Jurnal Edutech Undiksha
Volume 11, Number 2, Tahun 2023, pp. 369-377
P-ISSN: 2614-8609 E-ISSN: 2615-2908
Open Access: https://doi.org/10.23887/jeu.v11i2.64169

Environment-Based Interactive Multimedia to Improve Learning Outcomes in Natural Science Learning Content

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ARTICLE INFO

Article history:
Received June 21, 2023
Accepted November 09, 2023
Available online December 25, 2023

Kata Kunci:
Multimedia Interaktif, Lingkungan, Hasil Belajar

Keywords:
Interactive Multimedia, Environment, Learning Outcomes

ABSTRAK

Tidak memanfaatkan media pembelajaran menyebabkan pemahaman yang kurang tentang materi, yang menyebabkan siswa tidak memahami pelajaran. Siswa tidak memiliki motivasi untuk mengikuti pelajaran, yang menyebabkan mereka kehilangan fokus selama proses pembelajaran. Tujuan penelitian ini yaitu untuk mengembangkan Multimedia Interaktif Berbasis Lingkungan Pada Muatan Pelajaran IPA Di Kelas V SD. Jenis penelitian ini yaitu pengembangan dengan menggunakan model ADDIE. Subjek penelitian ini yaitu 1 ahli isi pembelajaran, 1 ahli desain pembelajaran, dan 1 ahli media pembelajaran. Uji coba produk dilakukan pada siswa yaitu 3 siswa untuk uji perorangan dan 9 siswa untuk uji coba kelompok kecil. Metode pengumpulan data penelitian ini menggunakan kuesioner dan tes. Instrument pengumpulan data berupa kuesioner. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif, kuantitatif, dan statistic inferensial. Hasil penelitian yaitu penilaian yang dilakukan oleh ahli isi mata pelajaran 94,6% (sangat baik). Hasil penilaian dari ahli media pembelajaran nilai 95,7% (sangat baik). Penilaian berdasarkan hasil uji coba perorangan mendapatkan nilai 91% (sangat baik). Hasil uji coba kelompok kecil mendapatkan nilai 81,83% (baik). Hasil uji-t menunjukan terdapat pengaruh yang signifikan antara Multimedia Interaktif Berbasis Lingkungan terhadap hasil belajar siswa. Disimpulkan bahwa Multimedia Interaktif Berbasis Lingkungan layak dan dapat meningkatkan hasil belajar siswa.

ABSTRACT

Not utilizing learning media causes a lack of understanding of the material, which causes students not to understand the lesson. Students need to be motivated to follow the lesson, which causes them to lose focus during the learning process. This study aims to develop Environment-Based Interactive Multimedia in Science Content in Class V SD. This type of research is developed using the ADDIE model. The subjects of this research were one learning content expert, one learning design expert, and one learning media expert. Product trials were carried out on students, 3 for individual trials and 9 for small group trials. Methods of collecting data in this study using questionnaires and tests. The data collection instrument is in the form of a questionnaire. The techniques used to analyze the data are descriptive qualitative analysis, quantitative, and inferential statistics. The result of the research is the assessment made by subject matter experts, which is 94.6% (very good). The assessment results by learning media experts were 95.7% (very good). Assessment based on the results of individual trials gets a score of 91% (very good). The results of the small group trial obtained a score of 81.83% (good). The results of the t-test show that there is a significant influence between Environment-Based Interactive Multimedia and student learning outcomes. It was concluded that Environment-Based Interactive Multimedia is feasible and can improve student learning outcomes.

1. INTRODUCTION

Human development and survival depend heavily on quality education. Education is developing human resource skills regarding spirituality and intellectuality (Bates, 2019; Criollo-C et al., 2021; Karwati, 2016). Education increases a person's knowledge and potential. Over time, education grew, and more and more efforts were made to improve its quality. New ideas are needed to improve the quality of education in

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schools (Farooq et al., 2020; Saito & Watanobe, 2020). Basic education aims to change students' personalities through learning activities and equip them with superior personalities, knowledge, and skills. Students can obtain important information in learning activities through a single interaction (Setyowati & Mustaji., Subroto, 2018; Yuanta, 2019).

