USABILITY ANALYSIS ON THE ENDANGERED INDONESIAN ANIMALS AND PLANTS AUGMENTED REALITY APPLICATION

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Abstract— *Knowledge about Indonesian endangered animals and plants has been taught at elementary school, but still based on text. In curriculum 2013, teachers are expected to be able to develop creative ideas such as using interactive learning media that makes learning fun for students. Interactive learning media can be used as a solution to make the learning process more interesting. The use of augmented reality technology can be implemented on interactive learning media that aims to increase elementary school children's interest and make the learning process easier for the teacher. This research uses a descriptive quantitative method by distributing questionnaires to test the HEBULA Application which is an interactive learning media for introducing endangered Indonesian animals and plants using augmented reality technology for elementary school children. Testing is done by using the User Acceptance Test (UAT). This research aims to find out whether the HEBULA Application can be well received and effectively used as a learning media. The results of this research show that HEBULA Application is suitable to be used as a learning media which is shown by the percentage of UAT eligibility of 92,6% that can be categorized as very well.*

Keywords *: interactive learning media, augmented reality, endangered Indonesian animals and plants, user acceptance test*

Abstrak— Pengetahuan tentang hewan dan tumbuhan langka di Indonesia diperkenalkan sejak berada di Sekolah Dasar (SD), namun pembelajaran masih terbatas teks. Pada Kurikulum 2013 guru diharapkan untuk mengembangkan ide-ide kreatif seperti menggunakan media pembelajaran interaktif yang dapat menarik minat belajar anak. Media pembelajaran interaktif dapat digunakan sebagai solusi untuk membuat proses pembelajaran menjadi lebih menarik. Penggunaan teknologi *Augmented Reality* dapat diimplementasikan pada media pembelajaran interaktif dengan harapan dapat meningkatkan minat belajar anak SD dan mempermudah guru dalam proses pembelajaran. Penelitian ini menggunakan metode kuantitatif deskriptif dengan menyebarkan kuesioner untuk melakukan uji coba pada Aplikasi HEBULA yang merupakan media pembelajaran interaktif dalam pengenalan hewan dan tumbuhan langka di Indonesia dengan menggunakan teknologi AR untuk anak SD. Pengujian yang dilakukan yaitu pengujian *usability* dengan menggunakan menggunakan *User Acceptance Test* (UAT). Hal ini dilakukan untuk mengetahui apakah Aplikasi HEBULA dapat diterima dengan baik dan efektif digunakan sebagai media pembelajaran. Hasil dari penelitian menunjukan bahwa Aplikasi HEBULA layak untuk dijadikan sebagai media pembelajaran yang ditunjukan oleh presentase kelayakan UAT sebesar 92,6% yang dapat dikategorikan dengan sangat baik.

Kata Kunci*:* media pembelajaran interaktif, *augmented reality,* hewan dan tumbuhan langka Indonesia, *user acceptance test*

INTRODUCTION

Knowledge about endangered animals and plants in Indonesia has been introduced from an early age, this can be seen from the existence of learning materials for the preservation of living things in schools, especially at the elementary school (Sembiring, Wahyuni, & Anurogo, 2018). The introduction of endangered animals and plants in Indonesia to children aims to form the idea that endangered animals and plants need to be protected and preserved to avoid extinction. The learning method currently used is curriculum 2013. The curriculum 2013 for elementary school uses a thematic learning approach (Suraya, 2014). Teachers are expected to be able to develop further creative ideas by utilizing alternative activities offered in the teacher manual (Kemdikbud, 2017), or develop their learning ideas, such as interactive learning media where learning methods combine fun and learning (Irfansyah, 2017). The problem that often occurs now is the absence of media that can attract children and the use of pictorial paper

media is not enough to stimulate their minds, feelings and, hearts (Hidayat & Setiyadi, 2017).

