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DEVELOPMENT OF LEARNING MEDIA BASED ON AUGMENTED REALITY ON MATERIALS OF CHANGING CONDITIONS OF THE EARTH

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ABSTRACT

Technology-based learning media is an innovation in the current learning process. The aim of this research is to produce the development of augmented reality-based media in Phase C science learning, especially regarding changes in earth conditions. The media must meet valid criteria, be very practical and effective. The method used in this development is Research and Development (R&D) with the ADDIE development model which consists of the following steps: Analysis, Design, Development, Implementation, Evaluations. The data collection techniques are used validation of media, materials, language, teacher response questionnaires and test questions. The data analysis technique uses quantitative descriptive analysis. The results of the research show that the development of augmented reality-based learning media on material on changes in earth conditions which was developed based on material validators, media validators, language validators to analyze the level of validity obtained a score of 92.86% with very valid criteria, the teacher response questionnaire validator for the field of practicality got a score 92.5% with very practical criteria and the evaluation question validator which aims to see the level of effectiveness obtained a score of 80.7% with effective criteria. So the development of augmented reality-based learning media in Phase C science and science learning on changes in earth conditions is very valid, very practical and effectively used as a medium in the learning process.

Keywords: *Learning media, augmented reality, science and technology, Changing Conditions of the Earth.*

INTRODUCTION

Learning is an activity that involves a lot of harmony between student activities and teacher activities to achieve learning goals (Reni, 2019). Learning in the classroom really supports the process of success in the classroom, the learning process in can be influenced by several important components, namely teaching materials, learning conditions or circumstances, media, resources, learning and finally the teacher as the learning subject. These components are very important during the learning process in the classroom. Based on this statement, one of the important components is the use of learning media. Learning media is very important in the learning process because with learning media the atmosphere in the classroom becomes more enjoyable and students can easily understand the material presented by the teacher.

Learning media are intermediaries or tools during the learning process, so that the atmosphere in the classroom becomes more active and not passive. According to Cikka (2019), in order to achieve learning success, there are several factors used by teachers in the teaching and learning process, namely objectives, material presented, learning techniques, approaches used, and learning media used in explaining the material. Another opinion was also expressed by Arda, Saehana, and Diarsikin (2015) that media can be defined as something that can be used to convey messages and can stimulate students' thoughts and feelings so that motivation to learn arises. One of the learning media that is currently being developed and is currently hot is augmented reality.

Augmented reality has provided a new space for learning media that can be used in learning both in the classroom and in various ways. According to Wardani (2016) augmented reality is a technology that combines virtual objects into a three-dimensional real environment and displays them in real time. Augmented reality is a learning medium that can be used in the learning process, both in three-dimensional and two-dimensional form. In the current era of globalization, we must use adaptive learning media for students so that they can easily understand the problems or lessons explained by their teachers while in class. Augmented reality in real life will help a teacher and this media is a tool to help a teacher in learning. According to Surdayanto (2018) that augmented reality can produce additional information so that students can see the simulations created and improve the quality of their learning process.

In the scope of classroom learning, everything is based on learning and learning theories. So that what the teacher conveys to students can be easily understood regarding the learning. One of the learning theories underlying augmented reality is situated learning theory. Situated learning theory illustrates that the best learning is when students are brought into a context that is related to their learning activities. In this statement, according to Dunleavy & Dede (2014:735) in Prasetyo 2018, situated learning theory

argues that all learning activities in a specific context and the quality of learning is the result of the interaction of people, places, objects, processes and culture in a particular context.

Based on the results of observations that have been made, learning media that uses augmented reality is something new for educators in schools. This augmented reality-based learning media is an interactive media that can improve the quality of the learning process to make it more effective. Therefore, researchers are interested in developing augmented reality-based learning media so that learning is more varied and fun for students. Wibisono (2011) revealed that in terms of its use, augmented reality is able to strengthen understanding in the teaching and learning process, this is because this technology is able to provide entertainment aspects that can arouse students' interest in learning.

METHODS

The research method used is the Research and Development (R&D) method which aims to develop a new product and then test the level of validity, effectiveness and practicality of the learning media product. This research uses data collection techniques in the form of expert validation sheets, teacher response questionnaires and test questions. The development model in this research uses the ADDIE model. The ADDIE development model consists of 5 stages, namely, Analysis, Design, Development, Implementation, Evaluation because this development model is more rational and more complete than other models according to the steps product development. The stages carried out are firstly analyzing the problem through analyzing the needs of students and teachers regarding augmented reality-based learning media.

