

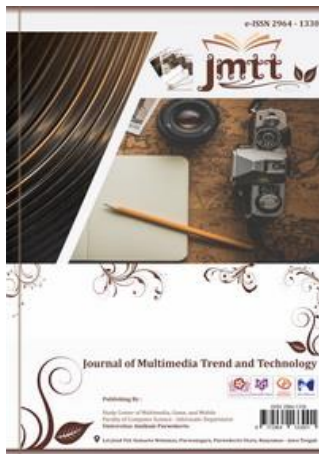
Implementation of Augmented Reality in Learning to Know the Android-Based Solar System

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ABSTRACT

The current learning media is very varied. The current social era requires students to really learn independently, including determining their learning patterns for future goals. According to the survey, currently there are many students who are still unable to determine and make decisions about selecting further studies at tertiary institutions or jobs that are in accordance with their identity. Even though it is very important that teenagers are fertilized from the age of 13 to find out their interests. This application aims to determine youth interest in work with the website-based Rothwell Miller Inventory Blank method. RMIB (*Rothwell Miller Inventory Blank*) is a tool for measuring a person's interest based on a person's attitude towards a job with the development method, namely the waterfall which goes through several stages including system analysis, design, coding, testing and maintenance. This application will rank 9 table indicators, namely from A-I and each table contains 12 job categories which will be sorted from the smallest number as the preferred job while the largest number is for the disliked job. In this study, the user conducts a test to determine interest in work according to his wishes, with one of the work outputs being mechanical.

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INTRODUCTION

As technology is currently developing very rapidly, almost all people use technology, for example the use of smartphones and other electronic devices that are used to facilitate daily activities[1][2]. A research suggests that the development of this technology can spur a new way of life in everyday life known as e-life, where life has been influenced by electronic needs. One of the latest technologies is augmented reality. Augmented reality or AR is a technology that combines 2D or 3D unreal or virtual objects into a real environment to be projected in real time[3][4]. Another point of view says that the use of still images in textbooks makes students feel passive and unable to interact because media images cannot provide a reciprocal response, do not look real and are less attractive to students[5].

In addition to its function of projecting 2-dimensional and 3-dimensional shapes onto the real environment, augmented reality can also be used as a learning medium to make it easier for students in their learning period[6][7]. Augmented reality will provide an overview of the material from a subject studied by students, this will make it easier for students to understand a material because the material is clearly described using augmented reality technology[8][9]. The views of the researchers state that this technology is useful in improving the learning process because it has entertainment elements that can increase students' interest in understanding the material presented in 3 dimensions[10][2].

The development of Android technology is now increasing rapidly and various versions have been released since the pre-commercial release version in 2007-2008 with Android Alpha and Android Beta versions[11][10]. Then it was further developed to the latest version, namely Android 12 Snow Cone, maybe this version is not the final version of Android, maybe there will be a newer version in the future[12]. Android is a Linux-based mobile device operating system that includes an operating system, middleware and applications[13].

Augmented Reality is a combination of the virtual world and the real world in 2 dimensions and 3 dimensions then projected into a real environment in real time[14]. Augmented Reality has three principles, namely[11][15]:

- a. Augmented Reality is a combination of the virtual world and the real world in real time.
- b. Augmented Reality runs interactively in real time or realtime.
- c. Has integration between 3-dimensional objects, namely virtual objects that are integrated in the real world.

Learning media is a communication channel, media that comes from the word "medium" which means "intermediary", namely an intermediary between the source of the message and the recipient of the message and Heinich gave examples such as films, television, diagrams, computers, and instructors. In this study, the authors will develop an augmented reality application as a learning medium for 7th grade students in natural science subjects in the solar system chapter.

Based on interviews conducted with one of the teachers at SMP Negeri 6 Purwokerto, there are various problems in teaching and learning classes such as students feeling bored and the most serious problem is the low level of student interest in participating in learning, especially in grade 7. This can happen because the learning that is carried out is a teaching and learning class as usual which only delivers material to students and then makes students work on assignments to fill in student assignment scores, therefore students can feel boredom, boredom when studying. Students need something that attracts their attention more while studying so that they can study well and improve the quality of student learning during teaching and learning classes.

