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Design of a Virtual Based English Learning Application System Reality and Augmented Reality

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A B S T R A C T

Textbook-based learning media makes the learning atmosphere less attractive for students, especially for elementary school students. This causes the transfer of knowledge to be hampered. Advances in information technology have penetrated the world of education which applies information technology as a tool in teaching and learning activities such as visual animations including augmented reality technology. The augmented reality of technology in English learning applications is a solution to attract the interest of elementary school children. This application has two main features, namely learning and quizzes. First, students are given an introduction to objects around the house in English, then asked to work on questions in an augmented reality and virtual reality technology environment. This application carries out several processes which include reading marker symbols using a camera, then carrying out a pre-processing stage, namely the segmentation process for comparing marker symbols. If the marker symbol is an image that is similar to the reference data, the recognition image will be used to display the 3 dimensions of the object. The trial results show that the features of this application work well, and students perceive it as helpful to have this application for learning English.

INTRODUCTION

So far, learning in general is still textbook-based, making it less interesting for students and teachers. Apart from that, much of English learning is still text-based. This causes children to get bored quickly, because it is less interesting. From this problem, the author provides a solution to this learning method, namely by utilizing multimedia-based learning media, including augmented reality technology. Augmented reality is a technology that combines real and virtual objects in a real environment, running interactively in real time [1,2,3,4]. Augmented reality-based learning is expected to enable students to learn English in a fun way. Apart from that, by using augmented reality the teacher does not need to provide physical demonstration materials for the word charades game in English so this method is very profitable for elementary school teachers [5,6,7].

METHOD

System Creation Flow

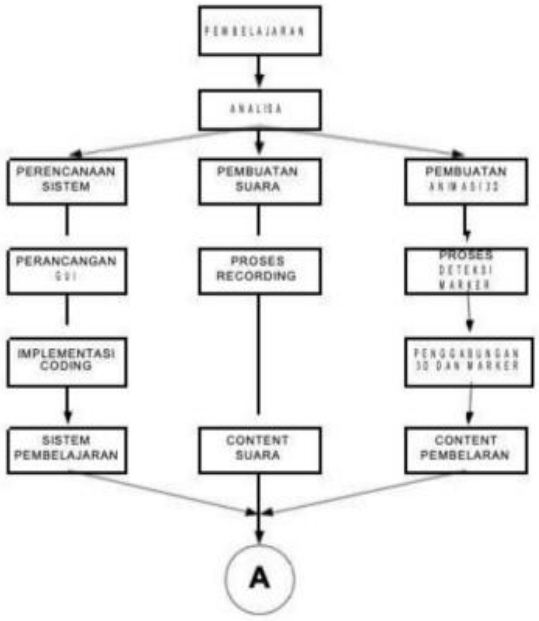

Figure 1. System Creation Flow

The stages in the system creation process are:

1. Learning Media
2. Analyzing
3. The analysis carried out consists of making system planning, making sound and making animation
4. In the system design, GVI design is carried out, in the sound creation, the recording process is carried out and in the animation creation, the marker detection process is carried out.

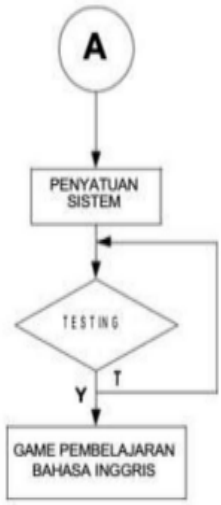

Figure 2. System Creation Diagram

Application User Flow

The process flow in the system to be created is as follows:

1. User selects a menu
2. If choosing learning, the user must bring the marker closer to the camera
3. The system will perform a check process and will display what object will appear, then the user can see the explanation and hear the explanation.
4. If choosing a question, the user must bring the marker closer to the camera.
5. The system will perform a check process and will display what object will appear, then guess.
6. The user can adjust the movement of the marker, so that it is clearer what object will be guessed.
7. After the user guesses correctly, the name of the object will sound out, if wrong, a sound will sound out indicating the wrong answer.
8. The application performs the value calculation process.

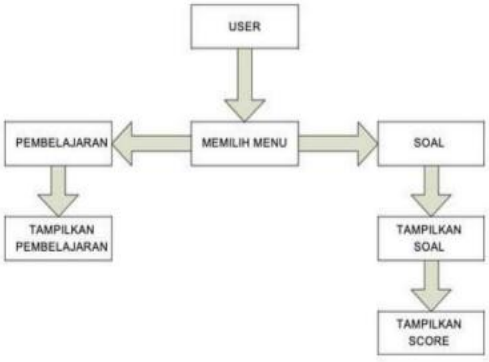

Figure 3. Application Menu Diagram

System Behavior

In general, the system can serve 4 main processes for users, namely: selecting menus, running learning modules, answering questions and viewing scores.

