

# Model Augmented Reality to Enhance Thinking Skills and Self Motivated Learning

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**Abstract**—The urgency of this study is to the creation of a learning model based Augmented Reality (AR) through a scientific approach. The learning model is expected to assist teachers in implementing the learning through the scientific method. Augmented Reality through a scientific approach that can combine virtual objects, and two-dimensional, or three-dimensional into a real three-dimensional environment. The matter of learning as a projection of real time in the virtual objects. Learning a phenomenon that should be visualized; with the learning model based Augmented Reality (AR). The model can solve the difficulty of conventional learning media regarding with time, space, and cost. The learning model based Augmented Reality (AR) can enhance the capabilities of thinking skills and self-motivated student learning.

**Index Terms**—augmented reality, thinking skills, self-motivated learning.

## I. INTRODUCTION

Instructional media consists of various types. Some universities used media print as instructional media. The using of media because they are practical, can adjust based on the ability of students, and quickly distributed, but the media has limitations that conceal the concrete objects such as sound, moving images, as well as three-dimensional objects [1]. Media utilization is expected to motivate the improvement of the quality of learning and teaching materials [2], the quality of the activity and independence of learners and educators with communication between learners and among learners [3]. Moreover, learning to use the three-dimensional object is learning that utilizes smartphone technology support.

In recent years, the development of learning media utilizes information technology supported by internet network. With these techniques, the learning media can contain interactive images both with two dimensions and three dimensions. Augmented reality is a technology that can illustrate real objects in the form of animation that can be accessed with a simple communication tool. The advantage of augmented reality technology is able to attract students' learning interest because students seem to be able to be physically involved in the environment.

Currently, the smartphone has been widely accepted by the people of Indonesia, as evidenced by the number of smartphone users ranging from teenagers to adults. Augmented Reality as technologies on the smartphone can support the learning process. Augmented Reality is a technology that combines 2D or 3D virtual objects into the real environment [4], [5]. Based on the problems mentioned above, it is necessary to research the effectiveness of the use of media-based learning courses Augmented Reality. Thinking skill is a cognitive process that manifests in many steps and is a guideline for structural thinking. These skills are built through a combination of information received by students as well as sequentially. Thus, learning media should be able to guide students in developing their skills. Self-motivated learning is the ability of students in developing their motivation to understand the learning content. With the motivation they have, the students can explore their potential. Self-motivated learning is part of emotional excretion.

This study aims to determine the effectiveness of media-based learning Augmented Reality. The benefits expected from the results of this study include: (1) For Students can provide supplies of experience in applying knowledge gained in a research paper. (2) For the University of Makassar can be used as input for the university through the use of Augmented Reality-based learning media in the learning process.

## II. MATERIAL AND METHOD

This study is a research & development (R&D) model. Software development such as learning model that combines the real world and the virtual world, using virtual reality was conducted by engineering approach where the stages are: analysis, design, implementation, and evaluation. Once generated a Learning Model-based Augmented Reality with Scientific Approach, the study continued to conduct tests on the products developed. The study design used in this study was pre-experimental design, with the form of one-group pretest-Posttest. The prospective study is a research and development in education (educational research and development) adoption of Borg & Gall model [6]. By the understanding that this research aims to produce products. The next development of Augmented Reality device used in research is as stated by [7]–[9]. AR design consists of 1) camera, 2) acquisition, 3) Tracking, 4) rendering, and 5) virtual components; 6) Augmented image, and 7) display.

