

Using Augmented Reality To Learn English For Children

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Abstract— Learning English from childhood needs to be done to get a generation that has good English skills because children have a relatively easier and faster time to learn something. Therefore, the right interactive English learning method which can be easily understood by children needs to be applied. To realize interactive English learning, an English learning method is needed in the form of a media application using Android-based Augmented Reality (AR) technology to help children learn English. By utilizing AR technology, it is hoped that the English learning process for children will not only become more interactive but also be more independent. The AR method used is the Markerless Augmented Reality method, with this method the user no longer needs to use a marker to display digital elements. The objects that can be scanned consist of 10 objects, namely elephants, bears, tigers, camels, rhinos, bananas, apples, pears, oranges, and watermelons. Based on the results of the study, it can be concluded that the application runs according to the plan, so Augmented Reality with the markerless method can be applied for learning English.

Keywords— Learn Media, Augmented Reality, Markerless, English, Children

I. INTRODUCTION

English is one of the world's official languages recognized by the United Nations (UN) or is called the Universal Language. So, English can also be said as the official language of communication between countries. Even in some countries, English is the official state language[1][2]. The importance of the ability to speak English to communicate well is needed. Therefore, a country that does not use English encourages its people to learn English, including Indonesia. To support the community's ability to speak English, even the Indonesian government has made English a subject to study from elementary school to university level[3][4][5].

Learning English since childhood needs to be done to get a generation that has good English skills because children understand what is being taught faster[6][7]. However, teaching English to children who do not come from an English-speaking background such as Indonesia, is an interesting challenge for educators[8]. Therefore, an appropriate interactive English learning method is needed so that it can be easily understood by children. Several factors can be considered in choosing a teaching method, namely internal and external factors. Internal factors are factors that

come from within students, namely age, maturity, health, interests, motivation, and mood. While external factors are factors that come from outside the students themselves, namely nature, objects, animals, and the physical environment. Educators are expected to pay attention to all factors in their students and have innovations in integrating teaching methods that can increase children's interest and interest in learning English. Thus, educators are required to be professional in choosing methods and organizing the teaching and learning process. There are many methods used by educators so that learning can be achieved, one of which is the existence of interactive learning media for children.[9][10][11].

To realize interactive English learning, an English learning method is needed in the form of a media application using smartphone-based AR technology to help children learn English. By utilizing AR technology, it is hoped that the English learning process for children will not only become more interactive but also be more independent.

A method is needed to build applications with AR technology. One of the AR methods that are currently being developed is the Markerless, with this method users no longer need to use a marker to display digital elements[12][13]. Many previous studies have used the Markerless AR method like [14][15][16][17][18], it can be stated that markerless methods on AR technology can be used in many things such as in education, etc.

This study uses AR technology which is expected to be a medium for learning English for children. Objects that can be scanned consist of 10 objects, namely elephants, bears, tigers, camels, rhinos, bananas, apples, pears, oranges, and watermelons.

II. LITERATURE REVIEW

A. Augmented Reality

AR technology as a combination of real and virtual objects in a real environment runs interactively in real time, and there is integration between objects in three dimensions, namely virtual objects integrated into the real world. Merging real and virtual objects is possible with appropriate display technology, interactivity is possible through certain input devices, and good integration requires effective tracking.

AR technology has been widely used in the world of entertainment, military training, medical, engineering design, robotics, manufacturing, education, and others. From a technical point of view, AR is a transformative technology. One of the most important characteristics is how AR makes an entertaining transformation in the user interaction process. The interaction system is not limited to certain places but covers the whole outside the screen display. From an economic point of view, the implementation of AR technology does not require high-cost equipment. To be able to run an AR-based system, it only requires the support of a minimum specification of a computer, a program that runs AR, and a camera. In terms of entertainment, this AR technology can be used as a means of advertising, promotion, and can also be implemented into a game. Images and videos can also be displayed using this technology.

The marker-based AR system works based on image detection, and the image used is a marker. The working principle is quite simple. A calibrated camera will detect the given marker, then after recognizing and marking the marker pattern, the camera will calculate whether the marker matches the database it has. If not, then the marker information will not be processed but if it is appropriate then the information will be used to render and display 3D objects or animations that have been created previously[13][18][19][20].

B. Vuforia SDK

Vuforia is an AR Software Development Kit (SDK) for mobile devices that enables the creation of AR applications. Formerly known as QCAR (Qualcomm Company Augmented Reality). It uses Computer Vision technology to recognize and track planar images (Target Image) and simple 3D objects, such as squares, in real-time.

The Vuforia SDK supports a wide range of 2D and 3D target types including markerless image targets, 3D multi-target configurations, and Marker Frame shapes. Additional features of the SDK include Local Occlusion Detection using 'Virtual keys', target image selection runtime, and the ability to create and reconfigure programming sets at runtime[21][22][23]. The following is an illustration of the Vuforia data flow diagram, which can be seen in Figure 1.

