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Approval Test of Augmented Reality-Based Learning Media on Computer Network Installation Materials

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INTISARI

Penelitian ini bertujuan untuk menggambarkan keabsahan media pembelajaran Augmented Reality pada materi computer network installation. Jenis penelitian ini merupakan penelitian R&D (reserch and development), dengan pendekatan model ADDIE: Analysis, Design, Develop, Implement dan Evaluate. Hasil uji validitas aspek media yang diujikan pada dua pakar menunjukkan bahwa media pembelajaran berbasis Augmented Reality dinyatakan sangat valid dengan nilai Aiken's V sebesar 0,827 dan uji validitas pada aspek materi yang dicoba pada dua pakar menunjukkan bahwa media Augmented Reality ini diklaim sangat valid dengan nilai Aiken's V adalah 0,958. Berdasarkan hasil yang diperoleh, maka media pembelajaran Augmented Reality pada materi computer network installation layak digunakan oleh siswa kelas X Teknik Komputer dan Jaringan di SMK Swasta Imelda Medan. Namun, penting untuk ditindaklanjuti, khususnya uji coba penggunaan media di dalam kelas untuk menentukan tingkat keefektifan media pembelajaran Augmented Reality pada materi computer network installation.

Kata kunci: *Media Pembelajaran, Augmented Reality, Computer Network Installation*

ABSTRACT

This study aims to describe the validity of Augmented Reality learning media on computer network installation materials. This type of research is an R&D (research and development) research, with the ADDIE model approach: Analysis, Design, Develop, Implement and Evaluate. The results of the validity test of the media aspect that were tested on two experts showed that the Augmented Reality-based learning media was declared very valid with the Aiken's V value of 0.827 and the validity test on the material aspects tested on the two experts showed that the Augmented Reality media was claimed to be very valid with the Aiken's V value. is 0.958. Based on the results obtained, the Augmented Reality learning media on the computer network installation material is suitable for use by class X Computer and Network Engineering students at Imelda Private Vocational School Medan. However, it is important to follow up, especially trials of using media in the classroom to determine the effectiveness of Augmented Reality learning media on computer network installation materials.

Keywords: *Learning Media, Augmented Reality, Computer Network Installation*

INTRODUCTION

The development of technology and information today has affected all aspects of human life. The field of education is one of the fields that is influenced by the development of technology and information. Education is a consciously planned work designed to help students learn in a conducive atmosphere. Learning is a deliberate activity planned by the teacher to provide a learning experience to students with the point that understudies can adapt autonomously [14]. One of them is to make it more straightforward for

educators to pass on learning data to understudies by utilizing learning media.

Learning media is an important component of learning resources [8][1]. Technological developments provide convenience in accessing learning media and making learning media easier. The learning process will be easier, interesting and effective when using audio-visual media [2][3]. In the learning system, the utilization of general media is very interesting for students. This shows that with the learning media students become focused and happy with the interaction of the learning media.

Factors that influence student learning interest include the media used in learning is not appropriate [4]. Based on the results of observations with teachers of computer subjects and basic networks conducted at Imelda Vocational High School Medan, it was found that the media used in learning was still using conventional media, namely power point media and there were no variations that made learning monotonous and only teacher-centered. The benefits of learning media include; 1) Clarify the information presented so that it is not too verbalistic. 2) Overcoming the constraints of room, time detects. 3) By applying appropriate and varied learning media, students can overcome passive attitudes. 4) Can lead to the same perception of a problem [3]. Interactive media can assist understudies with bettering comprehend and work on comprehension of the material [4]. In this way learning media is one way of taking care of the above issues, where utilizing learning media makes it simpler for understudies to comprehend the material introduced. One of the learning media used to pass on this data is Smartphone media with Augmented Reality innovation [5][6].

Augmented Reality is a certifiable direct or indirect communication that has been added by adding a virtual computer that generates data [7][8]. By using Augmented Reality, it is hoped that the learning process that initially only uses books and teaching aids that are monotonous in which students' brains are forced to remember and store various information can be circumvented by using technology that can attract students' interest in learning, namely by applying Augmented Reality technology [16].

