Media Development of Water Cycle Augmented Reality Media Based on ICT of Scientific Approach for Grade V

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Abstract---This study aims to create, develop and test the feasibility of Augmented Reality learning media in ICT-based Water Cycle material and scientific approach that is suitable for use in learning for students in grade V. The media is called the Augmented Reality Water Cycle (ARSA). ARSA acts as a supporting tool in the teaching and learning process. ARSAis developed by utilizing technology to integrate between the real world and the virtual world. ARSA was developed in the form of an Android-based mobile phone. The use of this media is designed to provide a unique experience to students, so students feel like doing a real experiment, even though they are actually in the virtual world. The method in this research is Research and Development (R & D) method, with stages of ADDIE (Analysis, Design, Implementation, and, Development). Data collection is done by documentation and distributing questionnaires, using instruments developed by the researcher. Data was analyzed by quantitative descriptive analysis techniques. Media validation (product) involves two learning media experts and one material expert. The results of the feasibility test by instructional media experts showed that the aspects of quality of content, purpose, instructional, and technical quality developed were 75% (very feasible category). The results of the feasibility test by the learning material experts, showed that from the aspect of content quality and purpose, the accuracy of word / sentence usage, the opportunity to facilitate students' critical thinking skills, ICT literacy, empathy attitude, and student communication skills is 80% (very decent category).Based on this, the media ARSA learning in this study is worthy of being used as a means of supporting the process of learning and teaching activities in grade V.

Keywords: Augmented Reality of Water Cycle (ARSA), based on ICT, scientific approach, learning media, development

I. INTRODUCTION

Today the nation of Indonesia are trying to prepare themselves in the face of revolution 4.0.

Minister of Research, Technology, and Higher Education (Menristekdikti) Mohamad Nasir (2018) explained, based on the initial evaluation of the readiness of the country in the face of the industrial revolution 4.0 Indonesia estimated as countries with high potential. From this, it can be said that Indonesia must be prepared to face the industrial revolution 4.0 therefore it education in Indonesia need to also prepare by doing some changes in methods of learning in school, first that is a fundamental change to the nature and mindset protégé, both able to hone and develop children's talents and the third educational institution should be able to change the model of learning tailored to the needs of the times.

Education is basically not merely teach the knowledge but to teach learners to gain the experiences varied. In this varied experience can be applied using the technology[1].reparing graduates who are qualified and able to compete globally, as well as master the technological development is essential for all people and for the future of a nation and the State[2]. the technology did indeed provide new opportunities and attractive for childhood activities.Digital literacy is therefore indispensable in the world of education today.

In this case the use of ICT is exploited for the development of digital literacy as a media application. The use of ICT media bring the expected media literacy learners are able to select and develop the selected media to communicate with ICT literacy learners can analyze the media information and creates the appropriate media for communication [3]. ICT devices developed in this regard is the use of the phone or can be called with the gadgets [4]. in this digital age of information easy to access where space and time is not an obstacle to get information

To support the growing process of learning in elementary school use of technology this interaction among them is the technology of Augmented

Reality.This technology is a 3-dimensional technology that combines the physical world and the digital world [5]. By blending these two worlds to the expected users can better understand the information provided against. This interaction makes use of technology students become more interactive with the condition of sekelingnya when users use this application. Utilization of instructional media of augmented reality (AR) will be developed in android-based mobile phone technology. The use of AR as multimedia technologies began to increase. In its application to the material, students like doing real experiments but they are in the world [6] . AR media potential as a source of learning enough that interest students. Based on the Assessment of Astita *et al* [7] of 15 respondents in the use of AR application on the floor plan of a school valued interesting, easy to understand and use, as well as being able to help the community in finding the location of the room in the school. On all aspects of the assessment of the respondents gave an average score of 90%.

In the use of media tools, it takes the form of AR cell phone. Using augmented reality (AR) in the android-based mobile phones can help teachers and make it easier for the teachers in the learning process of the water cycle on the material of the IPA primary level grade V in order to process the lesson can run better than ever. Integrating learning with AR material water cycle will make students more interested in studying it. The use of augmented reality (AR) in the formal education could prove a key component in future learning environments that are rich with a mix of hardware and application software.

Science is a very important subject in primary school education because science education trains students to think logically and rationally. The IPA has always been a subject tested both nationally and a globally. Science lessons are actually very fun and interesting to learn. Science can shape the scientific attitudes or behaviors of students, develop process skills, develop the attitudes and values that are useful for students to improve the quality of everyday life, and develop awareness about the existence of related relationships and mutual influence between the progress of science and technology and the environment.

