The Development of an Augmented Reality (AR) Based-Learning Media in Introducing Asean Countries for Elementary Schools

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Abstract—**This research is motivated by the importance of developing learning media that is able to change learning more interesting, effective, and increase student activities in the learning era 4.0. This study aims to describe the stages of making AR-based learning media on ASEAN countries material, develop students' abilities in representing the characteristics of ASEAN countries, and analyze the feasibility of AR-based learning media. Research and development have produced products in the form of AR-based learning media on ASEAN countries' material. The stages of the research were carried out by analyzing the material development of ASEAN countries, design, validation, and testing of students individually and in groups. Validation and testing on students is done to get feedback in the form of recommendations for improvement and assessment of aspects of learning, the substance of the material, visual communication, and software engineering, as well as the feasibility of its use for the purpose of making products. In general, the percentage of content expert testing results was 80%, the percentage of media expert test results was 78.8%, the percentage of results in individual students was 85.9%, and the percentage of results in large group students was 86.2%. This shows that AR-based learning media on ASEAN countries' material is in good category so that it is appropriate to be used as a learning medium for students to get the ability to develop the characteristics of ASEAN countries.**

Keywords—augmented reality, learning media, ASEAN

I. INTRODUCTION

The use of the terms sources and learning media can be used interchangeably, because the two terms are often inseparable, there are times when something acts as a learning resource, but at other times it becomes a learning medium, it depends on the context of its use [1]. Learning media plays an important role in the teaching and learning process and is an integral part of the world of education that cannot be separated [2]. Media can be used for learning purposes both classically and individually. In classical learning, media becomes an integral part of the learning process itself. Therefore, the use of instructional media must receive attention from the teacher as a facilitator in teaching and learning activities.

Along with the rapid development of technology, there are many learning media that can be used by teachers as a means of education. One of them is how to use an android smartphone device. Currently, smartphones are considered a necessity or necessity in every line of life as if the world is in hand. Smartphone devices have brought many changes, convenience, and practicality in every activity, so that Android smartphones can be used as an effective, creative, and educational learning medium [3].

At the education stage in elementary schools, learning media is needed to facilitate teaching and learning activities. The learning media that is used must be able to attract students' attention in learning. The Social Science subject according to students is easy, but in fact many students do not complete social studies learning. This is because the social studies material is so memorized that students easily forget. When introducing ASEAN countries, basically students are only able to remember some of the material provided by the teacher, because the lack of reading experience or literacy is added because of the limited use of learning media used by the teacher. The ideal condition for learning will be meaningful if students get real experiences or are directly related to concrete conditions in accordance with the material, students are invited to act as learning subjects, and the learning process can be designed to be fun. Therefore, it is necessary to develop educational learning media in which there are three-dimensional (3D) objects. One of the media that can be developed is in the form of augmented reality (AR) based on android [4,5].

The purpose of this research is to produce learning media that can be used to support social studies learning activities in ASEAN countries. Besides, this study also aims to determine the effectiveness of the media developed in social studies learning. The expected benefits of learning media in the form of android-based augmented reality include fostering student motivation and learning activities.

II. METHODS

This research was adapted and modified from the ADDIE model adapted to the characteristics of students with 5 stages of research required in learning activities, namely: (1) Analysis; (2) Design; (3) Development; (4) Implementation; (5) Evaluation [6]. The research and development carried out is focused on making and testing the quality of augmented reality-based learning. The subjects of this research trial were expert trials (media and material), individual trials, small group trials, and large group trials. Where in the individual trial using 3 class VI students, the small group trial of 6 class VI students, while the large group trial of 20 class VI students. The type of data obtained was based on trials of AR learning media with ASEAN country material in the form of quantitative data and qualitative data. Quantitative data were obtained from questionnaires distributed to test subjects, while qualitative data were in the form of responses and suggestions for improvement obtained from interviews.

III. RESULTS AND DISCUSSION

The results of research on this development are in the form of learning media based on android-based augmented reality applications and a book used to place markers from augmented reality applications on class 6 ASEAN country materials.

The results of the development of android-based augmented reality learning media in ASEAN countries are presented in Figures 1-4.

Fig. 1. Main menu display.