The researcher's initial study was conducted at Imelda Vocational High School Medan class 10th majoring in Computer and Network Engineering. It was found that students considered the learning media used to be conventional using power point media. In computer and basic network subjects, students assume that the material is abstract so that 81% of students find it difficult to understand the material or learning concepts. In addition, the availability of tools and equipment in computer network installation materials is limited so that students can only see images in the module, while 90% of students like learning using 3D animated images.

From the results of research conducted by Setiawardhana [13] said that Augmented Reality has been proven to be ready to make learning systems more dynamic, interesting and significant considering the fact that Augmented Reality innovations allow students to connect with virtual and constant applications and reduce fatigue in learning process. Based on the description above, Augmented Reality technology can help students have different points of view and have their own imagination in understanding the lesson[24].

Therefore, research was conducted on the Development of Augmented Reality-Based Learning Media on Computer Network Installation Materials. Based on the problems above, this study aims to examine the validity of Augmented Reality-based interactive learning media on computer network installation materials.

In this manner, research was directed on the Development of Augmented Reality-Based Interactive Learning Media on Computer Network Installation Materials. In light of the issues over, this review means to analyze the legitimacy of Augmented Reality-put together intelligent learning media with respect to computer network installation materials[25].

METHOD

This exploration creates intuitive learning media dependent on Augmented Reality on PC network establishment material[23]. The strategy utilized in this improvement research will be Research and Development (R&D) utilizing the ADDIE model. in particular by doing Analysis, Design, Develop, Implement and Evaluate [18][21].

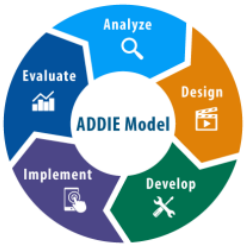

Figure 1. Addie Development Model

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RESULT AND DISCUSSION

The analysis stage is a preliminary study process to conduct a needs assessment (needs analysis) with the aim of knowing what needs are faced by teachers and students. At this stage, observations, questionnaires, and curriculum analysis were carried out. The data generated is about the learning media available in schools, student interest in teaching materials or media provided at school, the curriculum used, practicum tools on computer network installation materials and the use of smartphones during classroom learning activities. Preliminary study data conducted by researchers at Imelda Vocational High School Medan.

The design stage of this stage serves to facilitate the flow of application development that will be made to suit the needs. At this stage includes, a) System Architecture Design is the stage of elaborating the workflow of learning media for computer network installations to be built. The stages of Augmented Reality architecture are made using the Unified Modeling Language (UML) model. UML is an object-oriented software system development workflow mechanism using diagrams and connecting texts. System architecture design includes making use case diagrams, sequence diagrams and activity diagrams. b) Storyboard design is something that is very important in every application creation. Storyboard design becomes a bridge between the user and the system created, because the interface design itself must be attractive and easy to use. The Storyboard design has a Logo button layout in the application menu, background in the application, and supporting component design.

Development stage At the product development stage, learning media based on Augmented Reality will be made, and equipped with KI/KD materials and animated images according to the architecture that is prepared. The process of developing learning media uses the help of software such as Blender, Sketchup, Vuforia SDK, Unity 3D and Phothosop. Furthermore, validation was carried out on Augemneted Reality-based interactive learning media for the purpose of validation to determine the feasibility of the developed product. The validation carried out in this study includes media validation and material validation.

The data analysis technique at the development stage is in the form of product design validation data analysis and 1-1 test data analysis.

The Augmented Reality-based interactive learning media validation data analysis technique is carried out to see whether the data validation results of learning media that have been created are achievable to continue to the following stage or not. The formula used for validation is Aiken with Aiken's V index. Validity testing is carried out based on expert opinion in a particular field in accordance with the expertise required on the instrument used. The validity experts will give a decision in the form of the results of the proposed instrument can be used without improvement, or there is an improvement or even completely changed. The formula for calculating the validity coefficient of Aiken's V in [10] is as follows.

$$V=(\sum s)/([n(c-1)])$$

Information:
V= Index of respondent agreement regarding item validity
s = score determined by the respondent minus the lowest score (s = r-lo)
r = Score given by the rater
n = number of respondents
lo = the lowest number of choice categories
c = the highest number of choice categories filled by the respondent

The criteria for the validity of a product can be seen in Table 1.