A scientific approach is a learning process that is designed in such a way that learners actively mengkonstruk concepts, laws and principles through stages – stage observe (to identify or find problems),

formulating the problem, ask or formulate hypotheses, collect data using various techniques, analyze data, draw conclusions and communicate concepts, laws or principles "found" [8]. In the scientific learning learning conditions are created that is expected to encourage learners to find out information from a variety of sources through observation, and not just be told.

Learning that involves scientific approach will involve a process of skills, such as observation or observation activities required for the filing of a hypothesis or data collection. scientific method generally grounded with the exposure data obtained through observation or experiment [9] Therefore, the experiment can be replaced with activities to obtain information from various sources. In conducting such activities, help or guidance teacher still needed.

II. METHOD

The type of research used in the development of media ARSA i.e. research and development (research and development). Research and development of procedures used in this study refers to the development model of Reiser and Mollenda which consists of five stages, namely Analysis (analysis), Design (design), Development (development), Implementation (implementation), and evaluation (Evaluation) are known by the term ADDIE . However, in this study the stages of research that is to be used only until the third step IE Development. The subject of this research is the validator experts and students of class 5. Validator experts (2 professors and a teacher) serves as a validator instrument assessment developed in terms of content and invalid constructs. The sample of this research is the grade 5 students of 55 students who participate in the determination of the validity of the empirical instrument. Data collection techniques used in this research include interviews, question form, and documentation**.**

III. RESULTS AND DISCUSSION

The results of the research and the discussion. The methods used in this research is a method of research and development or Research and Development. Methods of research and development (R&D) is a research method that is used to generate new product designs, as well as develop and create new products. The research was designed using the approach of ADDIE. [10] The development model is customized and adapted in this research are still referring to the above development model so that

research and development procedures that authors use has four stages. Adaptation research step is done considering the limitations of the author in performing research. The following is the translation of the five stages of development that are tailored to the purpose of the study:

Analysis: this needs analysis Activities conducted by means of collecting data and information from interviews with the teacher of the class V in the SD SDI 04 and Sendangmulyo Shoots of hope. The problems that are found from the results of the interview are the difficulties of teachers in the use of the right media in learning the water cycle.

Design: in stage design (Design) the author makes and design a design illustration of the water cycle. At this stage, the author did a collection of materials that match the deeds. In making Augmented Reality here, making the object marker be Qrcode collected into one that will be merged with the form of three-dimensional objects with the help of software Unity 3D and Vuforia Unity. Then the next step is in the process of merging all existing material that is either a Qrcode that already identified to display different objects for further processed through software Unity 3D so that the result will created an Augmented Reality application that can run on Android devices. The marker of the ARSA media is shown in Figure 1.
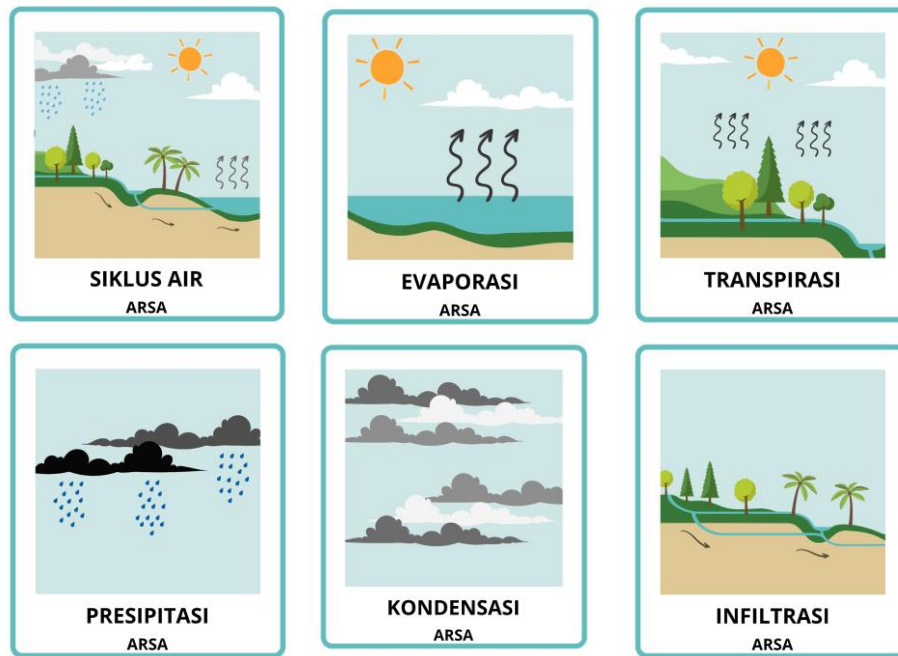

