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DEVELOPMENT OF MOBILE AR APPLICATIONS AS A SCIENCE LEARNING MEDIA IN INCREASING JUNIOR HIGH SCHOOL STUDENTS' INTEREST IN LEARNING

Supardi[1], Rezi Kuarta Putra[2*], Muhammad Iqbal[3], Kornelius Toni[4]
[1]Universitas Papua, Manokwari, Papua Barat, Indonesia
[2,3,4]IKIP PGRI Pontianak, Pontianak, Kalimantan Barat, Indonesia

* Corresponding Author. E-mail: rezikuarta@gmail.com

Abstract

The solar system is a vast universe residing within a galaxy of galaxies consisting of celestial bodies circling a central solar system. Celestial bodies contained in the solar system consist of the moon, asteroids, meteoroids, comets, and planets this study carried out the development of planetary recognition applications with augmented reality technology. This application development uses marker-based tracking technology with the waterfall method. Based on the test results, the application can run on several smartphones that have different specifications. This application can be suitable to detect markers with room lights lighting 20 watts with a height of 10-40 cm.

Keywords: learning media, 3D media, augmented reality, solar systems

INTRODUCTION

The solar system is a collection of celestial bodies consisting of a star called the sun and all the objects that surround it. The solar system is located within the Milky Way galaxy. A galaxy is a collection of stars, where stars are celestial bodies that emit their light. The sun is the closest star to Earth in the Milky Way Galaxy.

In 1543, Copernicus put forward a model of the solar system called the heliocentric model which explained that the sun was at the center of the universe and the planets, including the earth, revolved around the sun in their respective orbits. This model replaces the previously proposed geocentric model, which explains that the Earth is the center of the solar system.

The solar system is one of the natural science lessons taught in every school. However, currently, the delivery of this subject material is still through books or 2D pictures. It is hoped that learning by displaying 3D objects and animations through the use of technology can make us understand the material better, one of which is by using Augmented Reality technology.

This technology may still sound foreign to some people. In general, this technology has been developed on desktop PCs, but with advanced technology, many applications adopt Augmented Reality technology into a smartphone application. This application uses paper media that has been given a pattern or called a marker as a prop that is identified using a webcam camera or smartphone device to display a 3D object on the monitor screen.

Augmented reality is a technology that utilizes three-dimensional objects that are projected in real-time. Augmented reality adds or complements reality so that it can be interacted with in digital form. Augmented reality technology can be applied to

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applications in the form of desktops and smartphones. The application of augmented reality technology in the learning process is a solution to attract the interest of elementary school students because augmented reality applications can provide examples of rotation and revolution as well as examples of meteor showers, eclipses, and satellites.

Augmented Reality (AR) itself is a technology that combines the virtual world with the real world. This technology is widely used in the military, health, navigation, advertising, gaming, and education sectors. Generally, applications that apply AR technology aim to provide information to users clearly, in real-time, and interactively.

METHOD

The method used in this research was the Research and Development (R&D) method. R&D is a research strategy that produces products in the education sector. The development model used in this research was the DDDE (Decide, Design, Develop, Evaluate) model. Stage 1 Decide (Determine). At this stage determine the program objectives and materials, at this stage there are 4 phases, namely: a) Determine learning objectives; b) Determine the theme or scope of multimedia; c) Developing prerequisite capabilities; d) Assess resources.

Stage 2 Design. In this stage, creating the program structure, there are 4 phases in this stage, namely: a) creating a content outline; b) creating a Flowchart; c) creating a display; and d) creating a storyboard. Stage 3 Develop. At this stage producing media elements and creating multimedia displays.

Stage 4 Evaluate. This stage checks the entire design and development process. The instruments used in this research were questionnaires and documentation. Questionnaire instruments are used to obtain data on user needs, software and hardware requirements, media expert assessments, material expert assessments, and user response assessments.

Meanwhile, documentation instruments are used to obtain data on content requirements, interface design, program design, and program development. The grids from the questionnaires for material experts, media experts, and users were developed and adapted according to this research based on questionnaires that have been used in developing solar system learning media.

RESULTS AND DISCUSSION

Based on research results, the development of solar system AR learning media for junior high school students in science and science subjects begins with conducting a needs analysis consisting of user needs analysis, needs analysis and user response results are as follows: categories regarding the application of the solar system AR system, whether it provides convenience when application use was very difficult 1 (5.3%), difficult category 1 (5.3%), moderate category 9 (47.4%), easy category 5 (26.3%), and very easy category 3 (15, 8%). Thus, it can be concluded that the solar system AR system application provides convenience when using the application, which was quite agreeable with a percentage of 47.4%.

AR application category the solar system can operate the media well, those who chose strongly disagree 0 (0%), disagree category 3 (15.8%), moderate category 7 (36.8%), agree category 7 (36.8 %), and the strongly agree category was 2 (10.6%). Thus, it can be concluded that the solar system AR application can operate the media well, which was selected as sufficient and agrees with a percentage of 36.8%.