The second stage is planning the media design that will be created. At this stage, researchers are designing the creation of augmented reality-based media that will be adapted to materials that change earth conditions. The third stage is development, namely testing product validation and assessment by experts who have expertise related to augmented reality-based learning media. This validation and assessment includes aspects of the validity of the media, material and language used in the learning media. The fourth stage is implementation through a teacher response questionnaire to see the practicality of the media and also to find out the effectiveness of using augmented reality media in learning science and technology regarding changes in earth conditions. The effectiveness of using augmented reality-based learning media will be seen based on the test results given to students as a whole. After getting the results obtained, the percentage will be interpreted to see the effectiveness of the media.

The final stage is the evaluation stage which is a process to see whether the product that has been developed meets expectations or not. Based

on the final evaluation, augmented reality-based learning media will be able to determine its level of suitability as a learning media that can be used in the classroom learning process.

RESULTS AND DISCUSSION

This research uses the Research and Development (R&D) type of development, namely by developing products that are developed in the form of augmented reality-based learning media. The development model used is the ADDIE model, which consists of five stages, namely: analysis stage, design stage, development stage, implementation stage and evaluation stage. The research results obtained at each stage are as follows.

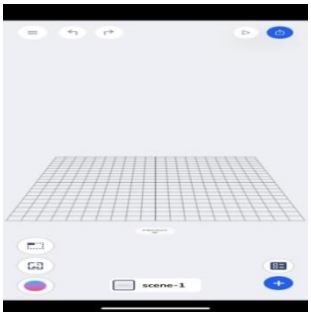
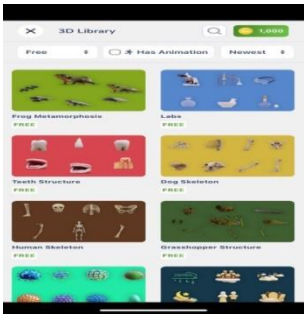
1. Analysis

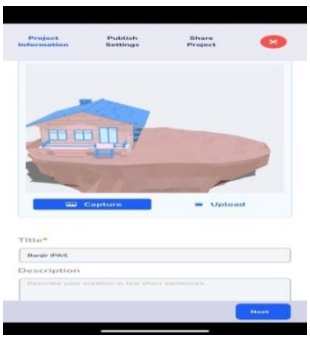
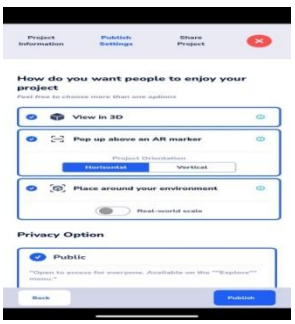
Based on the results of the needs analysis, information was obtained that both teachers and students had never used augmented reality-based learning media as a medium in the classroom learning process. This augmented reality-based learning media is something new. Students are very enthusiastic about the use of learning media based on augmented reality. Their motivation to learn increases and it is easier for them to understand learning material when using augmented reality-based learning media.

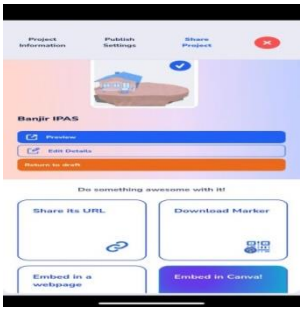
2. Design

The second stage is the design or planning stage. Researchers are trying to develop learning media products which are still in prototype form. This design process adapts to the material contained in the textbook for fifth grade students, specifically in Phase C, namely material on changes in the condition of the earth. The steps in designing augmented reality-based learning media are as follows.

Table 1. Sequence of Learning Media Design

1. Create panels 	2. Open the library 

3. Images that have been selected in the library 	4. Select the text menu 
5. Type text in add text 	6. Then text will appear on the image 
7. Once complete and appropriate, proceed to project information 	8. Once you have finished filling in the title and description, go to public settings 

9. After selecting all the ticks turn blue then proceed to share project 	10. Then select download maker 

At this design stage the researcher created a simple prototype in the form of augmented reality-based learning media. This design process is carried out by adjusting the material content, use of language and appearance of the prototype which is designed using graphic design and selecting appropriate colors. The process of making and perfecting this prototype will then be carried out at the next stage, namely the development stage.

3. Development

The third stage of the ADDIE model is the development stage. At this stage, the previously designed prototype will be validated by experts to determine its quality in terms of media, language and material aspects. After obtaining a validity assessment, augmented reality media is used in learning natural and social sciences, specifically regarding changes in the condition of the earth.