Figure 1. The marker of the ARSA

Development: research phase was done designing products and test the validity of the product. The result of the development of media and then validated by the three experts, namely two professors and a teacher. As for the aspects that are evaluated by experts, among other material, namely the quality of the content, objectives and instructional. Media experts to evaluate in terms of the quality of the content and objectives, the appropriateness of the use of the word/phrase, Measuring ICT literacy students, attitude of students, empathy and communication skills of students. The results of the validation has been done by experts can be seen in Table 1.

Table 1. Media Validation Analisys

Aspects Evaluated	Validator Value			Total
	1	2	3	
Quality of content and purpose	3	3	3	9
The accuracy of words / sentences.	3	3	3	9
Measuring students' ICT literacy	3	3	4	10
Measuring student empathy	3	4	3	10
Measuring student communication skills	3	3	4	10
Total	15	16	17	48
Score	48			
Persentage	80,00			
classification	Very good			

Table 2: Media Validation Analysis

Aspect Evaluated	Validator Value			Total
	1	**2**	**3**	
Quality of content and purpose	3	4	4	11
Technical	4	3	3	10
Total	7	7	7	21
Score	21			
Persentage	75,00			
Classify	Good			

Data collection is done by documenting and sharing polls, using instruments developed by researchers. The media validation (product) involves two learning media experts and one material expert.

IV. CONCLUSION

Based on the results of the research of the development that has been done by researchers may note that the eligibility test results by learning media expert, suggests that aspects of the quality of the contents, objectives, instructional, and technical quality are developed is 75% (very worthy category). Feasibility test results by learning material, experts point out that aspects of the quality of the content and objectives, the appropriateness of the use of the word/sentence, the opportunities to facilitate students ' critical thinking skills, ICT literacy, skills, and attitudes of empathy communication students is of 80% (very worthy category) based on it, then the learning media ARSA in the study used as a means worthy of supporting learning activities and teaching in the primary Classroom V.

REFERENCES

[1] Khasanah, Uswatun., Herina. 2019. Membangun Karakter Siswa Melalui Literas Digital Dalam Menghadapi Pendidikan Abad 21 (Revolusi Industri 4.0). *Proceeding: Jurnal PGRI Palembang.*

[2] Gelderblom, Helena., Kotzé Paula. 2009. Ten Design Lessons from the Literature on Child Development and Children's Use of Technology. University of South Africa.

[3] Wijaya, E,Y.,Sudjimat, D, A., Nyoto, A. 2016. Transformasi Pendidikan Abad 21 Sebagai Tuntutan Pengembangan Sumber Daya Manusia Di Era Global, 1.

[4] S Sarwi., Ellianawati E., Suliyanah. 2019. Grounding physics and its learning for building global wisdom in the 21st century. *Journal of Physics: Conference Series. 1171 012001*

[5] Garrett, Bernie M.; Anthony, Joseph; and Jackson, Cathryn (2018) "Using Mobile Augmented Reality to Enhance Health Professional Practice Education," *A Journal of the Current Issues in Emerging eLearning*: Vol. 4 : Iss. 1 , Article 10.

[6] Ibáñez, M.B., & Degado-kloos, C.2018. Augmented reality for STEM learning: A systematic review. *Journal of Computers and Education*. 123, 109-123.

[7] Astita, I, L, M, D., Rochim, F, A.,Martoo, T,M. 2015. Aplikasi Augmented Reality Denah SMP Negeri 36 Purworejo Menggunakan Mobile Android. *Jurnal Sistem Komputer*. 3(4), 189-145.

[8] Hosnan. (2014). *Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21*. Bogor: Ghalia Indonesia.

[9] Sani, Ridwan. A. 2014. *Pembelajaran Saintifik untuk Implementasi Kurikulum 2013*. Jakarta: PT. Bumi Aksara.

[10] Morrison G.R 2010 Designing Effective Instruction (6th Edition). John Wiley & Sona.