Learning is defined as a two-way communication process between educators and students. Teachers have three main roles during learning activities: planner, implementer manager, and evaluator. Teachers who work as educators must teach students to strive diligently in their education (Adiningtiyas, 2017; Rosita & Suherman, 2020). Students gain new understanding, knowledge, abilities, and personality changes due to learning. Thus, refining the curriculum, improving educational facilities and infrastructure, and implementing training will be very useful for improving the quality of educators (Andrian & Rusman, 2019; Tiara & Sari, 2019). The Indonesian government has done a lot to improve the quality of education, but these efforts must be increased further to reach the expected standards. The learning process in the classroom is the key to the success of the quality of education. The learning activities in class can help students maximize their potential (Divayana et al., 2016; Siregar et al., 2022).

However, the current problem is that classroom management could be more optimal. Previous findings also reveal that the problem that often occurs in the classroom is that teachers need help designing appropriate learning (Aryantini et al., 2021; Hamidah & Citra, 2021; Kaban et al., 2021). Other findings also reveal that the need for more innovative media is one of the main factors hindering students' lack of understanding (Lubis & Hidayat, 2021; Roshonah & Dwitami, 2021). The results of observations carried out at SD N 3 Panji Anom also found problems. The problem faced is the same as students who need help understanding the subject matter. The results of observations and interviews with subject teachers show that students experience boredom when conducting lessons. Apart from that, there needs to be more time to create interactive learning media to increase students' knowledge, and learning materials are difficult for students in fifth-grade elementary school to understand.

The inability to utilize learning media causes students not to understand the understanding provided by the teacher. Not utilizing learning media also causes poor understanding of the material, which causes students not to understand the lesson. In addition, the interview results show that students need to be more motivated to follow lessons, which causes them to lose focus during the learning process. Teachers usually give assignments as soon as students gather at school. The observation results also show that, as a fifth-grade homeroom teacher and teacher, using discussion, question and answer, and assignment methods using various methods in the learning process will have a positive impact on students. However, due to the transition from online to offline learning, at SD N 3 Panji Anom, 25 fifth-grade students have scores above the average of 3 people. This variation method still needs to be visible more during the learning process. Learning outcomes are used to determine students' level of knowledge during the learning process. In the learning process, teachers do not use interactive media; instead, they only depend on conventional media. If this is allowed, student learning outcomes will be very bad.

The solution to overcome this problem is to use technology-based media. Revolution 4.0 involves technological advances that involve the use of information technology not only in the world of work but also in the world of education to enable the use of this technology in the educational process (Khonitan & Utami, 2019; Widyawati et al., 2021). One of the media that can be used is environment-based interactive multimedia. By presenting videos and images, interactive media is chosen to help students with different learning styles (Anggreni et al., 2021; Husein et al., 2017). Students with different learning speeds can also use this interactive media (D. Arina et al., 2020; Saifudin et al., 2020). In addition, previous findings show that interactive media can help children learn science (G. Dwiqi et al., 2020; Hotimah & Muhtadi, 2018). Research also finds that interactive media helps students learn science and can improve their learning outcomes (Saputra & Putra, 2021). Therefore, interactive media learning models can solve science learning problems. In packaging, video, and animation are used together. Animation is the process of bringing something to life that does not move. Therefore, it is clear that the animated video consists of several moving image presentations that can be delivered directly to students. In this way, students can directly understand the storyline depicted in the animation through materials, media, video, and animation. Animation attracts students' interest and attracts them to learn.

