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The Influence of the Use of VR-Based Learning Media on Learning Outcomes and Learning Motivation of Students in Science Learning for Class IV SDN Sadeng 03

Nur Aziz[1], Tri Astuti[2], Nova Dwi Handayani[3], Rebecca Amellya Widyasepti[4], Fatimah Nurussyifa Clever Bright[5], Kania Yosa Nadila[6]
[1,3,4,5,6] Department of Primary Education, Faculty of Education and Teacher Training, Universitas Negeri Semarang, Semarang, Indonesia
[1]putraragil9997@students.unnes.ac.id , [2]triastuti@mail.unnes.ac.id , [3]novadwihandayani1@students.unnes.ac.id , [4]rebecca01@students.unnes.ac.id , [5]cleverbright147@students.unnes.ac.id , [6]kaniayosanadila@students.unnes.ac.id

ABSTRACT

This study aims to determine the effect of using Virtual Reality (VR) media on students' understanding and motivation to learn in learning Natural and Social Sciences (IPAS). The study was conducted with a quantitative approach using the ex post facto method, where researchers did not provide direct treatment, but analyzed data based on events that had occurred. The research subjects consisted of 16 students, with data collected through observation and questionnaires. The results of the analysis showed that 75% of students felt the benefits of using VR media in understanding IPAS material, while the other 25% showed doubts. In addition, the increase in IPAS scores that exceeded the Learning Objective Completion Criteria (KKTP) was also an indicator of the positive influence of VR media. In terms of learning motivation, 87.5% of students felt more motivated to use VR media, while the other 12.5% were doubtful. These findings indicate that VR media contributes to improving the quality of IPAS learning, both from the cognitive and affective aspects of students.

Keywords: Improved Learning Outcomes, Motivation to Learn, Virtual Reality,

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Corresponding Author:
Nur Aziz,
Department of Primary Education,
Universitas Negeri Semarang
Kampus UNNES Sekaran, Gunungpati, Semarang 50229 Jawa Tengah, Indonesia.
putraragil9997@students.unnes.ac.id

1. INTRODUCTION

The development of digital technology has changed the educational environment at various levels, including elementary schools. As part of learning in the 21st century, teachers not only need to provide materials, but also address them according to the characteristics of the digital-native generation, which is interesting and interactive. Students need to think proactively, creatively and critically about more dynamic training that is developing in a more dynamic direction. Learning is no longer focused on teachers *(teacher-centered)* , but is starting to shift to students *(student-centered)* . Students are directly involved in the learning process through exploration, collaboration, and the use of digital technology. This is a challenge and opportunity for the world of education, especially in the development of innovative learning media. The world of education has been greatly influenced by advances in modern technology, especially in terms of learning media, teaching techniques, and student perspectives. However, when older teachers face difficulties in adapting to contemporary learning trends, problems arise. Many of them still use traditional methods, such as lecture methods that take place continuously, using whiteboards, and assessing student learning outcomes through easily accessible learning modules, Student Worksheets (LKS). Memorization methods, or *mnemonics* , as well as learning approaches that center on passively gathering facts and information, referred to as the “banking model,” are other conventional techniques often used by senior teachers.

Nowadays, students’ needs are not only limited to delivering information verbally or visually; they also need media that can provide concrete, interesting, and relevant learning experiences to their world. *Virtual Reality -based learning media (VR)* is one type of developing media that can stimulate the senses,

increase focus, and foster broad learning motivation (Handayani, 2022). *Virtual Reality (VR) technology* is one of the media innovations that is increasingly relevant to be applied in learning because it allows users to experience a virtual environment in real terms through certain devices, such as *virtual reality headsets* (Fitriya et al., 2022). In learning, VR can create a learning atmosphere as if someone is in a virtual object or shot.

The previous research that is relevant to the research conducted by the researcher is *the first research,* which conducted by Nurul Fitri Azizah, Marisa (2023). This study examines the use of *Virtual Reality* in science subjects in elementary schools which aims to improve student interaction in learning. This study has been proven to be able to improve and encourage student interaction and active participation in learning because students are given experiences in the form of VR displays that resemble real conditions, so that students are interested in actively participating in the learning process.

Secondly, a study conducted by Dharma, Sugihartini, and Arthana (2018). The objective of this research was to assess the learning results of children utilizing VR in comparison to those using Children's Worksheets (LKA) on the topic of vehicle recognition at TK Negeri Pembina Singaraja. The research indicated that utilizing VR greatly influenced student learning results at TK Negeri Pembina Singaraja (Dharma et al., 2018).

