
Development of Virtual Map Learning Media Based on Augmented Reality to Increase the Learning Interest of Grade IV Students

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Abstract

In the digital era, ICT advancements have significantly influenced education, enhancing students' learning experiences. This study focuses on developing Augmented Reality (AR)-based learning media for fourth-grade Indonesian Language students at SDN Larangan Luar 2, Pamekasan. Using a constructivist approach, it addresses students' low interest and motivation in learning Indonesian and emphasizes the teacher's role as a facilitator. The Research and Development (RnD) approach follows the ADDIE framework—analysis, design, development, implementation, and evaluation. Seventeen students participated in observations and interviews to assess their learning characteristics and needs. Findings indicate that traditional learning methods often render students passive, necessitating innovative teaching strategies. The study introduces an AR-based Virtual Map that merges digital objects with real-world elements to create an interactive learning experience. Validation results confirmed the media's effectiveness, with high scores from learning design experts (86%), subject matter experts (84%), and instructional material experts (92%). The research highlights AR's potential in increasing students' interest and motivation in learning Indonesian. It also serves as a reference for educators and developers in designing engaging and interactive teaching methods, ultimately contributing to more effective learning experiences.

Keywords– Virtual Map, Augmented Reality, ADDIE model



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1. Introduction

In digital era, the development of information and communication technology has significantly impacted various aspects of life, including education. The presence of IT (Information Technology) in education can make learning activities more enjoyable for students. Utilizing IT in the learning process can provide new learning experiences for students and gradually change monotonous and tedious learning habits. This progress can be well-utilized to its fullest potential. One key factor in the success of modern education is the role of teachers as the main pillars. The role of teachers has reformed as times have changed. In the past, teachers acted as educators who were the sole source of knowledge for students. However, this principle is no longer applicable in today's era. The development of information and communication technology (ICT) has changed the educational landscape, transforming the role of teachers into facilitators (Dewi & Sahrina, n.d.). Today, students can freely seek knowledge from various sources while still receiving guidance from teachers. Thus, the role of teachers in achieving educational goals is crucial. One of the current responsibilities of a teacher is to create a dynamic, interactive, and sustainable learning environment.

One promising approach is the use of Augmented Reality (AR), which enables the integration of digital objects with the real world, providing an interactive and engaging learning experience. AR promises a more interactive and captivating learning experience, which can help boost students' interest in learning, particularly at the elementary school level (Spatioti et al., 2022). Research shows that children are more interested in learning processes involving advanced technologies, such as AR, compared to traditional methods that tend to be monotonous (Seviana et al., n.d.).

Learning media, literally, refers to a means or intermediary. Media is any form of intermediary used by the communicator to convey messages, ideas, or concepts, ensuring that the message is delivered to the recipient in a complete and clear manner. Learning media refers to anything that can be used to deliver or transmit messages, in this case, learning materials, which stimulate students'

interest and motivation to learn in order to achieve learning objectives. Learning media is crucial in the implementation of the Merdeka Curriculum, especially in teaching Indonesian language (Mustaqim, 2016).

Although educational technology has advanced significantly, there are still challenges in increasing student engagement, particularly in Indonesian language lessons for fourth-grade students. Based on initial observations made by the researcher, many students feel bored and uninterested in Indonesian language learning, which contributes to their low comprehension and academic performance. Therefore, an innovation is needed to create a more engaging and effective learning environment (Dwi Mukti, n.d.).

The constructivist learning theory emphasizes that effective learning occurs when students are actively engaged in the learning process. According to Piaget (1976), learning that takes place in contexts relevant and engaging to students is more easily understood and remembered. Research by Huang et al. (2020) also shows that the use of AR in learning can enhance student motivation and help them understand complex concepts through more tangible visualizations (Usmaedi et al., 2020a). This is particularly relevant in the context of Indonesian language learning, where the ability to read and comprehend texts is crucial. Several studies indicate that the use of AR-based learning media can increase student motivation and learning outcomes. According to research by Kamaruzaman, the application of AR in learning not only boosts student engagement but also strengthens conceptual understanding in an enjoyable way. Furthermore, the constructivist theories of Piaget and Vygotsky suggest that active and interactive learning experiences can facilitate better understanding (Nurhasana et al., 2022).

