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Design of an Android-Based Plant Planting Educational Game using the Luther-Sutopo Method at Dr. Wahidin Sudirohusodo Junior High School

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Abstract

Education is essential in character building and human resource development, especially at the Junior High School (SMP) level, a key stage in student growth. One innovative approach is using technology-based media, such as educational games, which enhance learning interest and conceptual understanding in an engaging way. This research aims to design an Android-based educational game with a plant-growing theme for SMP Dr. Wahidin Sudirohusodo. The development follows the Luther-Sutopo method, which includes six stages: concept, design, material collection, creation, testing, and distribution. The game introduces plant types and basic farming techniques while promoting environmental awareness and patience. Black-box testing confirms all features function properly, and user evaluations show high satisfaction in terms of design, usability, and educational value. This game is expected to serve as an effective and engaging alternative learning medium, particularly in Natural Sciences and Environmental Education.

Keywords: *educational game, Android, plant cultivation, Luther-Sutopo, learning multimedia, junior high school.*

1. Introduction

Educational games are digital products derived from the concept of game-based learning. Combining learning materials with challenging elements and engaging visualizations is a key component of educational games [1]. Educational games have become a popular learning medium in today's technological era, enhancing children's interest in learning. One such game, which offers numerous benefits for the environment, is gardening. Educational games are a fun and interactive way to help children learn. The importance of planting and caring for plants is a crucial topic for children. This has clearly impacted the use of applications for these activities. Applications have become more practical, effective, and accessible from anywhere [2].

Dr. Wahidin Sudirohusodo Junior High School is a pioneering school in education, promoting organizational progress and creating disciplined organizational achievements. After the pandemic, children are playing games and having fun with their smartphones. Schools have no planting activities, and during biology lessons, teachers don't encourage them to plant, leaving students with minimal knowledge to try growing plants outside. The problem is that students lack knowledge about how to plant and care for plants, and they don't have the opportunity to plant directly. This can make children in this era uninterested in this activity.Therefore, it is hoped that this can provide children with the opportunity to learn through play. Educational games designed for planting have the potential to make the learning process more enjoyable and engaging for children. This can increase their desire to learn and facilitate their understanding. Replacing a rote-based approach, which focuses on thinking activities, this approach aims to help students understand the concepts learned in the classroom [3].

Research conducted by Putra Arya Nanda (2020) shows that applying the Luther-Sutopo multimedia method to simulations can help present engaging applications. Providing information in visual form with the help of computers facilitates analysis and understanding by the recipient [4]. A study by Sondang Sibue et al. (2022) shows that the Android Studio application is a good tool for creating educational games [5].

Based on the description that has been presented, a research will be conducted with the title "Designing an Android-Based Planting Education Application Using the Luther-Sutopo Method at Dr. Wahidin Sudirohusodo Middle School"

2. Literature Review

Luther-Sutopo is a popular approach in multimedia development, including educational games. The author will analyze the proposed method by outlining the necessary working methods for creating interactive multimedia. With this method, the stages of multimedia development are divided into 6 stages [9].

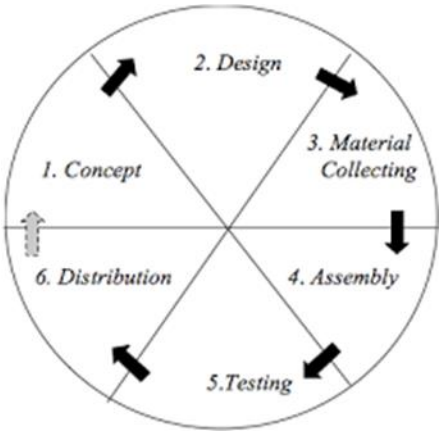

Fig. 1. Luther Sutopo's Stages

1. Concept
   In the concept stage, researchers conducted observations to gain initial ideas for developing a multimedia application and to determine whether the development of teaching materials was necessary for the learning process. From the information gathered, researchers concluded that the product idea to be developed was an Android-based application. Multimedia elements such as animation, images, colors, sound, and text were appropriate for students.
2. Design
   In this stage, researchers created specifications for the display and materials needed for each scene using a navigation structure and interface design, also known as a storyboard. The ideas for the application to be created are called storyboards. A storyboard is another term for a visual script that will serve as an outline of the project.
3. Material Collection
   This stage involves gathering the materials needed to build the application. The required hardware includes a laptop and a sound recorder. The required software includes Windows 10 64-bit, Adobe Photoshop 2020, CorelDraw 2020, Android Studio, and CapCut. Multimedia elements consisting of images, audio, text, and animation.
4. Assembly
   This is the stage where all multimedia objects or materials are created. Application creation is based on the design stage. This stage is where all the collected multimedia elements are put together. The application created during the design stage serves as a reference for the author in developing the application.
5. Testing
   This is carried out after the assembly stage is complete by running the application or program to ensure there are no errors. This stage is also known as alpha testing, which tests whether features, including buttons and displays, function as expected. Chapter VI (four) will discuss this stage further.
6. Distribution
   After testing, after evaluating the application's success on multiple devices, the final step in the Luther method is distribution. This is the application distribution stage, which can be used to install the application, publish the application, or publish the application to Android users.