Figure 1 contains the main menu in the application and has been developed. Each button has a different function. Media menus include sound settings menu, indicator menu, scan start menu and profile menu and log out menu. The marker used is presented in Figure 2.

Fig. 2. Marker display.

Figure 2 is a marker for displaying a 3D image where when the marker is wrong there will be no 3D image. When the marker matches the rules, a 3D image will appear along with a sound explaining the 3D image.

Fig. 3. Code for marker.

Figure 3 shows the link for online accessing by scanning a barcode to see how this learning medium works. Figure 4 shows the display when exiting the application.

Fig. 4. Exit menu display.

The resulting media has been validated by two social studies learning experts and tested either individually or in groups using a modified and developed assessment instrument [7]. The two experts have assessed the content of materials and learning media based on android-based augmented reality for social studies with the theme of ASEAN countries and have provided several notes for media improvement. The results of the validation of the two experts are presented in Table 1 below.

TABLE I. EXPERT VALIDATION RESULTS

Aspect	Validation Results (%)	
	Theory	*Media*
Relevance	80	80
Accuracy	78	78
Completeness	83	78
Presentation systematics	80	79
The suitability of the presentation with the demands of student-centered learning	80	77.5
Serving method	78	80
The suitability of the language with the rules of Indonesian is good and correct	80	78
Readability and communicativeness	81	80
Average	80	78.8

Based on Table 1, the results of the validation of the android based augmented reality learning media obtained an average of 80% material content and 78.8% media for the eight aspects assessed. The validation is in the good category with a note that it needs to be revised as necessary, namely "related to the material content, there is a need to practice questions that lead to HOTS questions, while for the media it needs to be given colors that are more attractive to students' attention". By practicing HOTS questions, it can encourage students to think creatively, while media with attractive colors can motivate students to continue learning. Input from these experts has been followed up by adding to the practice of HOTS questions in the resulting media.

According to the two experts, Android-based augmented reality learning media for social studies subjects with the theme of ASEAN countries are good to be used in supporting the learning process. With the results of this validation, the Android-based augmented reality learning media is suitable for use as social studies learning media [8,9]. The results of testing the use of android-based augmented reality learning media for social studies with the theme of ASEAN countries, either individually or in groups, are presented in Table 2 below.

TABLE II.   RESULTS OF LEARNING MEDIA TRIALS

Aspect	Test Results (%)	
	Individual	*Group*
Completeness of the material	85	86
Systematics of material presentation	85.5	85
How to present the material	86	85
The material is easy to understand	86	88
Readability and communicativeness	87	87
Average	85.9	86.2

Based on Table 2, the results of the trial using augmented reality learning media based on android obtained an average individual coca test of 85.9% and group coca test of 86.2% for five aspects assessed according to student characteristics. The results of the trials, either individually or in groups, were in the very good category. So it can be said that the resulting learning media is suitable for use in social studies learning to develop students' critical thinking [8–12].

To ensure that the application runs functionally, application tests have been carried out using the black box method. The application is tested with different android devices with different specifications to prove that the application can run properly. The purpose of the trial is the same as the previous trial, namely to determine the level of effectiveness, efficiency, and attractiveness of the development of augmented reality learning media products [13,14].

IV. CONCLUSION

The conclusion from the test results the developer realizes that the augmented reality learning media for the introduction of ASEAN countries can still be developed further. Where in the development of augmented reality products, of course there are advantages and disadvantages. Product revision is also carried out by referring to suggestions given by students from large groups. Because in addition to the assessment in the form of student scores in large group trials, qualitative data were obtained in the form of suggestions/ responses about the shortcomings or advantages of augmented reality media. Some things that are advantages in the development of augmented reality products for introduction to ASEAN countries are as follows:

While the weaknesses in this educational game development product are as follows: 1) Constrained by students who do not have an Android smartphone. Although almost all students have an android smartphone, there are some students who do not have a smartphone, 2) The marker size must be appropriate, 3) Can only be installed on the android operating system.

This learning media development product can be used as a means of improving teacher teaching strategies. In addition, AR-based learning media in the learning process, between teachers and students will be equally active so that it will reduce boredom in learning. Because it is based on Android, it is equipped with examples of 3D images, animations, and audio which also make students more interested in learning and easier to understand the material to introduce ASEAN countries.

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