Previous research findings state that children like multimedia (G. C. S. Dwiqi et al., 2020; Qistina et al., 2019). Other findings also state multimedia can improve student learning outcomes (Stiawan et al., 2017; Yasa et al., 2021). It was concluded that interactive multimedia can help students learn. Interactive multimedia adapted to science learning materials will be developed in the environment. Natural environment-based learning refers to the characteristics of students at elementary school age, where students carry out direct activities related to the material being studied without using intermediaries. Environment-based interactive multimedia can help students get to know their surroundings. To make science learning easier, the interactive media that will be developed will present things related to the

environment around students. There has yet to be a study regarding Environment-Based Interactive Multimedia to Improve Learning Outcomes in Science Lesson Content in Fifth Grade Elementary Schools. Based on this, this research aims to develop environment-based interactive multimedia for science lesson content in the fifth grade of elementary school.

2. METHOD

This type of research is developed using the ADDIE model, which includes analysis, design, development, implementation, and evaluation (Yu et al., 2021). Product needs, student characteristics, and the learning environment are analyzed at the analysis stage. At the design stage, interactive multimedia products are designed as flowcharts and storyboards used as references. Interactive multimedia was developed at the development stage. At the implementation stage, the product being developed is implemented. The evaluation stage was carried out to test interactive multimedia. The subjects of this research were one learning content expert, one learning design expert, and one learning media expert. Product trials were carried out on students: three for individual trials and nine for small group trials. This research data collection method uses questionnaires and tests—questionnaire method for collecting data in the form of scores given by experts. Test methods are used to test product effectiveness. The data collection instrument is a questionnaire. The instrument grid is presented in Table 1 and Table 2.

Table 1. Learning Content Expert Instrument Grid

No	Aspect	Indicator	Item Number
1.	Curriculum	a. Suitability of learning multimedia with learning indicators	1
		b. Suitability of learning multimedia with learning objectives	2
		c. Suitability of learning multimedia with learning indicators	3
		d. Learning objectives are by the ABCD format	4
2.	Method	a. Clarity of presentation of material	5
		b. Availability of examples	6
		c. Conformity of material with images	7
		d. Compatibility of material with animation	8
		e. Material completeness	9
		f. The material is given coherently	10
3.	Language	a. Use clear and precise sentences	11
		b. Appropriate use of language in communication with students	12
4.	Evaluation	a. Difficulty level of questions	13
		b. Suitability of questions to learning objectives	14
		c. The questions given are easy to understand and unambiguous	15

(Modified from Geni et al., 2020)

Table 2. Learning Design Expert Instrument Grid

No	Aspect	Indicator	Item Number
1.	Learning	a. Clarity of indicator formulation	1
		b. Compliance with indicators	2
		c. Accuracy in choosing learning methods	3
		d. Suitability of learning steps	4
		e. Conformity of assessment techniques with established indicators	5
		f. Suitability of assessment instruments Assessment techniques	6
		g. Media selection decisions	7
		h. The use of media makes learning easier	8

(Modified from Geni et al., 2020)

The techniques used to analyze data are qualitative descriptive analysis, quantitative, and inferential statistics. Qualitative descriptive analysis is a method used to process research data through reviews from student and teacher experts. Quantitative analysis is a method used to process research data through scores from student and teacher experts. Inferential statistical analysis tests the effectiveness of interactive learning multimedia products. The results of the pre-test and post-test will be analyzed using the t-test.

3. RESULT AND DISCUSSION

Results

This research aims to develop environmentally-based interactive multimedia learning using ADDIE. First, analyze. The analysis results are that teachers who use discussion, question and answer, and assignments that use various methods in the learning process will positively impact students. However, due to the transition from online to offline learning, at SD N 3 Panji Anom, there are 25 fifth-grade students with scores above the average of 3 people. This variation method still needs to be visible more during the learning process. Learning outcomes are used to determine students' level of knowledge during the learning process. In the learning process, teachers do not use interactive media; instead, they only depend on conventional media. If this is allowed, student learning outcomes will be very bad. The results of the curriculum analysis are presented in Table 3.