Interactive multimedia is a media equipped with a controller that can be operated by the user, so that users can choose what they want (Wibowo, 2012) for the next process, such as interactive learning and game applications, while learning is defined as the process of creating an enabling environment (Sutisna & Hikmah, 2018) the learning process occurs (Dewi, Isnanto, & Martono, 2015). One of the objectives of learning with interactive multimedia is to replace and or complement and support the elements of objectives, materials, methods (Devayana, 2017), and assessment tools that exist in the teaching and learning process in conventional education systems that are commonly used (Dewi et al., 2015), (Lubis, Ritonga, Hia, & Nasution, 2020). Learning using interactive multimedia can be a solution to increase children's interest in the learning process (Hamidi, 2018). In his research, the creation of interactive learning media for Islamic religious education was made to support the implementation of the curriculum 2013. In this research, it can be concluded that interactive learning media can support the implementation of the curriculum 2013 and is suitable for use as a learning resource for seventh-grade students.

Augmented Reality (AR) can be regarded as a technology that integrates computer-generated objects and virtual content into the real world, thereby it can improve (Kamphuis, Barsom, Schijven, & Christoph, 2014) the perception of reality (Thomas, Linder, Harper, Blyth, & Yee, 2019) . This technology can make an object that is initially flat or two-dimensional (2D) as if it becomes real and blends with the surrounding environment. The use of AR technology can be utilized in the learning of endangered animals and plants at the elementary school which can be adjusted to the method in the curriculum 2013 learning. The advantages possessed by AR are more interactive so that the application of the concepts used can increase one's reasoning power and imagination (Dhiyatmika, Putra, & Mandenni, 2015). The creation of three-dimensional (3D) objects and their shapes which are the combination of real and virtual objects can increase children's interest in learning more about the material. The application of the AR concept to the learning method can create a more real learning atmosphere (Kamiana, Made, & Gede, 2019).
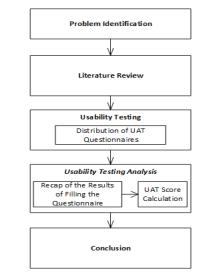
Similar research was conducted on the analysis of the use of logical algebraic interactive learning media using the User Acceptance Test (UAT) (Agustina & Suprianto, 2018). The results of this research, namely 86% of respondents stated that they agreed that interactive learning media

were very useful and easy to use which were considered appropriate (Agustina & Suprianto, 2018) with learning needs and were declared feasible to be developed again. Other research concerns interactive learning media using AR (Feoh & Cristyadi, 2018). This research states that learning using AR is very feasible to be used in helping teachers explain and increase student interest. Based on the UAT test results obtained, the feasibility percentage was 88.74% which can be categorized as very good feasibility.

This research aims to analyze the use of the HEBULA Application which is a learning media for endangered animals and plants in Indonesia using Augmented Reality (AR) for elementary school children using usability testing. The method used is the User Acceptance Test (UAT). This is done to determine the benefits of implementing interactive learning media for elementary school children. Whether using this application can increase the effectiveness in the learning process and can be well received by users.

MATERIALS AND METHODS

The research flow can be seen in the diagram, as in Figure 1.

Source : (Agustina & Suprianto, 2018)
Figure 1. Research Framework

Figure 1. is the research framework. The first stage is the problem identification stage. The second stage is a literature review. The usability testing using the User Acceptance Test (UAT) method. At this stage, the researcher distributes questionnaires to target users. The next stage is usability testing analysis, which consists of a recap of the results of filling out the questionnaire and calculating UAT. After the results of the UAT are obtained, the final stage is to conclude the use of

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AR-based learning media for endangered animals and plants in Indonesia in elementary school children.

The data collection technique used in this research is descriptive quantitative. The data was collected by distributing questionnaires. The object of this research is the HEBULA Application which is an interactive learning media application about endangered animals and plants in Indonesia using AR which is focused on elementary school children.

The UAT test is based on two criteria. The aspects used are display and functional. The display aspect aims to determine whether the display of the application is by the purpose and can be attractive to the user, while the functional aspect aims to determine whether the application is running well and is useful for the user.

The questionnaire was distributed to ten respondents starting from grade first to sixth grade. The questionnaire consisted of ten statements consisting of five statements regarding display aspects and five statements regarding aspects of functional. The questionnaire was created using a Likert scale assessment consisting of five levels of assessment, namely Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD) as well as in the Indonesian Language can be referred as *Sangat Setuju* (SS), *Setuju* (S), *Netral* (N), *Tidak* Setuju (TS), and *Sangat Tidak Setuju* (STS). Each assessment has a different weight.