Third, research conducted by Rahmawati, Isjoni, and Yuliantoro (2024). To increase students' motivation at SMAN 2 Singingi to learn, this study created a VR video about Muara Takus Temple. The study showed that the developed learning media received a very decent assessment from material experts, media experts and students. In addition, students' learning motivation increased after using the learning media (Rahmawati et al., 2024).

By providing more concrete and in-depth visualization, VR-based media is considered to have the ability to improve the quality of the learning process. With VR, students can interact with their learning environment virtually. This improves conceptual understanding and increases active student participation (Aini et al., 2023). In science learning, there is a lot of abstract and difficult to understand material only with printed or verbal media. Therefore, VR technology can help overcome this problem because it can turn abstract material into a real and interesting learning experience (Majda et al., 2023). The use of virtual media not only affects student learning outcomes but also affects their motivation to learn. Students may be more enthusiastic and focused when participating in learning that involves new interactive technology, such as (Rosmah et al., 2023). Students have higher intrinsic motivation because they feel directly involved in the learning process rather than just receiving information passively. Motivation is a major component of learning success, especially at the elementary level (Nursyafitri et al., 2024).

The implementation of VR-based educational tools in elementary schools continues to encounter numerous obstacles. Certain issues include restricted devices, insufficient teacher guidance, and low digital literacy levels in elementary school settings. Nonetheless, Virtual Reality (VR) technology has demonstrated significant promise in enhancing student involvement in learning, aiding in the visualization of abstract ideas, and boosting students' motivation to learn. Research by Tsaaqib, Buchori, and Endahwuri (2023) showed that the use of VR is more effective than conventional learning in trigonometry material in high schools. Students in the experimental class achieved higher average learning scores than students in the control class. These findings suggest that further research is needed on how VR media functions in elementary school science learning. Thus, this technology can be used more widely and effectively in elementary education (Tsaaqib et al., 2022). The purpose of this study is to determine and analyze how the use of VR learning media impacts learning outcomes and student learning motivation in the subject of science in grade IV at SDN Sadeng 03. This study is expected to help develop learning methods that are more creative, fun, and have a positive impact on elementary school students.

2. RESEARCH METHOD

This study employs a quantitative method utilizing the *ex-post facto method* . According to Sugiyono (2015) in Wahdah & Malasari, (2022) He stated that ex-post facto research is utilized to investigate or analyze return factors or reasons stemming from the event being studied, in which the incident or occurrence

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has already occurred from the respondents' perspective. Ex post facto research aims to investigate events that have taken place and then examine the past to identify the factors that led to the occurrence of the incident the (Syahrizal & Jailani, 2023). Then study This aiming to determine the effect of VR-based learning media on learning outcomes and learning motivation of students in science learning of grade 4 SDN Sadeng 03. The ex-post facto research approach was selected as this study aims to investigate the impact of VR-based learning media on the learning outcomes and motivation of grade 4 students in science education at SDN Sadeng 03. The subjects of this research were fourth-grade students of SDN Sadeng 03 during the 2023/2024 school year, comprising a total of 16 students. The researcher employed a sampling method known as total sampling or saturated sampling from this population, which involves using every member of the population as samples (Amin et al., 2023). This technique is often used if the population is small with a sample size of less than 30 people, or for research that wants to make generalizations with a small or small error rate so that all members of the population are represented. then a sample of 16 grade 4 students of SDN Sadeng 03 in the 2023/2024 academic year was taken.

Data gathering methods were implemented through structured interviews, surveys, and documentation (learning notes and records of educational activities). Interviews with fourth-grade students were carried out through a questionnaire that included details regarding the utilization of VR-based educational media employed for fourth graders, particularly in science classes. Subsequently, a questionnaire was created to gather data on how VR-based learning media affects the learning outcomes and motivation of fourth-grade students in science education. The data was subsequently examined through descriptive statistical analysis. This research employs descriptive statistical data analysis methods intended to outline learning results and student motivation following the utilization of Virtual Reality (VR)-based educational tools. The data obtained through the questionnaire were analyzed by calculating the average value and percentage of each statement, then interpreted into categories such as very high, high, medium, low, or very low, according to the predetermined value range. In addition, data from the interview were analyzed qualitatively through the process of simplifying important information, presenting it in narrative form, and drawing conclusions to support the findings of the questionnaire data.