In this case, according to the informants who provided information and based on the data that had been collected, grade 7 students had scores below the Minimum

Completeness Criteria, especially in natural sciences subjects, students had difficulty understanding the material that makes learning quality students decreased. The following is the value data for grade 7 students taken from 3 different classes in natural science subjects:

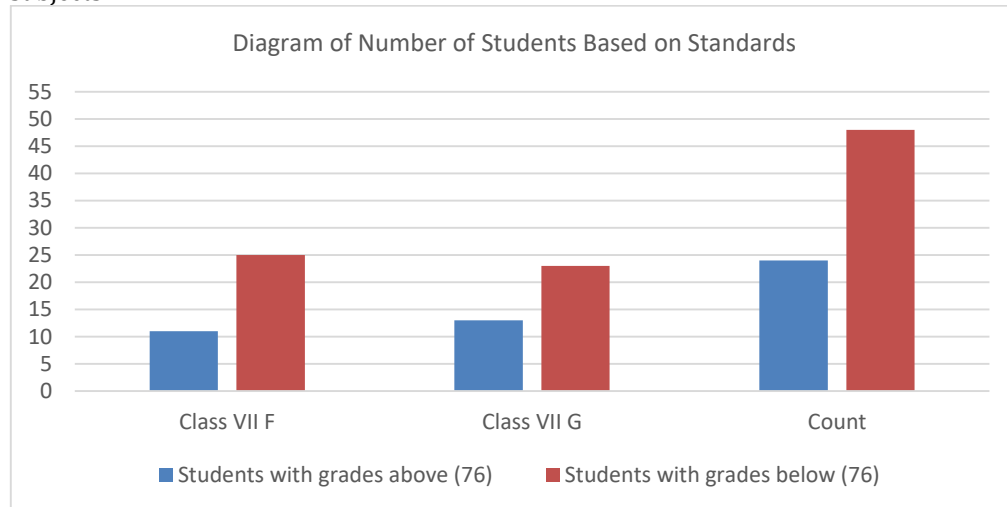


Figure 1, Diagram of the number of students based on standard grades.

Based on the bar chart above, out of 2 classes consisting of 72 students, only 24 students scored above standard, while 48 other students had scores below standard. Class VII F students have 25 students whose grades are below standard, 11 students whose grades are above standard and Class VII G students have 23 students whose grades are below standard, 13 students whose grades are above standard.

The reason the author chose grade 7 and natural science subjects in the solar system chapter was because grade 7 students were a transitional period from elementary to junior high where students were still unfamiliar with learning in the junior high school environment, the author chose natural science subjects because of the data that had been collected through interviews with the 7th grade homeroom teacher, natural science subjects had low scores compared to other subjects and had a low average score from the entire 7th grade and the selection of solar system material was due to adjusting the material being studied at that time so that it would more effective and does not interfere with learning activities. Therefore the author wants to make an application using augmented reality technology. The application contains elements of education in natural science subjects regarding the solar system for grade 7 students at SMP Negeri 6 Purwokerto, the application will represent material in a more tangible form. In this application there is material about the solar system which consists of the sun, solar system planets, asteroids, solar eclipses, and lunar eclipses. It is hoped that this application can help students learn the solar system.