Table 3. Description of Basic Competencies and Indicators

Basic Competencies	Indicators of Competence Achievement
3.8 Analyze the water cycle and its impact on events on Earth and the survival of living things	3.8.1 Identify the stages in the cycle 3.8.2 Describe the stages in the water cycle, such as evaporation, condensation, and precipitation. 3.8.3 Summarize the impact of the water cycle on events on Earth.

Second, design. At this stage, environment-based interactive multimedia learning is designed. Apart from that, research instruments were also developed at this stage. The initial stage was designed by designing an environment-based interactive multimedia learning storyboard to facilitate development. The environment-based interactive learning multimedia storyboard that was developed contains three parts: opening, content, and closing. The results of developing an environment-based interactive multimedia learning storyboard are presented in Figure 1.

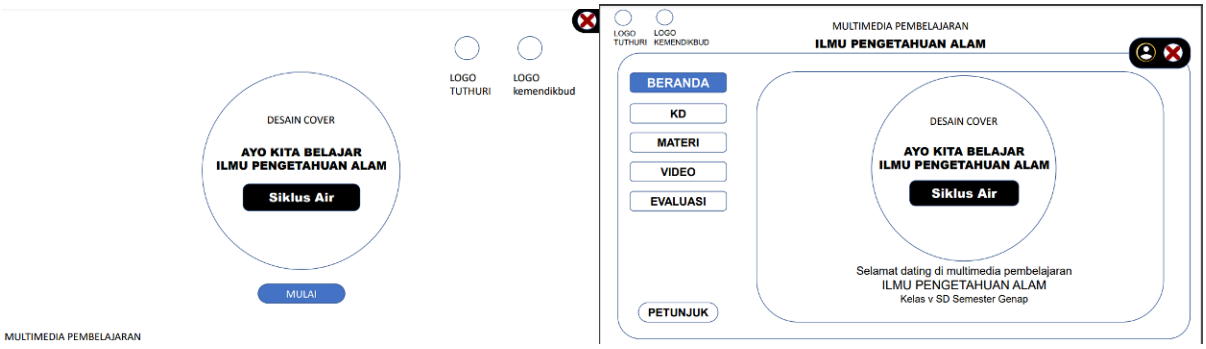

Figure 1. Multimedia Storyboard for Environment-Based Interactive Learning

Third, development. At this stage, Environment-Based Interactive Learning Multimedia is developed based on the storyboard created at the design stage. At the development stage, Environment-Based Interactive Learning Multimedia consists of 3 scenes: opening, content, and closing. The opening stage contains the title and start media button. The opening contains a homepage display, instructions, basic competencies, learning objectives, materials, evaluation, biodata, and an exit button. The content scene contains the learning material. The closing stage contains learning evaluation. The development results are presented in Figure 2.

Figure 2. Environment-Based Interactive Learning Multimedia

The Environment-Based Interactive Learning Multimedia that has been developed is then tested for validity. Based on the assessment results from learning design experts, they got a result of 95%, so they have very good qualifications. The assessment results by subject content experts were 94.6%, resulting in very good qualifications. The assessment results from learning media experts received a score of 95.7%, resulting in very good qualifications. Fourth is implementation. At this stage, environment-based interactive multimedia is implemented for students and teachers. The assessment results based on the results of individual trials received a score of 91%, resulting in very good qualifications. The results of the small group trial got a score of 81.83%, so they had good qualifications.

Fifth is evaluation. At this stage, a test of the success of Environment-Based Interactive Learning Multimedia implemented on students is carried out. The normality test results obtained a value of 0.958 > 0.05, so it can be concluded that the pre-test data is normally distributed. The post-test data is 0.222, so if 0.222 > 0.05, it can be concluded that the post-test data is normally distributed. The homogeneity test result is 0.063, so 0.063 > 0.05, so it can be concluded that the pre-test and post-test data are homogeneous. Next, a t-test was carried out. The results of data analysis were that a significance value was obtained, 0.000, so that 0.000 < 0.05. Based on these results, H_0 is rejected, and H_1 is accepted, so it can be concluded that there is a significant influence between Environment-Based Interactive Multimedia and the ADDIE Model on the learning outcomes of fifth-grade students at SD Negeri 3 Panji Anom. It was concluded that Environment-Based Interactive Multimedia with the ADDIE Model can improve student learning outcomes. The t-test results are presented in Table 4.