Table 1 Validity Criteria

No	Value	Criteria
1	0,81-1,00	Very Valid
2	0,61-0,80	Valid
3	0,41-0,60	Sufficiently Valid
4	0,21-0,40	Less Valid
5	0,00-0,20	Invalid

(Rahmat & Irfan Dedi)

This research produces a valid Augmented Reality-based interactive learning media. In this development stage, media expert validation tests and material validation tests were carried out by the validator. After the AR learning media is proclaimed valid. Coming up next are the consequences of Augmented Reality-based intelligent learning media.

Augmented Reality-base on interactive learning media display, starting from the Splash screen display. The first splash screen page is the AR logo, then enter the splash screen loading to start entering the application menu. The first splash screen will appear for 1 second and the second splash screen for 2 seconds. Here is the splash screen page and loading screen presented in Figure 1.

Figure 1. Splash Screen dan Loading Screen

The main menu page contains several buttons, namely the scan button, the Core Competencies and Basic Competencies buttons, the information button, the user manual button, the instruction button, and the exit button. The learning media menu page for computer network installation is presented in Figure 2.

Figure 2 Main menu

On this page presents Core Competencies and Basic Competencies to understand computer network installation and computer network installation. The views of the Core Competencies and Basic Competencies pages are presented in Figure 3.

Figure 3 Core Competencies and Basic Competencies

The Instructions for Use page contains an explanation of the functions of the buttons contained in the Augmented Reality learning media application. The following is a screenshot of the presented in Figure 4.

Figure 4 Instructions for using the application

The camera's AR scan page is a page that is used to display 3D images. When this page is opened it will open the camera on the smartphone

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device. The camera will direct the marker on the computer network installation module. If the camera is successful in scanning the marker, a 3D image will be displayed according to the marker database. On this page there is also a home button that serves to return to the main menu page. The AR scan page is presented in Figure 5.

Figure 5 Scan AR

The instruction menu page contains instructions on how to use an Augmented Reality-based interactive learning media application by explaining the stages of the marker scanning process to bring up 3D objects. The instruction page is presented in Figure 6.

Figure 6 Instruction Menu

The media validation test stage is completed with the goal that the created learning media can be distinguished dependent on the appraisal of material specialists and media specialists. The motivation behind the approval exercises in this review was to acquire legitimate status from the specialists. validation test information was acquired through validation instruments finished up by validators who were learning media specialists and learning materials specialists. The validation test was done utilizing the Aiken's V recipe. The consequences of the contribution from the master were utilized as modification material. Coming up next is an investigation of survey information from the consequences of master validation testing.

The validation of this material was carried out by two experts on computer network installation learning materials, the first validation was carried out by lecturers of the Information Technology Education Study Program and the second validator was carried out by educators who teach computer and basic network subjects at Imelda Vocational High School Medan. The reason for material master validation is to decide the attainability of the material substance of the created item. The validation evaluation information was gotten after the validator offered an appraisal and guidance on the learning materials in the learning media. The results of the material validation test in the form of suggestions and improvements are used as learning media revision materials. The results of suggestions and improvements are presented in Table 3.

Table 3 Suggestions and Improvements to the Material Validation Test

No	Before Revision	After Revision
1	Fix Margin	Fixed and adjusted
2	Add term	Terms have been added
3	Add Interesting pictures	Interesting pictures have been added

The results of the validator of learning media materials for computer network installations are presented in Table 4.

Table 4 Validator Results

No	Indikator	Aiken's V	Description
1	Validator 1	0.958	Very Valid
2	Validator 2	0.958	Very Valid
	Total	0,958	Very Valid

Based on the assessment made by material experts on learning media for computer network installations, it was found that for the first validator, the Aiken's V worth of 0.958 was remembered for the exceptionally legitimate class. The second

validator gives Aiken's V value of 0.958 whose is included in the very valid category. Thus, the overall average validation obtained is stated to be very valid with Aiken's V value of 0.958.