This study focuses on the main issue: how the development of AR-based virtual map learning media can enhance the learning interest of fourth-grade students in Indonesian language subjects (Nababan et al., 2024). This issue involves identifying the most effective AR elements and their impact on student motivation and engagement in the learning process. The problem addressed in this study is the low interest and motivation of fourth-grade elementary school

students in Indonesian language lessons. Many students find Indonesian language lessons boring and difficult, which affects their academic performance (Nistrina, 2021). By developing AR-based learning media, it is hoped that a more engaging and interactive learning experience can be created, thereby increasing students' interest and motivation (Dwi Mukti, n.d.).

Based on the observations made by the researcher, the problem of students' lack of interest in learning, especially in Indonesian language lessons, is due to the fact that the media used in schools are limited to textbooks containing images and theoretical texts. Additionally, some students do not have their own textbooks and only listen to explanations from the teacher, which leads to boredom (Moses Adeleke Adeoye et al., 2024). Therefore, the researcher is interested in developing technology-based media, with augmented reality (AR) being an attractive option as it can combine students' imagination with real-world objects. The presence of AR-based virtual map learning media, specifically designed for Indonesian language lessons, is a new development in the context of education in Indonesia. While many studies have explored the use of AR in various fields, few have focused on the development of learning media for Indonesian language subjects at the elementary level (Freedom to Learn in Ki Hadjar Dewantara's View and Its Relevance for the Development of Character Education, n.d.). This innovation is expected to serve as a reference for other education developers. The novelty of this research lies in the development of AR-based learning media integrated with the Indonesian language curriculum at the elementary level, which is still rarely done. This study aims to explore the potential of using AR to increase student interest in learning, as well as to contribute to the development of innovative and effective teaching methods for elementary education (Afriani et al., 2024). The research is expected to provide guidance for educators and media developers in designing more engaging and effective learning media (Kanti et al., 2022).

The aim of this study is to develop and test the effectiveness of AR-based virtual map learning media in increasing the learning interest of fourth-grade students in Indonesian language subjects. Thus, this study seeks not only to

contribute to the development of innovative learning media but also to encourage an increase in student interest, enabling them to enjoy and better understand Indonesian language lessons (Usmaedi et al., 2020b).

2. Method

This study uses the Research and Development (RnD) model, which aims to produce a product and test the effectiveness of the resulting product (Rachman, n.d.). In this study, the researcher developed a product in the form of an Augmented Reality-based Virtual Map, involving 17 students as subjects. The research was conducted from August to December 2024, with the study taking place at SDN Larangan Luar 2, Pamekasan Regency. The researcher employed data collection techniques such as interviews, needs questionnaires, documentation, and observation. This development research follows the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In this development study, the researcher applied the ADDIE development model to create Augmented Reality-based learning media, designed step by step through each stage.

3. Result and Discussion

Analysis of Data

Data Presentation is the stage where the data obtained during the product development is outlined. The product developed in this study is an Augmented Reality-based Virtual Map. Below is an explanation of the data presentation:

Analyze

The Analysis stage is used to analyze the initial needs in the development of the product. The researcher conducts an analysis of several aspects, including the characteristics of the students, the issues identified, and an analysis of the teaching materials. Based on observations made in the fourth-grade class at SDN Larangan Luar 2, it was revealed that student activity during the learning process is still relatively passive. Observations showed that students appeared bored

during lessons. Furthermore, the results of a questionnaire given to the students indicated that they had a curiosity and interest in learning about tourist locations in Pamekasan. Based on interviews with the fourth-grade teacher at SDN Larangan Luar 2, data was obtained that the teacher had difficulty finding appropriate media for teaching the Indonesian language subject. The teacher admitted that during lessons, they had to rely solely on printed textbooks to deliver the material.

Design

In the Design stage, the researcher creates the learning media design, which will later be submitted to the supervising lecturer for approval and feedback to refine and finalize the product for development (Carolina, 2022). The design includes drafts made using various applications such as Canva, Blender 4.3, Assemblr, and IbisPaint. These tools are used to create the Augmented Reality-based Virtual Map learning media. Canva is used for graphic design, Blender 4.3 for 3D modeling, Assemblr for AR content creation, and IbisPaint for designing visual elements. The combination of these tools is intended to produce an interactive and engaging learning media that will enhance students' learning experiences.

Development

This stage is carried out by researchers after the design and design stage, then realized into a real product, namely learning media. The product is made according to the storyboard that has been designed by the researcher.