From the results of this test, results will be obtained that can be used to analyze the suitability of the system that has been designed with user needs, especially in terms of display and functionality. This test will show whether the application can run well and the results of the level of user satisfaction with the application.

RESULTS AND DISCUSSION

User Interface Design
The display of the HEBULA Application can be seen in the following image:

Source : (Darmawel, 2019)
Figure 2. Display of Splash Screen

Figure 2. is the display of the HEBULA splash screen. This display will appear when the user opens the Application. In the HEBULA splash screen, there is the name of the application that is 'HEBULA' which stands for 'Hewan dan Tumbuhan Langka Indonesia' which means Indonesian endangered animals and plants.

Source : (Darmawel, 2019)
Figure 3. Display of Main Menu

Figure 3. is the display of the main menu. There are four menus in this application consist of AR cameras, materials, games, and quiz. The button with the yellow 'i' symbol on the top left is a guide for using the AR camera, while the red button with the exit symbol on the bottom right is a button that allows users to exit the application.

Source : (Darmawel, 2019)
Figure 4. Display of 3D Object Selection

Figure 4. is the display when the user selects the 'AR camera' menu which is a 3D object selection page. Objects that can be seen by users are divided into two, namely endangered animals and plants. The endangered animal's objects consist of the Sumatran Elephant, Javan Rhinoceros, Green Sea Turtle, and Sumatran Tiger.

Endangered plant objects consist of Rafflesia Arnoldi, Titan Arum, and Tropical Pitcher Plant.

Source : (Darmawel, 2019)
Figure 5. Display of Endangered Animal Javan Rhinoceros AR

Figure 5. is one of the displays of the AR camera, which is the Javan Rhinoceros Object. Objects can appear by using a marker. Users can freely choose and use markers according to the criteria described in the application usage guide on the main menu. Users can use the AR feature by pointing the camera at the marker then pressing the camera button in the lower right corner then the object will appear as shown in Figure 5. In this menu, there is a feature to listen to the sound of an object and an info button to view information according to the selected object.

Source : (Darmawel, 2019)
Figure 6. Display of Learning Material

Figure 6. is the display of the learning material menu. Users can read materials related to endangered animals and plants that are adapted to objects on the AR camera menu. The material in the learning material menu can be read first before the user answers the quiz on the quiz menu.

Source : (Darmawel, 2019)
Figure 7. Display of Quiz

Figure 7. is the display of the quiz menu. Ten questions must be answered by the user. The answer type is a multiple-choice consisting of 4 answer choices. The score can be seen on the upper right side of the page.

Source : (Darmawel, 2019)
Figure 8. Display of HEBULA Memory Game Level 1

Figure 8. is the display of the game menu. the game is called the HEBULA memory game which is a game to match cards with images of endangered Indonesian animals and plants. There are 5 levels in the HEBULA memory game. Figure 8. is an example of level 1. The higher the level, the more the number of cards.

User Acceptance Test (UAT)

At this stage, the respondents carry out the implementation and testing of the application. Respondents were asked to fill out a questionnaire consisting of statements relating to the features contained in the application. The respondents who are elementary school students will fill out a questionnaire after trying the HEBULA Application.

UAT Analysis

The UAT used a Likert scale as the level of assessment. The questionnaire consists of 10

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statements consisting of display and functional aspects that related to the HEBULA Application. Table 1. is the UAT questionnaire distributed to respondents. Table 2. represents the processing results taken from the questionnaire data that has been filled in by the respondent.