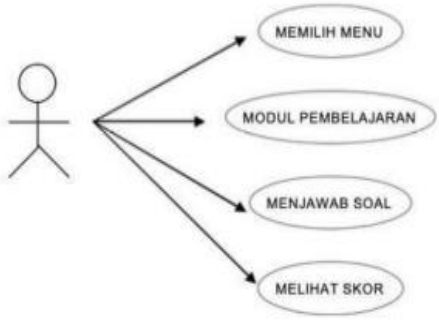

Figure 4. Use Case Diagram

The application flow can be explained starting from the user opening the application and playing it, then the user selects the menu whether it is a learning module or a question. If the user selects a learning module, the marker input will be give rise to an explanation of the object that appears. If you want to input another marker, the process will return to the input marker. If the user chooses a question, highlight the input marker on the camera, then the question will appear and the user must guess it. If the guess is correct, the sound of the object will appear and the score will increase and if you want to guess again, if yes, return to marker input, if not, the program is finished. If the answer is wrong, a sound will appear if the answer is wrong and the score remains and whether you want to guess again, if yes, return to mark input, if not, the program is finished.

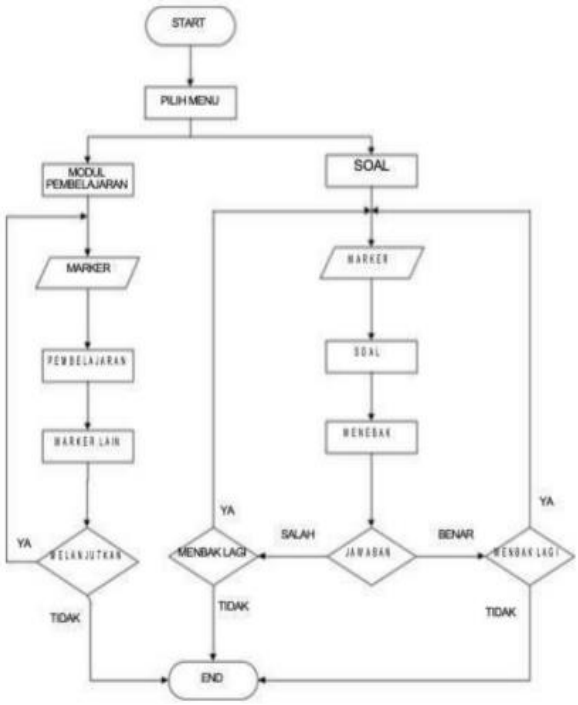

Figure 5. Application Usage Flowchart

RESULTS AND DISCUSSION

Testing is carried out by checking the camera and marker correctly according to the target. Apart from that, a survey was also carried out to find out the response from users to this English learning application.

Application Visualization

This English learning application is a multimedia-based application with the main feature of virtual reality. The initial stage of the user's learning process is to introduce a 3D model of the related object and add a sound feature so that elementary school children can know the form of the object and how to pronounce it in English spelling. The following is a visualization of English learning media based on augmented reality as shown in Figure 6.

Figure 6. Learning Visualization Results

The following are the results of trials to visualize objects in the form of 3D models displayed using augmented reality.

Table 1. Blackbox Test Results for 3D Virtual Objects

No	Object Name	Description AR	Status
1	Bicycle	application displays 3D virtual bicycle AR application	Valid
2	Cup	displays 3D virtual cup AR application displays 3D	Valid
3	Chair	virtual chair AR application displays 3D virtual	Valid
4	Ruler	ruler AR application displays 3D virtual book AR	Valid
5	Book	application displays 3D virtual car AR application	Valid
6	Car	displays 3D virtual hydrant Valid	Valid
7	Hydrants		
8	Fan	The AR application displays a valid 3D virtual angina fan	
9	Knife	AR application displays 3D virtual knife Valid AR application displays	
10	Flower vase	3D virtual flower vase Valid	
11	Spoon	AR application displays 3D virtual spoon Valid	
12	Tape Recorder	The AR application displays a valid 3D virtual tape recorder	
13	Screwdriver	AR application displays 3D virtual screwdriver Valid	
14	Shoe	AR application displays 3D virtual shoes AR	Valid
15	Fork	application displays 3D virtual fork AR	Valid
16	Mobile Phone	application displays 3D mobile phone Valid virtual	
17	Table	AR application displays 3D virtual table AR	Valid
18	Doll	application displays 3D virtual doll AR application	Valid
19	Mattress	displays 3D virtual bed AR application displays	Valid
20	Light	3D virtual lamp	Valid

Test Feature Questions

Users can show the marker and point it at the camera then certain 3D objects appear. Next, answer options 1 or 2 appear, users can choose by pressing the number button according to the choice. If the answer is correct the score increases, and if the answer is wrong the score still does not increase.

Figure7. Visualization of English Questions Based on AR and VR

The recapitulation of application trial results can be written as follows:

Table 2. Test Results

No	Information	Succeed	Fail
1	The camera captures the marker	√	
2	Can guess the answer	√	
3	Displays sound	√	
4	Displays the score	√	

CONCLUSIONS

This research has produced an English learning application based on virtual reality and augmented reality with 2 main features, namely: learning and quizzes. All functions and features of this VR and AR application can run well, especially the features: learning and quizzes. All 3D virtual objects can be visualized well and can be learned by students. The four main functions of testing the application can run well, namely: capturing the Camera capturing the marker, being able to guess the answer, displaying sound, displaying scores.

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