This validation is carried out by directly inviting experts to assess and validate the prototype that has been made. The experts are asked to assess it and then determine the weaknesses and strengths of the prototype. The validation results from experts in the form of suggestions and comments used to revise augmented reality-based learning media can be seen in the table below.

Table 2. Expert Validation Results

Validity criteria	Measured indicators	Percentage (%)	Criteria
Material Aspects	Suitability of the material contained in the learning media with the student's competency level	90	Very valid
Language	Use correct language and	96,6	Very valid

Aspects	suitable with writing rules		
Media Aspect	Ease of understanding media use	92	Very valid

Based on the results of expert validation in the table data above, it can be seen that the results of the material field expert validation obtained a percentage reaching 90% with the criteria "Very Valid", the results of the language field expert validation obtained a percentage reaching 96.6% with the criteria "Very Valid", and the results of the media field expert validation obtained a percentage reaching 92% with the criteria "Very Valid". These results indicate that the assessment of the three validators shows good results on learning media products.

From the validation results, data was also obtained regarding suggestions and input provided by the validators that needed to be improved. This data is related to the appearance of the learning media and the substance of the learning media which contains material on changes in the condition of the earth. Based on these suggestions and input, researchers carry out revisions and improvements which will then proceed to the implementation stage of learning media products.

4. Implementation

At this stage, two activities are carried out, namely the use of the product by the teacher to see the level of practicality of the augmented reality-based learning media product by filling in a teacher response questionnaire. After obtaining data regarding the practicality of augmented reality-based learning media, this media will then be used by students in the learning process in class, which will later also measure the level of effectiveness by giving test questions to students after using this augmented reality-based learning media. The teachers and students used as samples at this stage came from SD Negeri 22 Banda Aceh, specifically in class VA. The results of the teacher's responses can be seen in the table below.

Table 3. Results of Teacher Responses Regarding Media Practicality

Indicator	Score
The use of augmented reality media as a whole is very interesting	4
Suitability of augmented reality media for learning	5
Augmented reality media presentation supports students in the learning process	5
Students think easily when answering questions	4
The media used plays a role in helping students answer questions	5
Augmented reality media provides an interesting learning style	5
Students enjoy learning using augmented reality media	5
Ease of use of augmented reality media	4

Amount	**37**
Percentage	**92,5%**
Criteria	**Very Practical**

Based on the data in the table above, the percentage results obtained reached 92.5%, so based on the practicality value criteria it can be concluded that the teacher's response states that augmented reality-based learning media is "very practical" to use in the science and science learning process regarding changes in earth conditions. This learning media can support teachers in the learning process and is practically used in classroom learning.

Next, the stage of using augmented reality-based learning media was carried out in the learning process regarding changes in earth conditions in class V-A of SD Negeri 22 Banda Aceh the next day. After the learning process takes place, students are given questions related to the material that has been taught using augmented reality-based learning media. This test aims to see the effectiveness of the learning media. The test results obtained showed that from the involvement of 26 students who attended, only 5 students had not yet reached the KKM score, while the other 21 students had reached the KKM score based on the results of the tests carried out. Overall, the percentage obtained reached 80.7%, so based on the criteria for the level of effectiveness of learning media, it can be concluded that augmented reality-based learning media is categorized as effective in increasing students' understanding of the science and science learning process regarding changes in earth conditions in class V-A of SD Negeri 22 Banda Aceh.

5. Evaluation

The final stage is the evaluation stage, at this stage a thorough evaluation is carried out at each stage that has been carried out so as to produce an augmented reality-based learning media product that is suitable for use. The purpose of this evaluation is to refine the product that has been developed. From each validator's response, suggestions are obtained for developing augmented reality media that can be used in the learning process. The evaluation results also concern data on student completion in the effectiveness section where there are still 5 students who have not completed the results after using augmented reality-based learning media products.

CONCLUSION

The conclusion of research on the development of augmented reality-based learning media for science and science learning, material on changes in earth conditions, proves that the learning media that has been developed has very valid criteria with a percentage of media experts of 92%, material experts

have a percentage of 90% with very valid criteria and language experts have very valid criteria valid with a percentage of 96.6%. Then the level of practicality of the media obtained through the teacher response questionnaire towards the augmented reality development media obtained a percentage of 92.5% with very practical criteria and the media was also effectively used in the science and science learning process on changes in earth conditions in class V-A of SD Negeri 22 Banda Aceh with completeness, overall as much as 80.7%. From the results of the research data described above, it is proven that augmented reality-based learning media is worthy of being used as a learning media.

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