The Development Of Augmented Reality For Hardware Introduction For SDU Hamzanwadi Students

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Abstract. The study conducted on the Primary School (SDU) Hamzanwadi with the subject focused on the main informatics on introduction of hardware. Here, the teacher only explained by drawing on the blackboard without being equipped with learning media. The formulation of the problems were: How is the learning media design process in the form of Augmented Reality, What result from product validation both from media experts and material experts, What is the response of users, namely SDU students Hamzanwadi. Research and Development methods. Based on the results of the validation of media experts in the form of Augmented Reality hardware recognition got an average value of a percentage of 93.16 included in category 4 that is “very feasible”, the results of expert validation the material got an average value of a percentage of 94.5 included in category 4 that is “very feasible”. Based on the results of interviews conducted to 5 students, they found it that students enjoyed learning media products in the form of Augmented Reality. The results got show that there are positive responses got from students related to learning media products in the form of Augmented Reality.

Keywords–Augmented Reality, Hardware, SDU Hamzanwadi

1. Introduction
In his digital era most of the humans are inseparable by technology. Technology is very influential in all fields of human life, both in the fields of government, medicine, industry, commerce, education to human daily life. So that, humans assume “it is better to leave behind a wallet than a cell phone” because through payment processing technology can be resolved, it shows that people very depend on technology. Something similar happens in the world of education, which is that in teaching and learning process students are no longer enthusiastic about receiving learning, if the teaching delivered not use technological help, such the learning media. The teaching and learning process will be the same direction which is dominated by the passive teacher and students, so they require the teacher to make learning media that are not only interesting but must be able to be interactive.

On this study the researcher focused on the Primary School (SDU) Hamzanwadi, which is an elementary school that was just established on the year 2019-2020. Based on the mission of SDU Hamzanwadi the point number 1, it states that learning is based on local, national, global technology-based information, information, and multi-language (http://sdu.hamzanwadi.ac.id/visi-misi/). Based on this mission, the role of technology in learning is very important. Based on Minister of Education and Culture Regulation No. 37 of 2018 concerning changes to regulating the minister of education and culture No. 24 of 2016 concerning core competencies and basic competencies of lessons in the 2013 curriculum in basic education and secondary education, in full in article 2A point 1 mentioning informatics content in Primary/Madrasah Schools Ibtidaiyah (SD/MI) can a learning tool and/or learned through extracurricular and/or local content. With the re-entry of subjects known as technology,
information and communication (ICT) subjects have now changed to informatics. Under the 2013 curriculum in elementary schools and has been implemented at SDU Hamzanwadi, starting from the first grade of elementary school students, SDU has studied informatics subjects.

Based on this information, the researcher made observations in class I of SDU Hamzanwadi, on the informatics learning on introduction of teacher hardware. Here, the teacher only explained by drawing on the board without being equipped with learning media, according to the results of interviews with teachers for the initial stage students have not been given the original form of hardware because it is still in the initial recognition process. Students follow the entire learning process, but because of learning that does not use learning media at the end of the learning period students experience boredom and start doing other activities. Referring to these problems, the researchers conducted the development of instructional media in the form of Augmented Reality which did not require much and practical costs.

This study was focus on the designing of instructional media in the form of Augmented Reality. The formulation of the problems were: 1. How is the learning media design process in the form of Augmented Reality; 2. What result from product validation from media experts and material experts; 3. What is the response of the user, namely SDU student Hamzanwadi. This study determines the results of validation from media experts and material experts and knowing responses from users of learning media applications in the form of Augmented Reality. The benefits of this research are as new innovations for teachers in making learning media, teachers and students can use products in the form of learning media in the form of Augmented Reality for learning.

Innovative learning in the Indonesian dictionary, the word “innovation,” means the introduction of new things or renewal “[1]. Innovation means new discoveries different from those that already exist or that are already known (ideas, methods, or tools). Syah and Kariadinata innovative learning can balance the functions of the left and right brain when done by integrating media / tools especially those based on new / advanced technology into the learning process[2]. We can conclude it that innovative learning is learning that contains change or renewal either in opinion, or the tools used.

