

Fun physics learning using augmented reality

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Fun Physics Learning Using Augmented Reality

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Abstract. Physics learning media is currently starting to increase according to the trends. Android-based learning applications are currently starting to develop towards augmented reality (AR) technology. This study aims to develop a product in FULAN (Fun Physics Learning Using Augmented Reality) learning media as a learning medium on magnetic electricity material. This type of research is development research. The subjects involved in this study were a learning media expert and physics education expert, and physics teacher candidate students at Sultan Ageng Tirtayasa University. The data processed in this study were collected through expert validation sheet and student response questionnaires with a Likert scale. The collected data were analyzed descriptively. The model used in this study is the ADDIE model, which consists of five stages, namely assessment analysis, design, development, implementation, and evaluation. The results of this study are: the learning media made obtained a score of 81% from instructional media experts, 85% from physics education experts, and 88% from student responses. FULAN learning media using Augmented Reality technology as a creative, innovative teaching aid can increase student enthusiasm in studying magnetic electricity material. Based on these results, it can be concluded that the FULAN learning media is suitable for use in learning physics.

INTRODUCTION

Educational technology in the teaching and learning process has changed how students adopt learning well, from the model curriculum to technology-based learning media [1]. Teaching and communication technologies are always developing in accordance with the development of information technologies and the needs of students in obtaining information [2]. In addition, along with the widespread use of Android among teachers and students, teaching technology has also evolved towards Android, which means that students can learn in and outside the classroom [3].

Android-based learning apps are beginning to evolve towards augmented reality (AR) technology [4]. Augmented reality is an application that combines the real world with the virtual world, both two-dimensional and three-dimensional, projected simultaneously into the natural environment [5]. The combination of these technologies provides real-time integration. content on a computer with a live image on video [6].

Augmented Reality technology development is applied to education and developed in clinical care [7]–[9]. The results show that with Augmented Reality technology, doctors are assisted in carrying out operations [10]. Augmented-Reality technological innovation forms a brand new setting wherever physical and virtual objects are integrated at totally different levels [11]. Augmented reality can also be used in the welding industry, like education and training [12]. The results show that participants who participate in the activity can practice welding techniques first through Augmented Reality technology [13]. Augmented reality is a teaching aid that can be used during the learning process [14].

The results show that Augmented Reality as a teaching aid can help students understand the concepts being taught [15]. Other results indicate to college students that digital literacy can be improved through Augmented Reality [16]. On the other hand, learning the science of outer space can be better understood using Augmented Reality technology. The results show that the earth and moon's circulatory system look natural as if we were in the area [17].

AR within the mastering procedure is an attempt made to correlate mastering with presently growing generation [18]. One instance of the usage of AR generation in schooling is AR to observe frame anatomy [15]. Students can analyze human organs via AR-primarily based totally applications, for instance, the human cranium in a third-dimensional shape genuinely and have interaction with those digital objects [19]. Furthermore, via way of means of the usage of AR, college students can analyze visually and interactively approximately earth and area and specific existence beneath the sea [20].

Augmented truth may be an opportunity mastering medium in better schooling. This augmented truth assist device makes use of a cellular phone or android and its application. In addition, a laptop and software program are had to put together an outside product within the shape of an augmented truth card this is used as a mastering medium. Using AR as an opportunity mastering media, it's far far hoping that mastering sports may be extra appealing to college students. Another advantage received is a extra superior mastering media via way of means of taking gain of contemporary technological developments. It may be an answer for doing practicum via AR, however within the digital shape [21].

METHOD

This research method uses a development model consisting of Analysis, Design, Development, Implementation, and Evaluation (ADDIE) [22]. This research was conducted on student physics teacher candidates at Sultan Ageng Tirtayasa University, Banten province, Indonesia. In connection with the covid-19 pandemic and the implementation of social distance, the subjects of this study were limited to only 20 students aged 20 years, consisting of 10 male students and ten female students. The research method used in this study can be seen in Fig. 1 below.