Implementation

The Virtual Map Learning Media based on Augmented Reality for Pamekasan tourism that has been printed is then tested to get an assessment of the developed teaching materials (Fakhrudin & Kuswidyankar, 2020). The assessment is seen in terms of validity. Data at the implementation stage was obtained from the implementation of product trials consisting of expert trials. The expert trial was carried out by giving a questionnaire to several experts with the aim of obtaining a validity score from the Virtual Map learning media. The results of this validity test can be described as follows:

*Validation of Learning Design Experts***Table 1.** Results of the Validation Questionnaire of Learning Design Experts

No.	Indicators	Scores obtained
1.	The accuracy of learning objectives with the material given to students.	5
2.	The accuracy of learning objectives with the level of student development.	4
3.	Suitability of the systematics of the preparation of teaching modules.	4
4.	Suitability of learning steps with learning objectives.	5
5.	Activities in Learning Steps emphasize more on the learning experience of students	4
6.	Appropriateness of time allocation in teaching modules.	4
7.	Appropriateness of time allocation at each learning step.	3
8.	Attaching assessment instruments for the purpose of evaluation and assessment of learning outcomes in the form of tests and non-tests.	4
9.	Suitability and completeness of evaluation instruments (questions, answer keys, and scoring guidelines)	5
10.	The suitability of the assessment instrument with the learning objectives to be achieved	5
Number of scores obtained		43
Maximum number of scores		50

The results of the material expert validation assessment based on the results above were obtained with a score of 43 with a maximum score of 50 with a feasible and usable record.

Validation of Learning Materials Experts

Table 2. Results of the Validation Questionnaire for Learning Material Experts

No.	Indicators	Scores Obtained
1.	The material and pictures of the Pamekasan tourist location presented are relevant.	4
2.	Examples of explanations of Pamekasan tourist locations on the Virtual Map are relevant to the competencies that must be mastered by students.	5
3.	The depth of the material description is in accordance with the level of understanding of the students	4
4.	Completeness of the description of the material about the Pamekasan tourist location	3
5.	The material presented is in accordance with the scientific field (according to theory)	4
6.	Presenting the complete presentation of Pamekasan tourist locations (Location Pictures, explanations, plans)	5
7.	The Pamekasan Tourism Virtual Map presents systematic material from simple to complex	4
8.	Pamekasan Tourism Virtual Map encourages students to preserve local wisdom of regional tourism	5
9.	Pamekasan Tourism Virtual Map encourages students' curiosity	4
10.	Pamekasan Tourism Virtual Map encourages students to build their own knowledge	4
Number of scores obtained		42
Maximum number of scores		50

The results of the material expert validation assessment based on the results above were obtained with a score of 42 with a maximum score of 50 with a feasible and usable record.

*Validation of Teaching Materials Experts***Table 3.** Results of the Validation Questionnaire for Teaching Materials Experts

No.	Indicators	Scores Obtained
1.	The suitability of the Pamekasan Tourism Virtual Map to the needs of students	5
2.	Suitability of the Pamekasan Tourism Virtual Map with the characteristics of students	4
3.	The ability of the Pamekasan Tourism Virtual Map to develop students' motivation to learn	4
4.	The ability of the Pamekasan Tourism Virtual Map as a tool to understand and remember information	5
5.	Efficiency of Pamekasan Tourism Virtual Map in relation to time	5
6.	Virtual Map of Pamekasan Tourism in relation to the cost	5
7.	Pamekasan Tourism Virtual Map in relation to energy	5
8.	The ability of the Pamekasan Tourism Virtual Map to attract students' attention and interest in learning	5
9.	The Pamekasan Tourism Virtual Map can be used for a long period of time	4
10.	The Pamekasan Tourism Virtual Map has good quality and is not easily damaged	4
Number of scores obtained		46
Maximum number of scores		50

The results of the validation assessment of teaching material experts based on the results above obtained a score of 46 with a maximum score of 50 with a feasible and usable record.