Table 1. UAT Questionnaire

No	Questions	SA	A	N	D	SD
Display						
1	The layout of the buttons in the application are arranged according to their place	6	4	0	0	0
2	The texts on the application can be seen clearly	8	2	0	0	0
3	The display of the Hebula application is interesting	5	3	2	0	0
4	The menus contained in the application is quite complete	5	5	0	0	0
5	The features contained in the application are interesting	6	3	1	0	0
Functional						
6	The buttons contained in the application function properly	7	2	1	0	0
7	The augmented reality feature of endangered animals and plants in Indonesia helps in the learning process in schools	9	1	0	0	0
8	The application makes it easier for users to learn endangered animals and plants in Indonesia	5	5	0	0	0
9	The features contained in the application are easy to use	8	2	0	0	0
10	The performance of the application provides a fast response	8	2	0	0	0

Source : (Darmawel, 2019)

Table 2. Results of Questionnaire Data Processing

No	Questions	SA	A	N	D	SD	TO-TAL
Display							
1	The layout of the buttons in the application are arranged according to their place	6	4	0	0	0	10
2	The texts on the application can be seen clearly	8	2	0	0	0	10
3	The display of the Hebula application is interesting	5	3	2	0	0	10
4	The menus contained in the application is quite complete	5	5	0	0	0	10
5	The features contained in the application are interesting	6	3	1	0	0	10
Functional							
6	The buttons contained in the application function properly	7	2	1	0	0	10
7	The augmented reality feature of endangered animals and plants in Indonesia helps in the learning process in schools	9	1	0	0	0	10
8	The application makes it easier for users to learn endangered animals and plants in Indonesia	5	5	0	0	0	10
9	The features contained in the application are easy to use	8	2	0	0	0	10
10	The performance of the application provides a fast response	8	2	0	0	0	10
	TOTAL	67	29	4	0	0	100

Source : (Darmawel, 2019)

The answer to each statement has a different weight value. The following Table 3. is the rating point of each answer:

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Table 3. Rating Point	
Agreement	**Point**
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Source : (Darmawel, 2019)

Table 4. Interpretation of Score After Conversion	
Rate (%)	**Classification**
0-20	Very Bad
21-40	Bad
41-60	Below Average
61-80	Good
81-100	Excellent

Source : (Darmawel, 2019)

Based on the results of the questionnaire data processing in Table 2. The following is a description of the calculation of the questionnaire data processing:

1. Strongly Agree, was obtained 67 answers from respondents. The calculation can be shown on the equation below:
$Strongly\ Agree = 67 \times 5 = 335\ point$

2. Agree, was obtained 29 answers from respondents. The calculation can be shown on the equation below:
$Agree = 29 \times 4 = 116\ point$

3. Neutral, was obtained 4 answers from respondents. The calculation can be shown on the equation below
$Netral = 4 \times 3 = 12\ poin$

4. Disagree and Strongly Disagree, was obtained 0 answers from respondents.

The frequency of data (f) calculations can be shown on the equation below:

$f = Point\ (SA) + Point\ (A) + Point\ (N) + Point\ (D) + Point\ (SD)$ .... (1)

$= 335 + 116 + 12$
$= 463\ point$

The calculation of the number of samples processed (N) can be shown in the equation below:
$N = Highest\ Rating\ Point \times Total\ Answers$ ..(2)
$N = 5 \times 100 = 500$

The formula to get the Interval (I) is shown in the equation below:
$I = \dfrac{100}{Total\ Score\ (Likert)}$ .... (3)
$I = \dfrac{100}{5} = 20\%$

The interval is used to determine the rating scale. The interval used is 20% starting from the lowest distance of 0% to the highest of 100%, Table 4. below is the rating scale used:

The calculation for obtaining the percentage of UAT result is shown in the equation below:

$Percentage\ (\%) = \dfrac{f}{N} \times 100\%$ .... (4)

Description:
P : Percentage
f : Data Frequency
N: Number of Samples Processed

$Percentage\ (\%) = \dfrac{463}{500} \times 100\%$
$= 92{,}6\%$

Based on the results of percentage, it can be conclude from the number of user acceptance test (UAT) which is 92,6%, HEBULA Application can be categorized as "Excellent".

CONCLUSION

Based on the analysis of usability testing using UAT which consists display and functional, the results show that the HEBULA Application which is an interactive learning media for endangered animals and plants in Indonesia for elementary school children using AR is very suitable for use to understanding learning about endangered animals and plants in Indonesia. This application can increase interest and make it easier for elementary school children to learn about endangered animals and plants in Indonesia.

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