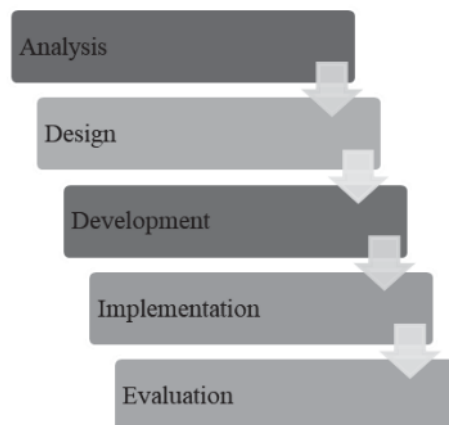


FIGURE 1. Research methods [23]

RESULT AND DISCUSSION

Analysis

The development of this learning media is carried out by researchers starting with an assessment analysis. The first is to conduct curriculum analysis, namely by direct observation in the field to find out the application of the curriculum applied in learning. Furthermore, analyzing the need to find out the problems that occur, both for lecturers and students. The analysis was carried out to find out the situation to provide solutions to the issues of lecturers and students in classroom learning. The requirement is learning media with a small size and lightweight so that it is easy

to carry and does not make it difficult to store and can be reproduced easily. In addition, students must also use technology commonly used so that students are familiar with its use.

Design

Furthermore, at this stage, namely designing a prototype of FULAN learning media, the following results from the FULAN prototype that have been developed can be seen in Fig. 2 below.



FIGURE 2. FULAN learning media

Development

At this stage of development, the learning media made were validated by physics learning media experts. Experts who validate are experts who have at least five [28](#) years of experience in their field. This learning media was tested by five physics learning media experts. Following [the validation results can be seen in Fig. 3](#) below.

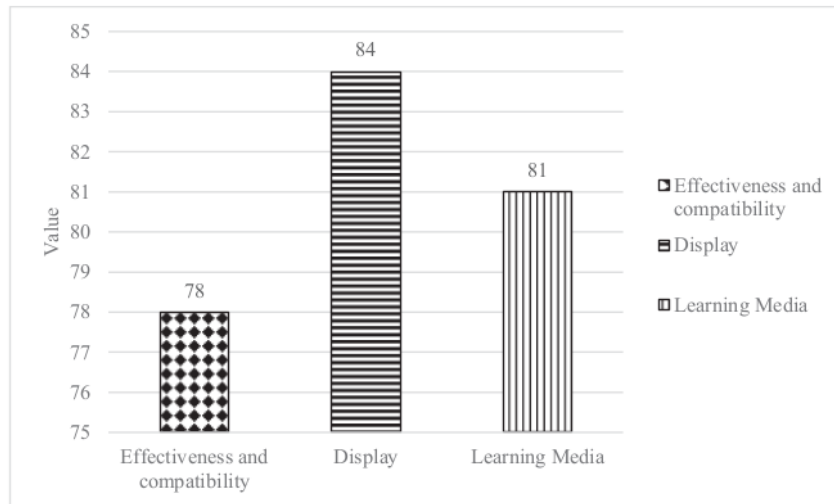


FIGURE 3. Physics learning media experts validation

Based on Fig. 3, it can be said that the FULAN learning media shows an average result of 81. This means that the FULAN media developed is very feasible to be used as a media for learning physics.

Implementation

Furthermore, implementation is carried out to material experts. This stage is carried out to measure the material used in the physics learning process, especially the magnetic electricity material.