Evaluation

Evaluation is the result of researcher data that goes through the stages of results and validation tests. The evaluation has been carried out in several stages consisting of design, analysis, development, and implementation. The analysis of the validity of teaching materials was obtained based on assessments from several experts. Table 1.1 shows the results of the validation of the learning design, which is 43 out of 50. Table 1.2 shows the results of the validation of

learning materials, which is 42 out of 50. Table 4.4 shows the results of the validation of teaching materials, which is 46 out of 50. Based on the value of each expert, then the researcher obtained the percentage of results from each expert:

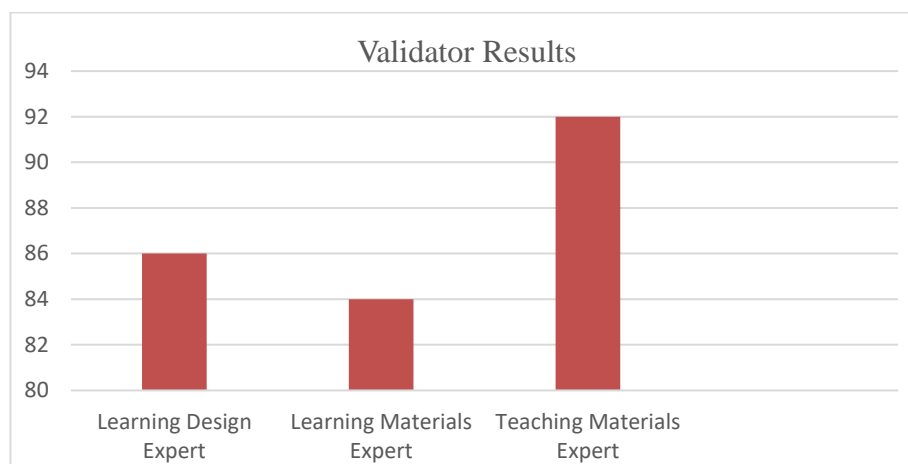


Figure 1. Expert Validator Result Diagram

The results of the validity of the validators were 86% learning design experts, 84% learning material experts, and 92% teaching material experts. Based on the results of presentations from several experts, the developer will calculate the combined validation using the combined validation formula. (Akbar, 2013: 158).

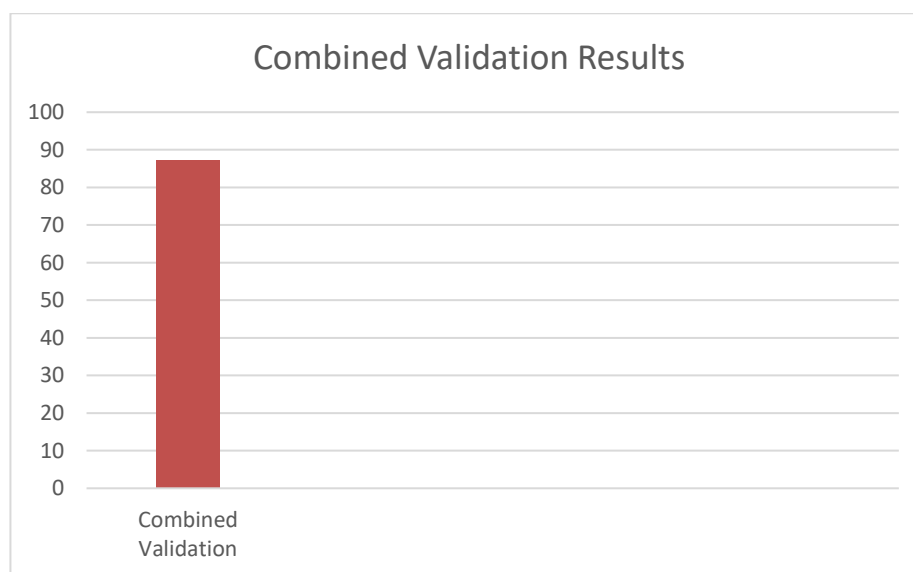


Figure 2. Combined Validation Results

Based on the results of the calculation of the combined average of the three validations, a percentage of 87.3% was obtained, including the very valid category based on the validity criteria of Virtual Map teaching materials based on Augmented Reality.

4. Conclusion

Development of Augmented Reality (AR)-based learning media to increase the learning interest of grade IV students in Indonesian subjects at SDN Larangan Luar 2. This research is motivated by the low interest and motivation of students in learning, especially in lessons that are considered boring. By utilizing AR technology, which combines digital objects with the real world, it is hoped that the learning process will be more interesting and interactive, so that it can improve students' understanding and academic achievement. Through the stages of structured research using the ADDIE model, the results of the test show that the developed learning media received excellent validation from experts, with an average validity percentage of 87.3%. This indicates that the use of AR in the context of Indonesian learning has great potential to create a more innovative and effective learning environment (Spatioti et al., 2022)

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