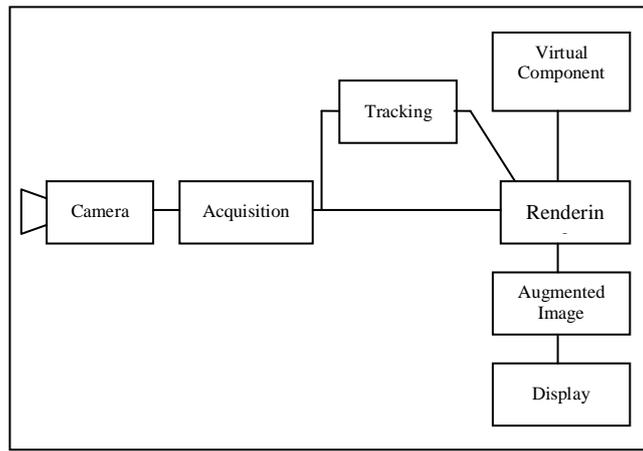


Fig. 1. Design of Augmented Reality

The data were obtained using several instruments. The data collection technique using a test sheet provided to students. Data from the pretest and posttest of the experimental class were taken using a test instrument that contains some indicators set in the form of multiple choice questions which constitute the entire scope of competence to be achieved in the learning materials.

Data analysis technique used is descriptive statistical analysis and inferential data analysis. Descriptive statistical techniques aim to manage and describe the hardinformation in the form of data more meaningful and easily understood by others. Meanwhile, inferential statistical techniques used for hypothesis testing and sample data to generalize to the population.

**III. RESULT AND DISCUSSION**

The procedure of research and development models Gall et al. (1996) consists of two main objectives, namely: (1) develop products, (2) to test the effectiveness of the product to achieve goals. The first goal leads to the development of a product and the second aim is to result in validation. Through the adaptation of models of research then obtained a development model that is used in research and development is shown in Figure 2.

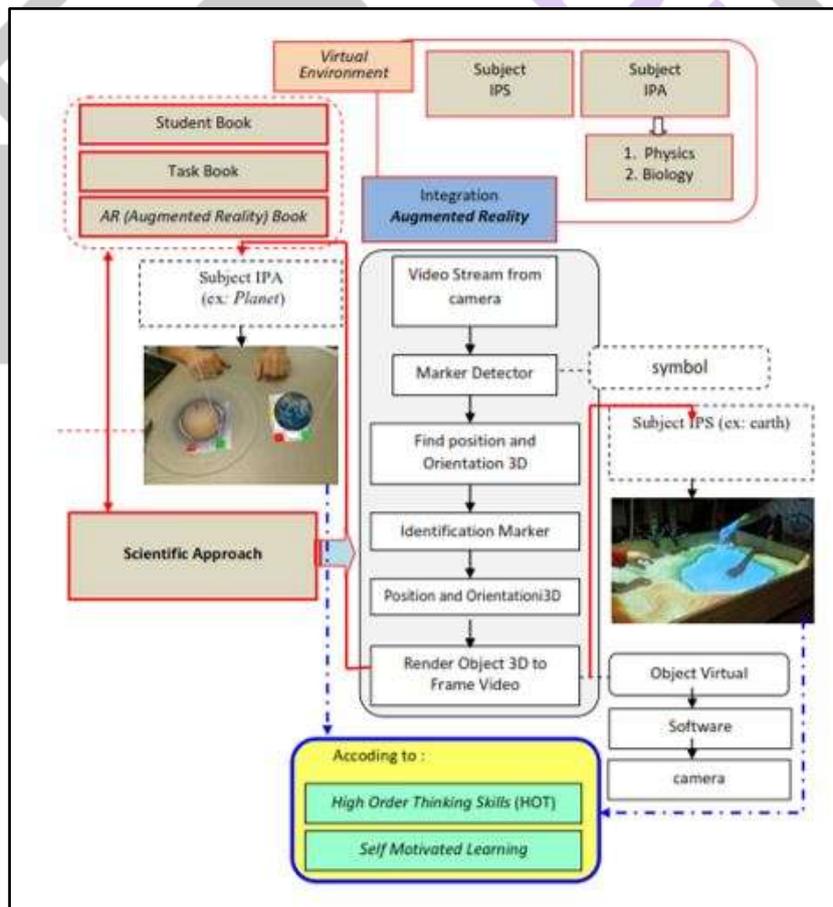


Fig. 2. Model augmented reality to improve the thinking skills and self-motivated learning

The implementation of the study is to examine differences in student learning outcomes before using Augmented Reality Software with student learning outcomes after using Augmented Reality Software. Differences in the average value of learning outcomes in pre-test and post-test can be seen in Table 1.

