

Research Article

The Effect of Using Interactive Multimedia Design with the STEM VR Approach to Strengthening Pancasila Student Profiles in Elementary School

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Abstract.

In producing interactive multimedia, based on STEM VR, with the help of virtual reality which elementary school students need in studying human digestion material, it is hoped that virtual packaging of human digestion material will increase students' understanding of the topic that cannot be seen by the naked eye. Critical and creative research was carried out on the development of interactive multimedia based on virtual reality for learning about human digestion in fifth-grade elementary schools. This research uses the MDLC stage model with six stages, namely concept, design, material collection, assembly, testing, and distribution. The subject is fifth-grade elementary school. The VR-based interactive multimedia product was validated by experts and continued with a posttest and user response questionnaire with the following results. The science material interactive multimedia product has been validated by material and media experts with results that are very suitable for use in the learning process. Then the product was tested on a limited basis at the SDN Rejosari 01 Semarang school with the influence of 84.4% of students really liking VR-based interactive multimedia products and 15.6% being influenced. Other factors that prevent students from achieving optimal learning outcomes include the school's lack of VR-related infrastructure so that students are not optimal.

Keywords: the effect, interactive multimedia, STEM VR, Science material, elementary school

1. Introduction

Science learning in elementary schools is not just learning that has been conveyed. Still, elementary school students must really master the material correctly. Students enjoy participating in class learning, then based on observations at Pedurungan Kidul Elementary School, Semarang and Harapan Bunda Islamic Elementary School, Semarang in 2022, it shows that 70% of fifth-grade elementary school students in science learning really need a touch of technology in their learning in class, this needs to be innovated

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because science learning is concrete learning that requires real examples, provides opportunities to think, explore curiosity, be responsible, discipline, never giving up in the face of secrets or natural phenomena. Meanwhile, in classroom learning, students are only directed to memorize information, remembering without understanding the information obtained in daily life activities [1]. Most teachers are fixated on textbooks as a learning resource. As time goes by, technological developments and research have emerged, and many references have emerged to make science learning fun, but not necessarily suitable for the conditions in the class being taught. Apart from creating interesting learning media, a teacher must be able to choose a learning approach that suits the characteristics of students, one of the approaches used is the integrated STEAM approach to project-based learning (Project Based Learning) carried out in learning that has the aim of producing a product by applying the principles of STEAM (Science, Technology, Engineering, Art and Mathematics) principles in creating projects. [2], then the application of interactive multimedia can improve students' understanding of science concepts in elementary schools for the better [3]. With this interactive multimedia media, it is hoped that an independent and creative Pancasila student profile will be formed with the various facilities available in this interactive multimedia media.

Based on conditions in schools and relevant research, the problem can be formulated as follows: is there an influence of the use of interactive multimedia media for elementary science material on students' independence and creativity?

2. Method

The research method used is the Luther-Sutopo version of the Multimedia Development Life Cycle (MDLC) development model through six stages [4], namely concept, design, material collection, assembly, testing and distribution, and produces interactive science multimedia products that have been validated by both material expert validation and media expert validation [5]. After the science interactive multimedia product was validated with excellent results, the product was then tested on a limited basis at SDN Rejosari 01 Semarang from August to September 2023 by selecting 1 experimental class and 1 control class with the results tested by simple regression after students were treated with interactive multimedia based STEM VR.

3. Result and Discussion

In this research, an interactive multimedia design was produced using the STEAM approach to science learning, making elementary school students more enthusiastic about learning inside and outside the classroom, then the resulting interactive multimedia design made students and teachers more interactive in understanding science material and increased student independence and creativity in supporting profile of Pancasila students, below are the results of research using the MDLC model as follows:

3.1. Concept.

In this concept step, we have looked for an interactive multimedia concept that is integrated with STEAM class V science material, a concept that we have discussed with media experts and teachers at SDN Rejosari 01 Semarang who want interesting learning that can increase motivation, student learning achievement and especially the profile of Pancasila students, namely independent, critical reasoning and creative, therefore the STEAM approach is suitable by linking technology with learning. One of the technologies that is suitable for the STEAM model is virtual reality which can increase students' creativity and critical and creative reasoning. By developing Interactive Multimedia in Class V Elementary School Thematic Learning, elementary school children are more motivated in learning science [6]. Then, by creating interactive multimedia with Canva as a science learning medium for heat transfer material in elementary school, children can master the material more thoroughly and have fun [7].

3.2. Design

In designing elementary science material, you need strong skills, especially in creating VR applications for science learning in fifth grade elementary schools, in creating attractive designs and displaying 3D objects for use in fifth grade elementary science learning, one of which is the theasys application which displays 3D objects in learning in class is assisted by VR glasses or Oculus VR.