AR application category the solar system can operate the media well, those who chose strongly disagree 0 (0%), disagree category 2 (10.5%), moderate category 8 (42.1%), agree category 6 (31.6 %), and the strongly agree category was 3 (15.8%). Thus, it can be concluded that the solar system AR application can operate the media well with a percentage of 42.1%.

The category of language use presented in the AR system in the solar system is clear and easy to understand, with those choosing strongly disagree 0 (0%), disagree category 2 (10.5%), moderate category 10 (52.6%), agree category 4 (21.1%), and the strongly agree category was 3 (15.8%). Thus, it can be concluded that the use of language presented

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in the AR system in the solar system was clear and easy to understand, with a percentage of 52.6% choosing enough.

Categories presentation of examples of material and applications in the AR system in the solar system was clear and easy to understand. Those who chose strongly disagree 2 (10.5%), disagree category 1 (5.3%), moderate category 5 (26.3%), agree category 9 (47.4%), and strongly agree category 2 (10.5%). Thus, it can be concluded that the category of presenting examples of material and applications in AR systems in the solar system was clear and easy to understand which agrees with a percentage of 47.4%.

Based on the results of user needs analysis, categories regarding the material presented in the AR system in the solar system were clear and easy to understand, those choosing difficult 1 (5.3%), poor category 1 (5.3%), sufficient category 9 (47.4%), easy category 5 (26.3%), and very easy category 3 (15.8%). Thus, it can be concluded that the category regarding the material presented in the AR system in the solar system was clear and easy to understand, with a percentage of 47.4% choosing sufficient.

The category regarding the display in the solar system AR application chose difficult 0 (0%), less category 2 (10.5%), sufficient category 7 (36.8%), easy category 7 (36.8%), and category very easy 3 (15.8%). Thus, it can be concluded that the display in the AR application of the solar system was quite and easy with a percentage of 36.8%.

The category regarding the presentation of AR system practice questions in the solar system is clear and easy to understand, those choosing difficult 1 (5.3%), poor category 2 (10.5%), sufficient category 6 (31.6%), easy category 8 (42.1%), and very easy category 2 (10.5%). Thus, it can be concluded that the display on the solar system AR application was easy to choose with a percentage of 42.1%.

The category regarding neatness in the solar system AR application program chose difficult 2 (10.5.5%), poor category 1 (5.3%), sufficient category 6 (31.6%), easy category 8 (42.1 %), and very easy category 2 (10.5%). Thus, it can be concluded that the neatness of the solar system AR application program was easy with a percentage of 42.1%.

The category of graphical display of the interface in the AR application looks attractive. Those who chose difficult 0 (0%), less than 2 (10.5%), moderate category 4 (21.1%), easy category 11 (57.9%), and very easy category 2 (10.5%). Thus, it can be concluded that the graphical interface of the AR application looks attractive, with a percentage of 57.9% being easy to choose.

The category regarding the quality of material and applications of AR in the solar system can motivate people to study the solar system who chose difficult 0 (0%), poor category 3 (15.8%), sufficient category 5 (26.3%), easy category 9 (47.4%), and very easy category 2 (10.5%). Thus, it can be concluded that the quality of the material and the application of AR in the solar system can motivate people to study the solar system who choose easily with a percentage of 47.4%.

The category regarding learning media about the AR-based solar system can assist and make it easier for students in the learning process who chose difficult 2 (10.5%), less than 0 (0%), sufficient category 6 (31.6%), category easy 6 (31.6%), and very easy category 5 (26.3%). Thus, it can be concluded that AR-based learning media about the Solar system can provide assistance and make it easier for students in the learning process who choose easy and sufficient with a percentage of 31.6%.

The results of the needs analysis showed that not many users are familiar with the AR system in the solar system. However, from this analysis, the response from students seems interested in the media we have created. Regarding student responses regarding the material, students do not yet know and still understand the content of the material, so students can only get to know the AR system directly using the AR application.

This follows previous research which stated that the use of solar system AR media can attract students' attention so that students focus on paying attention to the learning material. Based on the results of the needs

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analysis, it is also known that learning media is made for mobile devices such as smartphones and tablets (Android not IOS).

The choice to use a smartphone is because smartphones (Android) have quite extensive uses so they can carry out activities like a computer or laptop with a high level of flexibility. We cannot provide applications for IOS users because the application method is complicated to enter into the IOS system, we only use the Android system.

CONCLUSION

Based on the research that has been carried out, it can be concluded that the solar system AR learning media for junior high school SCIENCE subjects with the development method used in this research was the Research and Development (R&D) method. The development model in this research used the DDDE (Decide, Design, Develop, Evaluate). The results of this analysis can be concluded that the media expert respondents tend to be good at the appearance, interface, and application of AR programs that function well as a teaching method for students and can be understood by users/students. In the results of the material expert respondents, there was a sufficient category for completeness of the material and clarity of the content of the Solar system material, so that students can understand and know easily and clearly about learning about the solar system. Based on the results of student respondents/application users, it can be concluded that the results of user responses tend to be good, these users tend to be able to understand and be able to assess the appearance of the application and the application of the mobile AR application, so that they can learn and recognize the solar system carefully and are more interested in studying solar system.

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