Gagne states that the media are various types of components in the student environment that can stimulate them to learn, meanwhile Briggs believes that the media are all physical tools that can present messages and stimulate students to learn [3][4]. The teaching media according to Ibrahim and Syaodih is defined as anything that can channel messages or lesson content, stimulate students’ thoughts, feelings, concerns and abilities, to encourage teaching and learning. We can conclude it that learning media is a tool teacher can use that to help the learning process to stimulate students’ interest in learning[5][6][7].

Several learning theories are derived from the philosophical framework of constructivism, including discovery-based learning, situated learning, and problem-based learning. AR technologies allow learners the freedom to actively experience digital content and integrate new information into their existing knowledge base, thus engaging on an individualized path of discovery[8]. Cawood & Mark Augmented Reality is a natural way to explore 3D objects and data, AR is a concept that combines virtual reality with world reality. So that the virtual object 2 Dimension (2D) or 3 Dimension (3D) as if it looks real and merges with the real world[9][10][11]. Azuma defines Augmented Reality as a merging of real and virtual objects in a real environment, runs interactively in real time, and there is integration between objects in three dimensions, namely virtual objects integrated in the real world. The integration of real and virtual objects is possible with appropriate display technology, interactivity is possible through certain input devices, and good integration requires effective tracking. It can be concluded that Augmented Reality is the merging of real and virtual objects that run in the real world, interacting in cyberspace[12][13][14][15][16]. Augmented reality offers us a new way to interact with the physical (or real) world. It creates a modified version of our reality, enriched with digital (or virtual) information, on the screen of your desktop computer or mobile device [17][18]. Augmented reality adds digital information to the world that you can interact with in the same manner that you interact with the physical word [19] [20].

2. Method
They conducted this study at the Hamzanwadi flagship Primary School, with the random sampling trials was the technique to select the sample. The subjects in this study were students at SDU Hamzanwadi, because SDU Hamzanwadi was an elementary school newly established on the school year 2019-2020.
and the number of students classified as small so that researchers only took a sample of 5 people in this study using small classes to seek responses to application of the Augmented Reality application.

The research design of the study was the development research, to develop new products. The research design used is the Development Research Method with products in the form of learning media in the form of Augmented Reality. Research and Development methods (Research and Development) are research methods used to produce certain products and test the effectiveness of these products.

Product design stage, based on observations through identification of potential problems and data collection, the data got are then analysed. It then uses the results of the analysis as a reference for the initial design of the contents of the learning media in the form of Augmented Reality that will be developed. Product design describes the form of hardware that is more easily understood by students in grade I of elementary school.

I submit the beginner product to the expert for evaluation. Media experts and material experts assessed the design at Hamzanwadi University and school teachers. To assess the design of the product can meet the eligibility criteria of learning media or not. Experts in material and media assessed the feasibility of instructional media in the form of Augmented Reality and the responses of students through interviews, because the first grade students of elementary school could not be asked formally. The instructional media product in the form of Augmented Reality is said to be workable if the instrument that is validated by the expert states that the instructional media in the form of Augmented Reality is in the workable category and the response got from students states good or like. After material experts and media validated the design experts, I made experts. The part that was repaired was the part that was still considered lacking by media experts and material experts. The validator suggestions on the questionnaire can a reference for improvement.

I do once the trial use of the product on a small scale, if we find there it is a response that is not good, researchers will revise the product without retesting. Determination of the subject is done randomly without considering the background of students, both families, academic abilities, and the ability to use technology. It revised the revision stage of instructional media products in the form of Augmented Reality taking into account the results of product trials that have been carried out. I can correct weaknesses in the learning media in the form of Augmented Reality first before a medium in classroom learning.

3. Result and Discussion

A. Research Results

Results of the analysis phase: based on observations made on SDU students Hamzanwadi in introducing hardware students are only given a general description and draw pictures on the board related to what is included hardware while the original device has not been shown by the teacher because for class I students have not entered the stage of using hardware, teachers do not have adequate media for explanations related to hardware material, students often play with their parents’ mobile phones when they get home. The next step is designing the flowchart design:

![Figure 1. Augmented Reality Flowchart](image-url)
Results results of the expert validation stage:

1. Media expert validation

I carried the validation of media experts out by two Hamzanwadi university lecturers who were studied in relation to instructional media in the form of Augmented Reality. The assessment is done by filling out a questionnaire (questionnaire) by giving a good value or not the instructional media product in the form of Augmented Reality and declared worthy of use.