METHOD

Research is an activity or process to solve problems that are carried out by applying the scientific method. To solve this problem, the writer uses a plot that is generally used a lot. The author calls it the agile framework. Why? because after this is resolved it is likely to be developed for many more versions. In order to complete a study, a research concept was created which is described in the following framework:

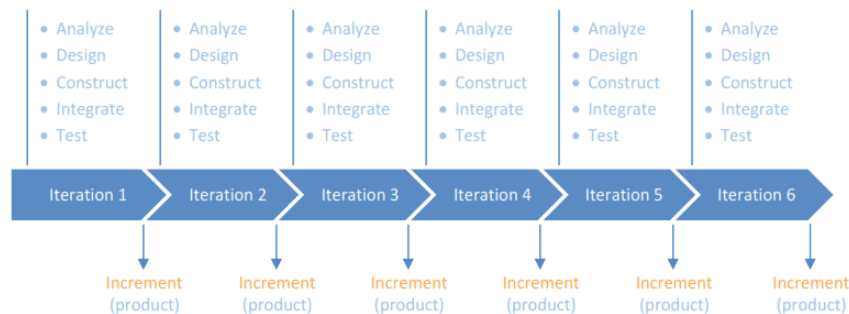


Figure 2, Agile framework for solving problems.

The first is the author determines the method used in collecting the necessary data and to obtain valid and factual information. Data collection methods used in this research are observation, interviews, documentation, and literature study. After the data is obtained, then for software development used is the Multimedia Development Life Cycle (MDLC) method.

The final stage is to store the software in an Android in *.apk format. The final distribution will be via Google Drive which can be accessed by teachers and students at SMP Negeri 6 Purwokerto.

RESULT & DISCUSSION

In this study, using the Multimedia Development Life Cycle (MDLC) system development method. The stages of developing the MDLC system are as follows:

1. Concept.

The author starts by making a Storyboard, after it is formed then creates a flow or application navigation structure so that the design is easier and more organized. Here is the navigation structure in flowchart form:

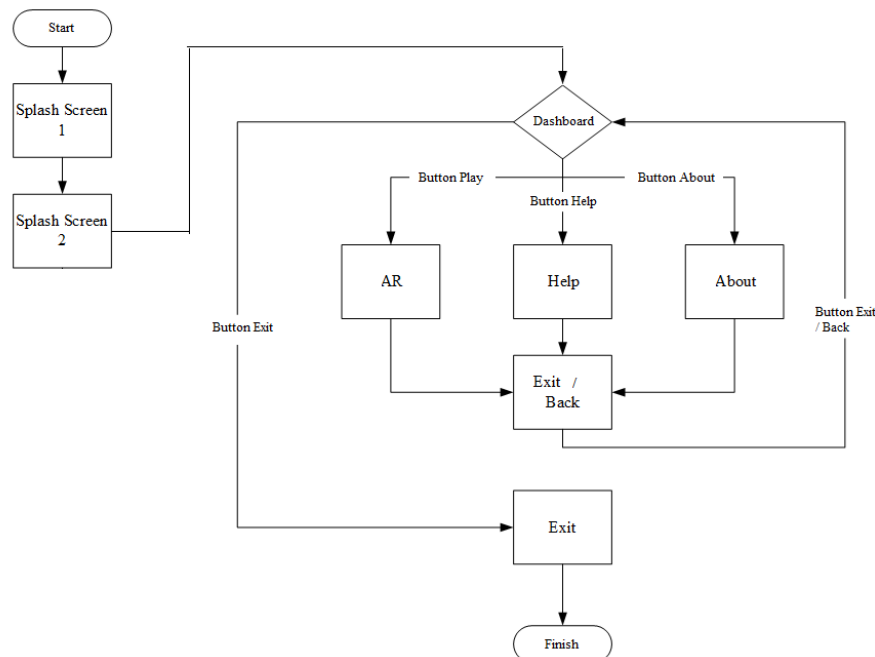


Figure 3, Concept completion process.

2. Design.

In addition to the storyboard and application navigation structure, this design stage includes a wireframe or application display design. The following is the application display design designed at this writing:

3. Material Collecting.

At this stage, material or materials are collected in making Augmented Reality applications such as images, 3-dimensional objects, and others. The following is a table of collection of materials as follows:

Table 1, Material Collecting.