Table 1. Average Value of Student Learning Outcomes

Action	Average value
Pre-Test (before treatment)	55.65
Post-test (after treatment)	80.43

Based on Table 1, the difference in the average value of student learning outcomes can be seen in Figure 3.

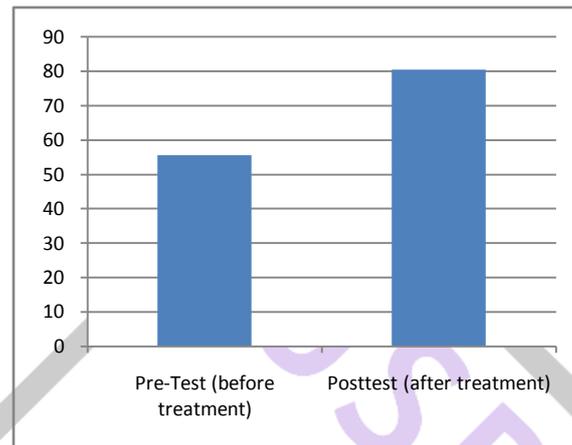


Fig. 3. Average value of student learning outcomes

Before actual testing is taken in this study, the ability of students measured beginning with the provision of pre-test to obtain an average value of 55.65. Researchers provide pre-test to the students to determine the level of student understanding before learning applied using Augmented Reality Software in the learning process. After action by applying the learning to use Augmented Reality Software in the learning process, an increase in the average value on a posttest at 80.43. Figure 3 indicated that an increase in the mean value of student learning outcomes after learning using Augmented Reality Software is applied in the learning process.

Implementation of the strategy applied learning a learner is one of the factors that determine student achievement of learning outcomes. Due to the use of teaching strategies, by the material presented will affect the interests and activities of students in university classes that will ultimately affect the study results. Learning media strongly supports the research results have been obtained. The strategy used in practising a particular skill or procedure in the material.

Improved student learning outcomes have reached standards assessment guidelines  $\geq 61$ . It can be seen from the results of student learning in Department of Education Electronic Engineering force in 2014 which showed that the average value obtained from the pre-test is 55.65 with the number of students that fail as many as 18 people or 78.3%, and the number who pass as many as five people or 21.7%. Later in the post-test learning outcomes Students, the average value reached 100% by the number of students who graduate as many as 23 people. The outcome leaning shows an increase in student learning outcomes after the use of Augmented Reality Software

The analysis is then performed on the value pre-test and post-test to test normality data. Based on the analysis concluded that the data came from a normally distributed population because the data came from a normally distributed population, the test to support the results of descriptive analysis and prove the hypothesis. Based on the results of inferential analysis using different test average (Yuji- t) Paired Samples Test post-test known that the value  $t_{count} > t_{table}$  ( $10.376 > 2.073$ ) and significance of ( $0.000 < 0.05$ ). Then  $H_1$  accepted, and  $H_0$  rejected. There are significant differences in the use of Augmented Reality Software. In other words the use of Augmented Reality Software effective or no increase student learning outcomes.

## Discussion

AugmentedRealityModel has advantages compared to conventional media that is increasing student activity in seeking information. Learning media that are readily available by students will maintain the spirit of learning and improve motivation to learn. This is the reason the ability of the augmented reality model can improve self-motivated learning. Student thinking skills develop with the augmented reality model because the learning media makes it easier for students to develop their creativity. This media encourages students to practice repeatedly in structured mindset in a structured way. This learning model provides freedom of creativity and encourages participation in learning.

#### IV. CONCLUSION

Augmented Reality through a scientific approach that can combine virtual objects and two-dimensional or three-dimensional into a real three-dimensional environment. The matter of learning, as a projection of real time in the virtual objects. Learning a phenomenon that should be visualized; with the learning model based Augmented Reality (AR). The model can solve the difficulty of conventional learning media regarding with time, space, and cost. The learning model based Augmented Reality (AR) can enhance the capabilities of high order thinking skills and self-motivated student learning.

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