Aspects of the assessment related to the media are: Display of learning media, software engineering, responsiveness. We can see the test results on the table below:

| Aspect of Rating      | Score | Maximum Score | Percentage | Category     |
|-----------------------|-------|---------------|------------|--------------|
| Software engineering  | 52    | 56            | 93         | Very decent  |
| Media display         | 44    | 48            | 91.83      | Very decent  |
| functioning           | 53    | 56            | 94.64      | Very decent  |
| **Total**             | 149   | 160           | 93.16      | Very decent  |

Based on the results of the media experts validation above shows that learning media in the form of Augmented Reality hardware recognition got an average percentage value of 93.16 included in category 4 that is “very feasible”, so that learning media in the form of Augmented Reality is feasible to be used in the next stage which is trial use product.

2. Material expert validation

1 lecturer conducted material expert validation at Hamzanwadi University and 1 Hamzanwadi SDU teacher who was reviewed in connection with the suitability of instructional media in the form of Augmented Reality with the needs demanded by the existing curriculum and syllabus. The assessment is done by filling out a questionnaire (questionnaire) by giving a good value or not the instructional media product in the form of Augmented Reality and declared worthy of use. Aspects of the assessment related to the media are: Media clarity, Media suitability with the curriculum and syllabus. We can see the test results on the table below:

| Aspect of Rating      | Score | Maximum Score | Percentage | Category     |
|-----------------------|-------|---------------|------------|--------------|
| Media clarity         | 67    | 72            | 93.17      | Very Decent  |
| Media compatibility   | 46    | 48            | 95.83      | Very Decent  |
| **Overall number**    | 113   | 120           | 94.5       | Very Decent  |

Based on the results of the material expert validation above shows that the learning media in the form of Augmented Reality hardware recognition got an average value of a percentage of 94.5 included in category 4 that is “very feasible”, so that the learning media in the form of Augmented Reality is feasible to be used in the next stage which is trial use product.

3. The results of testing the use of the product to students

I conducted the compliment of learning media products in the form of Augmented Reality to 5 Hamzanwadi Elementary School students who were randomly selected without considering the students’ background, either family, academic abilities, or the ability to use technology. This test is done by showing and asking students to run or play the application, then the interview process is conducted to students as respondents.

Based on the results of interviews conducted to 5 students, it was found that students enjoyed learning media products in the form of Augmented Reality and wanted the media to be used in informatics learning about introducing hardware in class because in the classroom learning was still done by the teacher drawing in front of the class. The results got indicate that there are positive responses got from students related to learning media products in the form of Augmented Reality.
B. Discussion
The results of testing of learning media products in the form of Augmented Reality by: 1. Media experts got by 93.16% show that the product is suitable for use; 2. Expert material got by 94.5% results show that the product is suitable for use. Based on the two tests, it shows that we can continue learning media products in the form of Augmented Reality at the next stage, which is the product use trial phase.

The Primary School Students of Hamzanwadi who are classified as new have new class I students so it relates learning to new informatics on introducing hardware only. The product use trial phase shows that the students’ responses to the learning media products in the form of Augmented Reality are very good, students are more interested in learning material hardware introduction, based on the results of interviews conducted students feel interested because previously students in learning the subject of hardware discussion was only given by the teacher drawing in front of the class. Students are interested in this media because students have never seen an Augmented Reality media.

Basically, the Augmented Reality media in the East Lombok region is indeed still very rarely used by schools, especially teachers in teaching and learning activities, not even all teachers are familiar with the term Augmented Reality.

4. Conclusion
Based on the objectives and formulation of the problem that has been prepared by researchers that is related to the design, validation of media experts, material experts and how the response of users of instructional media products in the form of Augmented Reality, got results from media experts and material experts in the workable category. The next stage is testing the use of the product got by the user response that students are very interested in using instructional media products in the form of Augmented Reality in the teaching and learning process in the classroom.

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