#	File	Format Berkas	Description
1	<i>Background Image</i>	.JPEG / .JPG / .PNG	Image photo
2	App Title		
3	Sun Texture Material Image		
4	Solar System Planets Material Texture Image		
5	Moon Texture Material Image		
6	Image of Material Texture Asteroids		
7	The pictures are in the package book		
8	3D object of the Sun with an exposed core	.BLEND & .FBX	Objek 3D on Blender
9	3 Dimensional Objects of the Sun, Moon and Solar System		
10	Asteroid 3D Object	.BLEND & .FBX	Objek 3D on Blender
11	Plain 3D Objects		
12	<i>Background Music Space</i>	.MP3	Musik

4. Assembly.

At this stage all objects or materials will be created. In making an application, making refers to the design stage which consists of a storyboard and a wireframe or display design. Before creating an application, first create a 3-dimensional object that will be used and displayed as Augmented Reality. The 3-dimensional objects created are the planets in the solar system, the sun, the moon, and asteroids. Making 3-dimensional objects using Blender software.

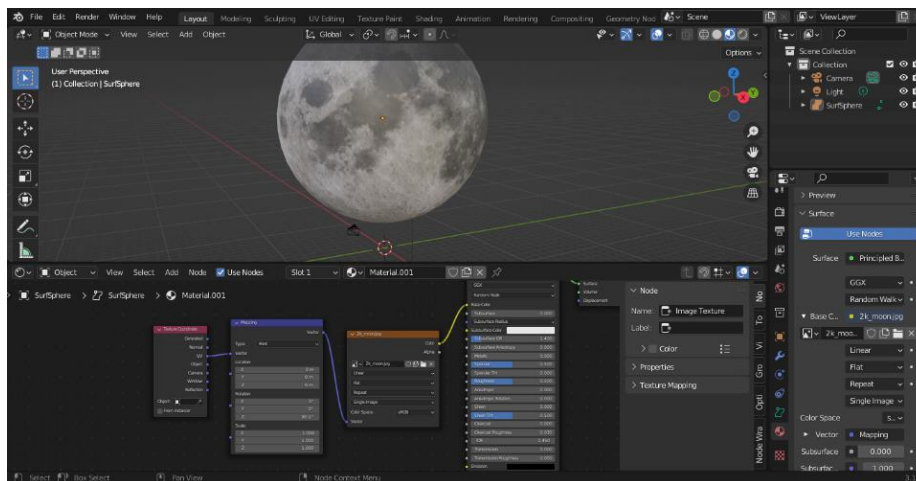


Figure 4, 3D asset modelling,



Figure 5, Scene modelling.

5. Testing.

From the results of the score calculation above, get a total of 173 "Yes" answers and 2 "No" answers. Then to find out how the attitude of respondents to the Augmented Reality application is by calculating the total score of each question, with notes P1 as question 1 and so on, then calculate the total score of all the questions and calculate the average score with a formula:

Average = total score/total questions

Average Average = 173/5 = 34.6

With description:

- *Total score = total "Yes" answers to all questions.*

- *Total questions = total questions on the questionnaire.*

Then determine the percentage form with the formula:

Percentage = average score / number of respondents x 100%

Percentage = 34.6 / 35 = 0.98

Percentage = 0.98 x 100%

Percentage = 98%

From the calculation of the percentage score that has been done above, it has a percentage score of 98% so it can be categorized as Very Good because it is in the score interval of 81% - 100%. So it can be concluded that the attitude of the respondents towards the Augmented Reality application is very good so that it is feasible to apply it to SMP Negeri 6 Purwokerto.

CONCLUTIONS

At the end of this thesis, the author will present two conclusions that were obtained from the results of the discussion described in the previous chapter, namely as First, successfully made an Augmented Reality application as a learning medium for science subjects for class VII students at SMP Negeri 6 Purwokerto. The application has been successfully designed and tested so that it is ready to be used and applied to science learning at SMP Negeri 6 Purwokerto. Second is this application can be said to be very good because it has passed the alpha test and beta test in accordance with the previously designed research concept and was tested on 35 class VII students at SMP Negeri 6 Purwokerto and got a percentage result of 98% which gets a score interval that is very Well.

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