To confirm that the questionnaire accurately assesses the intended dimensions, a validity test is conducted in two phases: content validity and empirical validity. Content validity is achieved by gathering input from specialists, such as supervisors and class teachers, who assess whether each statement in the questionnaire is in accordance with the learning motivation indicators to be measured. After the questionnaire is declared feasible.

Empirical validity was analyzed using data obtained from all students using *the Pearson Product Moment correlation technique* , with the formula, $r_{xy} = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{\{n\sum x^2-(\sum x)^2\}\{n\sum Y^2-(\sum Y)^2\}}}$.

Each statement in the questionnaire is compared to the overall score to see how well it represents what is being measured. A statement is deemed valid if its correlation coefficient exceeds the r table value at a specific significance level.

3. RESULTS AND DISCUSSION

A. Research Results

Based on the results of observations carried out by distributing questionnaires to respondents, data was found which was then analyzed and processed systematically by the researcher, thus obtaining research results which showed that

1. The use of VR-based learning media for class IV students at SDN Sadeng 03

Table 1. Results of the Questionnaire on the Use of VR-Based Learning Media for Grade IV Students at SDN Sadeng 03

Interval	Categories	Frequecy	%
106-125	Strongly agree	0	0
86-105	Agree	12	75

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66-85	Nether agree	4	25
46-65	Disagree	0	0
25-45	Strongly disagree	0	0
	Totally	16	100

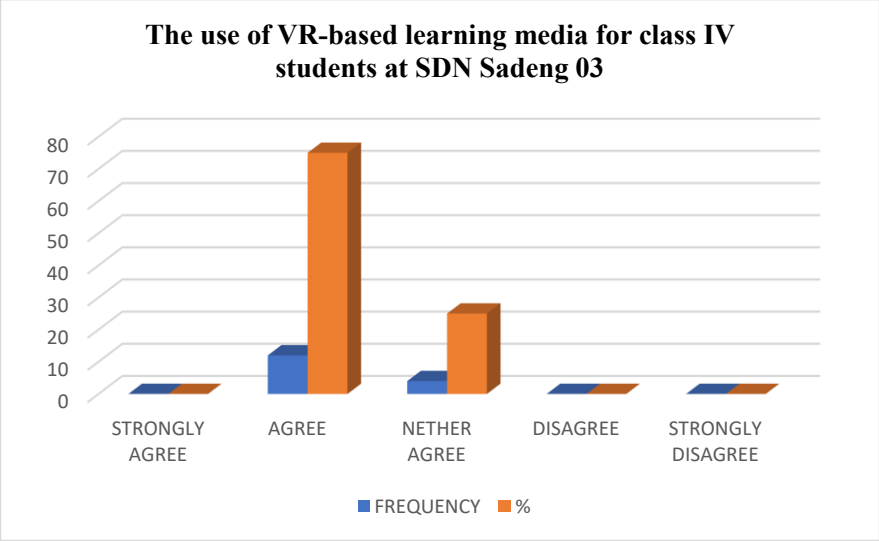


Fig 1. Use of VR-Based Learning Media for Class IV SDN Sadeng 03

2. Student motivation towards the use of VR-based learning media for class IV students at SDN Sadeng 03

Table 2. Results of the Motivation Questionnaire on the Use of VR-Based Learning Media for Grade IV Students at SDN Sadeng 03

Interval	Categories	Frequecy	%
106-125	Strongly agree	0	0
86-105	Agree	14	87,5
66-85	Nether agree	2	12,5
46-65	Disagree	0	0
25-45	Strongly disagree	0	0
	Totally	16	100

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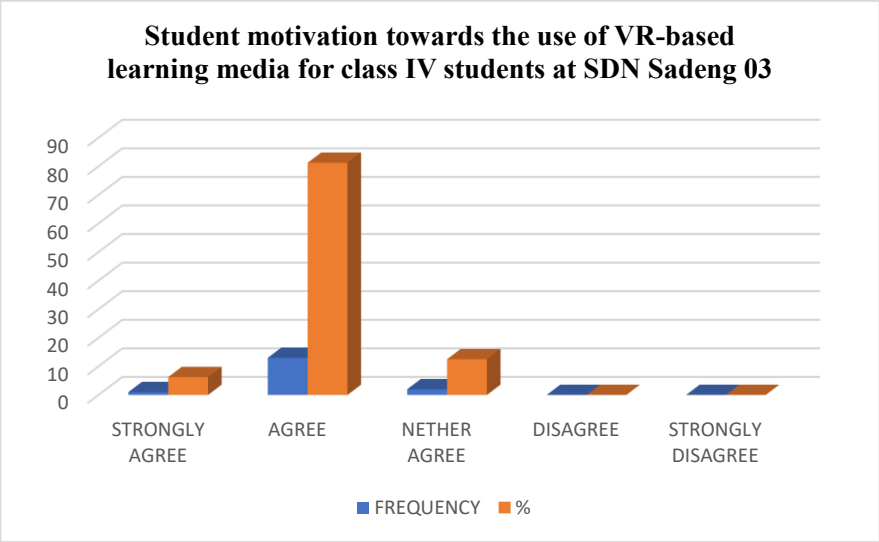