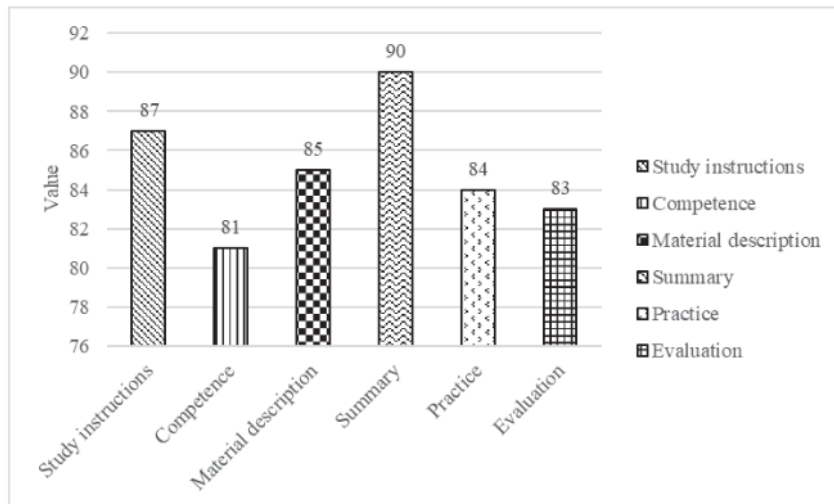


FIGURE 4. Physics material expert validation

Based on Fig. 4, it can be said that the FULAN learning material shows an average result of 85. This means that the FULAN learning material developed is very suitable for use in learning physics.

Evaluation

Furthermore, at the evaluation stage, test students' responses to the use of FULAN media. The following results of student responses to FULAN media can be seen in Fig. 5 below.

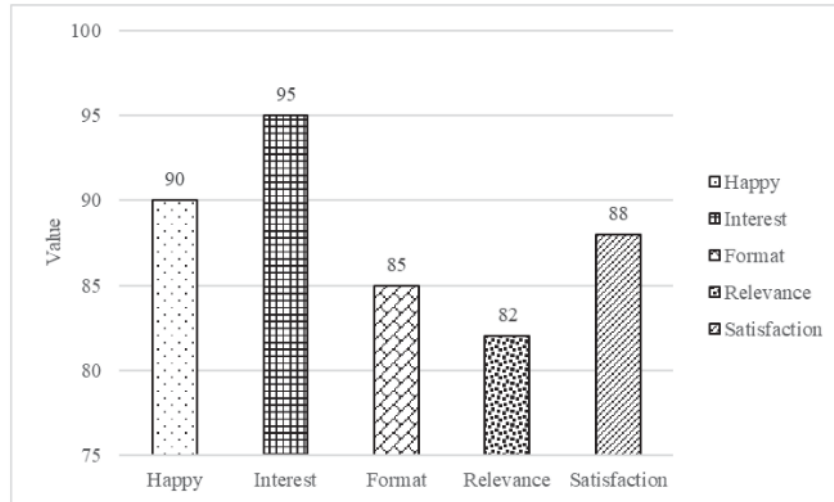


FIGURE 5. Results of student responses

Based on Fig. 5, the results of the student response test get an average value of 88 so that it is included in the feasible category to use, and students are interested in using this FULAN learning media in learning activities. Overall, based on the validity test of instructional media experts, the results of the material validity test, and student responses. It can be said that the FULAN learning media is suitable for use in physics learning activities. The use of FULAN learning media is beneficial in the learning process and students' interest in learning. Because in the FULAN media, there are aspects that can increase students' interest in education and playing and projecting it in absolute terms and involving the interaction of all five senses of students using the FULAN media. This is because the FULAN media has characteristics and functions that are almost the same as the learning media, which functions to convey information between educators and students, clarify the delivery of information provided by educators and students in the learning process, and stimulate motivation and interest in learning.

Learning media are something that may be used to transmit messages from educators to college students to stimulate thoughts, feelings, attention, and hobby in learning [24]. Learning media can be interpreted as a tool that functions and helps channel learning messages [25]. Learning media as a device and fabric with inside the studying process [26]. Learning media is whatever which could direct messages from reassets in a deliberate way as an attempt to create an powerful and green studying process [27]. Thus, the learning environment mediates between teacher and student in learning process, capable of communicating, providing information, and delivering and transmitting messages to create an effective and efficient learning process. Furthermore, Augmented Reality also can be used on physics experiment [28].

CONCLUSION

The conclusion from the above discussion is that learning physics using augmented reality (FULAN) media can make students interested, attention, and desire to learn the material. FULAN learning media using Augmented Reality technology as a creative, innovative teaching aid can increase student enthusiasm in studying magnetic electricity material.

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