Table 4. T-Test Results

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Test - Post Test	-44.640	12.093	2.419	-49.632	-39.648	-18.457	24	0.000

Discussion

Environment-Based Interactive Learning Multimedia gets excellent and practical qualifications from experts. Apart from that, there is a significant influence between Environment-Based Interactive Multimedia and the ADDIE Model. Several factors cause this. First, media development pays attention to learning design elements. Environment-Based Interactive Multimedia received excellent qualifications from learning design experts. Learning design experts consider This media very good because the indicator formula is clear, and the learning material is appropriate (Aruan et al., 2019; Hidayati & Irmawati, 2019; Weng et al., 2019). It is reinforced by research findings stating that clear indicator learning material will make it easier for students to understand (Husein et al., 2017; Prasetyo et al., 2021; Shi, 2017). Other research also finds that formulating indicators will make it easier for students to understand the material (Arsyad, 2018; Lindasari et al., 2019). This media also examines the learning process to clarify the material presented.

Second, Environment-Based Interactive Multimedia to improve Learning Outcomes has very good qualifications from learning material experts because it pays attention to aspects of learning material and learning indicators and objectives. The theory regarding learning media also states that if students' basic competencies are adapted to the learning objectives presented in the media, it will make the lesson easier for them to understand (Mukmin & Primasatya, 2020; Nazalin & Muhtadi, 2016; Pangaribuan & Saragih, 2014). Other findings also state that developing learning media that considers aspects of learning objectives produces media well-received by experts (G. Dwiqi et al., 2020; Kuswanto et al., 2017). The media also pays attention to how the material is presented and the sequence of the material, which results in a systematic presentation of the material.

Third, considering the media's quality, using environmentally-based interactive media to improve learning outcomes is an excellent choice for learning media experts. With the ADDIE model, environment-based interactive media offers an attractive display of material that attracts students' attention (Jonnalagadda et al., 2022; Kurniawan & Soenarto, 2022). In addition, other research finds that well-made multimedia can make students more interested in learning (Ayu et al., 2015; Fauyan, 2019; Rejeki & Mukminan, 2020). Environment-based interactive multimedia focuses on using images, text, and animation

to make material presented clearly. Previous studies show that using appropriate text will make reading easier for students (G. Dwiqi et al., 2020; Kuswanto et al., 2017; Rosalina & Suhardi, 2020). In addition, other research has found that the quality of images presented in multimedia will increase students' interest in learning (Rejeki & Mukminan, 2020).

Previous research findings also suggest that high-quality media is critical to helping students learn (Dina Arina et al., 2020; Rahmadianto & Melany, 2018). Other research also states multimedia can improve the atmosphere and student learning outcomes (Hendriawan & Muhammad, 2018; Wibawa, 2017). Environment-Based Interactive Multimedia has paid attention to all aspects of developing learning media for learning. Appropriate technology will achieve learning goals. The use of technology in learning is very important because it helps teachers and students. The difference between this research and others is that environment-based interactive media is different from other interactive media because it presents information relevant to the environment around students. Environment-Based Interactive Multimedia can be used on various devices, such as mobile phones, laptops, and computers, making it very practical for learning. This research implies that environmentally based interactive media can be used to improve student learning outcomes, especially regarding the topic of water cycle.

4. CONCLUSION

The results of the data analysis show that Environment-Based Interactive Learning Multimedia has received very good and practical qualifications from experts and students. The t-test results show a significant influence between Environment-Based Interactive Multimedia and the ADDIE Model on the learning outcomes of fifth-grade students at SD Negeri 3 Panji Anom. It was concluded that Environment-Based Interactive Multimedia with the ADDIE Model can improve student learning outcomes.

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