Media validation is a validation of the accuracy and suitability of interactive learning media developed with media criteria for learning. Media validation was carried out by two media expert validators. The first validator was carried out by a media expert lecturer from the Department of Computer Science and the second validation was carried out by an expert from the Information Technology Study Program. Validation assessment data is obtained after the validator provides assessments and suggestions for interactive learning media. After that, the data was analyzed by using the Rater Agreement analysis using the Aiken's V value. suggestions and improvements to the media validator are presented in Table 5.

Table 5 Media Validator Suggestions and Improvements

No	Before Revision	After Revision
1	Add computer network cable type	The type of computer network cable has been added
2	Buttons have been adjusted	Customize buttons on the app

The results of expert validation of computer network installation learning media are introduced in Table 6.

Table 6 Media Validator Results

No	Indikator	Aiken's V	Description
1	Validator 1	0.916	Very Valid
2	Validator 2	0.735	Valid
	Average	0.827	Very Valid

CONCLUSION

In the development process, validation tests were carried out by experts. The purpose of validation by experts is to obtain input, criticism, and suggestions for improvement for the perfection of the developed media. [19] The validity test of learning media for Computer network establishment is done from two parts of legitimacy, specifically the validity of the material and the validity of the media. In view of the consequences of the validity of the material including two specialists in the field of study and the media validity test including two specialists in the field of study.

The aftereffects of the media expert validation state that first validator gives Aiken's V value of 0.916 which is included in the very valid category. The second validator gives Aiken's V value of 0.738 which is included in the valid category. Thus, the overall average validation obtained is stated to be very valid with Aiken's V value of 0.827. Based on the validation results that have been carried out, Augmented Reality learning media is declared suitable for use in terms of three aspects that are tested, namely, 1) the aspect of the subject matter is in accordance with the completeness of the material content, interactions, and benefits of using media, 2) the aspect of presenting the application with a color selection display. , the layout of the buttons, the text is precise and neat so it is comfortable to see and the quality of the displayed image is clearly seen already presenting the original form of the 3D image, 3) the programming aspect is smooth without any hangs, crashes or lags when used. This result is supported by research conducted by [6] which states that media is able to make the learning atmosphere fun, because students are more motivated to complete learning which can later be learned. In addition, [11] in his research revealed that interactive learning media was able to increase the effectiveness of student learning. Furthermore [9] in his exploration said that the learning media on electric charges was viewed as substantial and this media was not difficult to use for understudies and educators in the learning system. This shows that Augmented Reality-based interactive learning media is announced attainable Becomes utilized as a learning medium in Imelda Vocational High School Medan class 10th, Department of Computer and Network Engineering.

The following stage is the material approval test showing that the first validator gives Aiken's V worth of 0.958 which is remembered for the extremely legitimate classification. The second validator gives Aiken's V worth of 0.958 which is remembered for the exceptionally substantial classification. In this manner, the general normal approval acquired is expressed to be extremely substantial with Aiken's V worth of 0.958. Based on the validation results that have been carried out by material experts, it is declared feasible to use in terms of five aspects that are tested, namely, 1) aspects of explaining the material with the truth of the concept, the truth of terms and the preparation of the material is appropriate and appropriate in

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explaining the material available in the module, 2) viewpoints the degree of significance is as per the detailing of the material that alludes to center skills and essential abilities, 3) in terms of the usefulness of the material presented can improve students' understanding abilities, increase students' thinking coherently, and improve students' critical thinking, 4) learnability aspects can facilitate students use learning media anywhere and make it easier for students to do practicum, 5) interesting aspects of learning that are presented can cause further student curiosity and make learning more fun[19][20].

This is in accordance with the opinion expressed by [14] that the module is a unit of teaching program that is arranged in a certain form for learning purposes that allows students to master the unit of lesson content to be studied. These results are further strengthened by research conducted by Mantasia and Jaya [8] which states that learning media with Augmented Reality technology has been proven to improve students' skills, cognitive, learning interests and students' affectiveness and make learning in understanding something abstract a meaningful learning. complex because of the 3D image visualization. This shows that the material on the Augmented Reality-based module that was developed is declared suitable for use by students of class X Computer and Network Engineering at Imelda Vocational High School Medan.

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