicking Buttun Paly Now, it will be directed to the Select Level view and then Click the Level Button, after that then the Player enters the main game at level 1. If the Player succeeds in the first level namely level 1, the Player can continue the game to the next level and if the Player fails at level 1 or does not want to continue to the next level, the Player will repeat it at the level currently being played. When the Player succeeds in completing all the existing levels, the player will return to the Select Level Menu display or can return to repeat the game at level 4 and the player can also end it with Exit.

4. Conclusion

After doing the construction using Construct 2, the game is then built into an Android-based application. The Main Menu display is a display when the loading process has been completed, it will display the main page or Main Menu. To see how it looks in the Fig 4 below :

Fig 4. Main Menu Interface Display

When the loading process is finished processing, the main page display (Main menu) will appear after the loading process. There is a Play Now button to start the game. And there are also buttons for setting sound effects, music, rules of the game (Rules) and Info / About (About). The Select Level display is a display that displays a selection of levels that can be played by the Player before the game starts. To display the Interface Select Level can be seen in the Fig 5 below :

Fig 5. Interface Select Level Display

When the Player clicks the Play Now button on the Main Menu page, the select level display will appear. In this display there is a home button to return to the Main Menu page. And there are also buttons for setting sound effects and music. In this view, there is also a choice of levels that can be played by players before entering the game. The Success Level view is a display that displays a Popup if the Player manages to pass the obstacle and also gets all the trash and keys at that level. To see how it looks in the Fig 6 below :

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Fig 6. Display Interface Level Complete 1-3

Meanwhile, the Complate level display at the end of the last level will display the Complate level Popup if the Player manages to put the trash into the trash correctly according to its type. To see how it looks in the Fig 7 below :

Fig 7. Level Complate Interface Display level 4

The display in Fig 6 will appear if the player is successful complete level 1-3, and the display in Fig 7 will appear if player successfully completes level 4 and gets an Award in the form of Adipura Cleanliness Cup. In this display there is a NextLevel button, where the button can be used by the Player when successful, when the Player clicks the NextLevel button it will continue to the next level. Meanwhile, at level 4 it will return to the level selection display (Select Level).

After developing an eco-friendly adventure game, here are the conclusions :

a. This eco-caring adventure game was developed with the Scirra Construct 2 and Corel DrawX7 software using the Rational Unified Process (RUP) method as a learning and education medium about caring for the environment for waste that is packed with the Majalengka icon as the background game.
b. Based on the results of the implementation and testing of this Environmental Care Adventure Game, it can be used and installed on an Android-based Smartphone with a minimum version of Kitkat. The way to play this game is by pressing the left, right, jumping and shooting buttons. This game has a mission to collect Organic, Organic and B3 waste and dispose of it in the trash according to its type properly.

In making and developing this Adventure Game Caring for the Environment Against Waste, there are still many shortcomings and weaknesses that must be developed further towards a better direction. To improve the quality and functionality of this game, the researchers gave some suggestions to make this game better and more interesting, namely as follows :

a. Increasing the levels in the game, so that people can play this game longer and more challenging by adding more enemies and obstacles to make it more diverse and also increasing the types of garbage so that they can recognize the types of garbage correctly.
b. Improve the image and motion animation on each object to make it look more lively and attractive.
c. Adding the top score that is stored online so that people who play this game can be motivated to each other to achieve the highest score.
d. Improve the display graphics or pages in this game to make them look attractive and upgrade them to 3D if possible.

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