3. Research Methods

The author identifies a problem faced in a particular situation or context. Dr. Wahidin Sudirohusodo Junior High School, Medan, is a private educational institution engaged in education. Students have minimal knowledge of farming methods. Teachers will educate and deliver learning to students. Therefore, this study aims to create an application that can assist teachers and students in the teaching and learning process. The researcher will analyze the proposed Luther-Sutopo method by outlining how it works. This method is a combination of Luther's multimedia development model and Sutopo's system development model. The following are the main steps that need to be followed in designing an educational game based on this method:

1. Concept
   Researchers will meet with teachers and other educational staff at the school to understand the educational needs and topics that are important to students. They will identify relevant learning materials that can be packaged in the form of educational games. Researchers will create a concept description.

Table 1: Concept Description

Title	Design Of An Android-Based Plant Planting Educational Game Using The Luther-Sutopo Method at Dr. Wahidin Sudirohusodo Junior High School
Genre	Simulation
Platform	Android
Animation	2D Animation

Users	Children Aged 8-15 Years
Player	1 Player
Interactive	Touch to select Menu

2. Design
   Researchers will first determine the flow to design and organize an interface that allows students to easily navigate from one section to another within an application. They will adapt the educational content to the material taught in junior high school, with different levels based on the difficulty of the concepts
3. Material Collection
   Researchers are involved in the product or project development process of creating educational games. The necessary elements and materials are gathered before the production process begins. Researchers will involve teachers and educational staff from Dr. Wahidin Sudirohusodo Middle School to provide input on the materials to ensure they meet the students' educational needs.
4. Assembly
   The researcher uses Android Studio software with Java language for the execution process. The researcher will be in the development phase, which aims to combine the various components or elements that have been collected into a complete system.
5. Testing
   During the testing phase, the researcher will test to ensure all features function properly. Testing will be conducted by a subject matter expert in Biology to ensure proper gameplay. Testing will be conducted by a media expert in Multimedia to ensure suitability for students and staff.
   6. Distribution
   The Android application is ready to be distributed to students of Dr. Wahidin Sudirohusodo Middle School after the testing phase by the researcher is completed and the results are positive.

4. Results and Discussion

The following will explain the appearance of the Android-based Planting Educational Game Design Using the Luther-Sutopo Method at Dr. Wahidin Sudirohusodo Middle School, which can be seen as follows.

Fig. 1: Login Section

Fig. 2: Introduction

Fig. 3: Tutorial Section

Fig. 4: Plant Names Section

Fig. 5: Play Section

Fig. 6: Level Section

Fig. 7: Main Section

The advantages of the developed system include:

1. The system is designed with a simple and easy-to-understand game mechanism for caring for plants, thus facilitating students' learning.
2. The game is equipped with a scoring system (points) that can be used as an indicator of user achievement during the interaction process.
3. The application can be accessed and played flexibly from various locations, supporting a learning concept that is not limited to the classroom.

While the system has several advantages, it still has several shortcomings, including:

1. The system does not yet provide a dedicated login feature for teachers, including facilities for inputting and managing learning materials independently.
2. Several materials and supporting features have not been fully implemented in the application, requiring further development.

5. Conclusion and Suggestions

The following outlines the conclusions from the research conducted:

1. An Android-based educational game about growing plants using the Luther-Sutopo method at Dr. Wahidin Sudirohusodo Middle School provides an interactive learning tool that encourages students to understand how to care for and maintain plants in a fun way.
2. The implementation of the Luther-Sutopo method in the development of this educational application, along with an attractive and user-friendly interface, facilitates students' effective and efficient learning.

For further development of this educational plant-growing game, the following suggestions are provided:

1. To increase the app's appeal, it is recommended that future development include more varied and interactive animation elements.
2. It is recommended that the developer add a specific level of difficulty tailored to the cognitive abilities of junior high school students, particularly those at Dr. Wahidin Sudirohusodo Junior High School, to increase the challenge and effectiveness of the learning process.
3. The app's interface should be designed with a more attractive and aesthetically pleasing color scheme to increase user interest and comfort while interacting with the system.

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