3.3. Collection of materials

The interactive multimedia materials collected are prepared according to the theme that will be chosen for elementary school science material. The learning materials used are human digestion material which was chosen based on discussions with UPGRIS science lecturers and teachers at SDN Rejosari Semarang. This is because learning about human digestion is very important. It is important for students to master this material about human digestion so that they can think critically about the food they eat every day, and what the input and output processes are like because it cannot be seen by the eye, so innovation is needed to make it visible in 3D in classroom learning.

3.4. Influence Test

In this research, the influence test was carried out using a simple linear regression test with the help of the SPSS program. This test aims to determine the effect of using interactive multimedia media based on STEM Virtual Reality (VR) on student learning achievement. From the SPSS output results, the following results were obtained.

TABLE 1: Results of a simple linear regression test.

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.649	12.450		4.723	.000
	Interactive Multimedia	.340	.158	.374	1.525	.183

Dependent Variable: Result Test

From the coefficients table 1, constant values and simple regression coefficient values for the independent variables are obtained. From this value, a simple regression value can be found which is expressed in the following equation.

$$Y=37.4+(1.525)X.$$

From this equation, the results of the simple regression equation mean A constant of 37.4, if the Interactive Multimedia Media variable is assumed to be constant, then learning achievement will increase by 37.4. The regression coefficient value for the Interactive Multimedia Media variable in the regression equation shows a positive value of 1.525, which means that if the Interactive Multimedia Media variable increases by 1%, then learning achievement will increase by 1.525%. From the results of testing the regression coefficients, it is concluded that the use of Interactive Multimedia Media

has a positive effect on learning achievement at SDN Rejosari 01 Semarang. To find out how much influence the independent variable (Interactive Multimedia Media) has on the dependent variable (learning achievement) can be seen in the R square value contained in the SPSS output as follows.

TABLE 2: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.323 ^a	.844	.889	6.953
a. Predictors: (Constant), Multimedia Interaktif				

From the Model Summary table 2, it is found that the R Square value is 0.844=84.4%. This value means that the influence of interactive multimedia media on learning achievement is 84.4%, while 15.6% of learning achievement is influenced by other variables outside of the independent variables in this study. Developing interactive multimedia-based learning media, it is able to increase scientific literacy in the subject of digestive organs and their functions for fifth-grade students at SEMPU Elementary School by up to 70 percent [8], then it is further confirmed that by developing interactive multimedia-assisted inquiry learning in science subjects for fifth-grade elementary school, it is able to improve the completeness of student learning [9], then a study of interactive-based learning media to strengthen the profile of Pancasila students in elementary schools shows that interactive technology makes students more critical and innovative in participating in science learning [10].

Limited test documentation at SDN Rejosari 01 Semarang can be seen in the Figure 1.

Distributing interactive science multimedia products to all elementary schools in the Kedungsapur area will be carried out in October 2023. This has been shown that learning using interactive multimedia (adobe flash CS6) is able to improve the mathematics learning outcomes of fifth-grade students at SD N Jurug Sewon [11], then with computer-based interactive multimedia: a study on the effectiveness of integrative thematic learning in elementary schools [12], so using Model of Geometry Realistic Learning Development with Interactive Multimedia Assistance in Elementary School [13], The effectiveness of STEAM-based augmented reality media in improving the Quality of natural science learning in elementary school [14], Interactive multimedia development with a contextual approach it is able to improve problem-solving mathematical abilities [15], then using Interactive Multimedia makes Teachers at SMP Negeri 1 Karangawen Demak more motivated in carrying out learning in the classroom [16]. The obstacle in this research is the limited tools for playing virtual reality-based interactive multimedia



Figure 1: Limited test of interactive multimedia products at SDN Rejosari 01 Semarang.

which only certain schools in the city of Semarang have because the tools for playing VR-based media must use VR glasses and Oculus VR which elementary schools very rarely own, the next obstacle is The material created regarding human digestion must be adapted to the independent curriculum so that it must truly suit the learning objectives.

4. Conclusion

The VR-based interactive multimedia product was validated by experts and continued with a posttest and user response questionnaire with the following results The science material interactive multimedia product has been validated by material and media experts with results that are very suitable for use in the learning process. Then the product was tested on a limited basis at the SDN Rejosari 01 Semarang school with the influence of 84.4% of students really liking VR-based interactive multimedia products and 15.6% being influenced. Other factors that prevent students from achieving optimal learning outcomes include the school's lack of VR-related infrastructure so that students are not optimal.

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