Fig 2. Student Motivation Towards the Use of VR-Based Learning Media in Class IV SDN Sadeng 03

B. Discussion

Learning outcomes using VR-based learning media in the subject of science for grade IV students at SDN Sadeng 03

Table 3. Learning Outcomes of Students in the Science Subject of Class IV SDN Sadeng 03

Number	Student Name	KKTP	Value
1	A	75	85
2	B	75	85
3	C	75	75
4	D	75	75
5	E	75	85
6	F	75	80
7	G	75	90
8	H	75	95
9	I	75	75
10	J	75	75
11	K	75	85
12	L	75	80
13	M	75	95
14	N	75	95
15	O	75	92
16	P	75	95

Learning using VR media is learning using sophisticated technology to visualize learning that seems abstract. This is also supported by the opinion of Eldiana, et al. (2022) who said that Virtual Reality

Media is a media that can present real situations for its users, so that users can feel the atmosphere like the one in the media. So based on the results of the questionnaire, three results were obtained in the form of students feeling that the use of VR media in learning really helps them understand the material being studied. This is because Virtual Reality media is able to present real situations for students. So that virtual reality media can increase students' learning motivation. In addition, because its use only requires a smartphone, it adds practicality for its users, especially for use by elementary school students, most of whom are familiar with it in everyday life (Eldiana, et al.: 2022). Science learning tends to require media that visualizes the material being taught. so that the use of this VR media really helps students understand the contents of the material. this can be seen from 75% of the 16 students agreeing that there is an influence of the use of VR media in science learning and the other 25% are hesitant. The data is supported by the IPAS scores of students after using VR media, which shows that the assessment results exceed the KKTP.

VR media additionally impacted learning results. This is evident from the variations in the *pretest* and *posttest* outcomes conducted by Aini et al. 2023 which showed that utilizing VR media in elementary science education has been effective in enhancing student learning results. This is demonstrated by the outcomes of field experiments which indicate that the sig. The (2-tailed) value amounts to 0.096, which is greater than 0.05. Before impacting learning outcomes, there is typically an effect of heightened student motivation to learn, which fosters success in education. The success of student learning can be influenced by their level of motivation. Students with strong learning motivation generally achieve high results; on the other hand, if their learning motivation is weak, their academic success will also be diminished (Rahman Suharti, 2021)

From the observation data, 12.5% of students were hesitant that the use of VR media could motivate learning, but 87.5% of the total number of students were motivated to learn using VR media. This indicates that most students feel happy and interested in learning, thus motivating them to try to understand the material being taught. Overall, this can be interpreted that the use of VR media in science learning not only improves understanding of the material, but also contributes greatly to increasing learning motivation. Visual support and a more interactive learning experience make this media an effective alternative in creating a fun and meaningful learning atmosphere for students.

4. CONCLUSION

Virtual Reality (VR) tools in scientific education have demonstrated a beneficial effect on students' comprehension and enthusiasm for learning. Most students (75%) feel helped in understanding the material through the visualization provided by VR media, and their learning outcomes have increased beyond the KKTP. In addition, 87.5% of students admitted that they were more motivated to learn when using VR media, which shows that this technology is able to create a more interesting and interactive learning experience. In order for the use of VR media in learning to be more optimal, it is recommended that educators and schools continue to develop their abilities in using this technology through relevant training. Schools also need to provide adequate facilities and infrastructure and consider the balance between the use of technology and conventional learning approaches so that students do not depend entirely on digital media and remain physically and socially active in the learning process.

The use of VR in science learning still has great potential to be developed in the future. Future research can focus on combining VR with hands-on learning activities, so that students not only understand concepts visually, but are also practically skilled. It is also important to examine the long-term impact of VR on students' memory, critical thinking, and problem-solving skills. In addition, tailoring VR content to individual learning styles as well as the use of more affordable devices can encourage equitable access to this technology. These findings will be an important foundation in designing a more engaging, inclusive, and effective learning system.

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