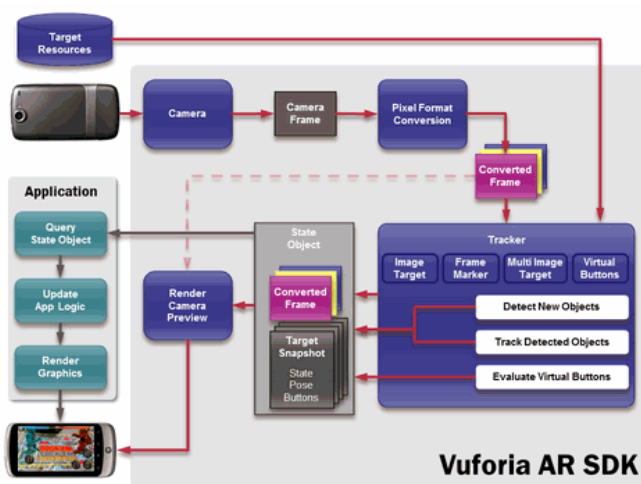


Fig. 1. Vuforia data flow diagram [23]

C. Markerless

The marker is usually a square black and white illustration with a bold black border and a white background. The

computer will recognize the position and orientation of the marker and create a 3D virtual world, namely the point (0,0,0) and three axes, namely X, Y, and Z. The marker used in this study is the markerless method because Vuforia allows the application of augmented reality to the marker. Markerless augmented reality is a term indicated in Augmented Reality technology that does not require special knowledge of the user's environment to display virtual objects at a certain point. Markerless is a marker whose shape can be anything so that anything in the real world can be considered as a marker[14][16][17].

D. Data

Data obtained by following Lee's research[24][25]. The application that has been built is demonstrated how to use it to kindergarten teachers and elementary school teachers in grades 1 and 2 in Samarinda City, East Kalimantan, Indonesia. After the teacher understands how to use the application and states that it is acceptable to children, this application is demonstrated again to their students. During the application demonstration period, the children were accompanied by parents whose children attended kindergarten and elementary school that we studied. The purpose of this demonstration of the English language learning media application to children and parents, so that parents can teach back to children at home if there are children who have difficulty in using the application. After the application demonstration, the researcher gave a questionnaire to the child's parents. The questionnaires collected from the Kindergarten and Elementary Schools studied amounted to 100 completely filled out questionnaires.

III. RESULTS AND DISCUSSION

This learning media has one process, namely, on the start button, this process is a process where the application will bring up 3D objects from the markers available in the application. How to bring up 3D objects on the screen of the user's android device or user is by pointing the camera at the book that has a marker image or 2D object from the 3D object. Images on books are a requirement of the rendering process of 3D objects stored in applications that have been installed on android devices. The scanning process is a single target, which means that the camera can only process one object at a time.

When the user opens the application, will immediately find the main page when opening the application. Figure 2 shows the main menu display of the augmented reality application for learning English using the Markerless method, the image shows the two main function buttons in this application, namely, Start which will immediately take the user to the camera where the user can directly point the camera at a 2D image of the object predetermined targets. When the marker is detected, the user can see the 3D object according to the marker image or 2D object in the book, if the system cannot find the marker pattern, the system will continue to search until it finds the pattern from the marker.

Figure 3 shows the scan results from the AR camera in the application which shows one example of an object available in this application, namely a bear. In this application, there are 10 objects, namely elephants, bears, tigers, camels, rhinos, bananas, apples, pears, oranges, and watermelons. If the user presses the Play Sound button, the system will display the English translation of the 3D object being scanned. The results of the application in the form of English learning media have

a simple and easy to use display, following the display of the English learning media menu.



Fig. 2. Main page

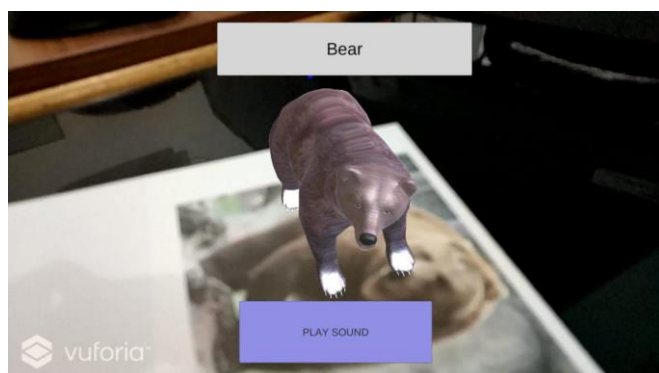


Fig. 3. AR camera view

After completing the English learning media, testing is needed to see if this learning media can be accepted by children and can generate interest in learning English. The questionnaires collected from the kindergarten and elementary school grades 1 and 2 in Samarinda City, East Kalimantan, Indonesia. The questionnaires collected from the Kindergarten and Elementary Schools studied amounted to 100 completely filled out questionnaires.

The questionnaire consists of 7 items that are filled in after the parents get the child's response to the learning media. These 7 items are about children's interest in learning English using AR-based learning media. The questionnaire used a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree). Table I shows the items in the questionnaire and the percentage of participants selecting each point in the Likert scale for each questionnaire item.

TABLE I. QUESTIONNAIRES RESULT

Items	1	2	3	4	5
Increase interest in learning	0%	0%	10%	65%	25%
Increase enthusiasm for learning	0%	0%	10%	60%	30%
Make learning fun	1%	4%	5%	55%	35%
Makes you not sleepy	3%	7%	13%	62%	15%
Feeling interested in learning English	0%	0%	12%	61%	27%
Following the sound of learning media	1%	1%	10%	57%	31%
Suitable for use when studying	0%	0%	10%	80%	10%

Based on Table 1, the item make learning fun has the highest score for strongly agree at 35%. And the item suitable for use when studying has the highest value in agreeing at 80%. So it can be said that the use of AR to learn English in children functions as expected, namely the learning media can be well received and interesting to use.

IV. CONCLUSION

An Augmented Reality application has been created for learning English using the Markerless method. Based on the results of tests conducted on kindergarten and elementary school children in grades 1 and 2 in Samarinda City, East Kalimantan, Indonesia, the application functions as expected and can increase children's interest in learning English.

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