The Influence of Learning Media Based *AR* On the Science Learning Outcomes of MIN 3 Sambas Students

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Abstract: Study This aim For analyze influence use of learning media based *AR* to results Study eye lesson Knowledge Natural and Social Sciences (IPAS) on the material of circulatory organs blood of grade VI students of MIN 3 Sambas in 2019 2024/2025 academic year. The research method used is experiment quasi - *experimental* research with design *Post-test Only Control Group Design*. Research Sample consists of two classes, namely class VI A as group experiments using AR media and class VI B as group control using conventional media, each consisting of 30 participants educated. Data collected through test results study (*post-test*) consisting of 20 items question choice double and analyzed use statistics descriptive and inferential through the SPSS program version 24. Research results show that the average value *post-test* class experiment by 78 is more tall compared to with class control of 65. *Independent Sample T-Test* produce mark significance 0.001 < 0.05, so H_0 rejected and H_1 accepted. This proves that the use of learning media based *AR is influential* in a way significant to improvement results student learning. AR media is proven capable of visualizing draft abstract, becoming more concrete and interactive, improving motivation learning, and supporting learning that is active and meaningful for the participant educated school base.

Keywords : *Augmented Reality;* results study; circulatory organs blood

Introduction

Knowledge Natural and Social Sciences (IPAS) at MIN 3 Sambas, especially circulatory organ material blood, still face a number of constraints in the learning process. One of the challenge main issues faced is students' difficulties in understand concepts abstract submitted through method lectures and books text. Limitation methods cause low student participation in discussion, which has an impact on understanding less than optimal material. Therefore, appropriate learning media innovation is required with characteristics of the school students base, which has a need for study in a way more interactive and interesting. Feasibility study of interactive video media showing contextual interactive media increase involvement and understanding basic science concepts (Natharani, 2024). Board media/ circulation model developed blood show improvement understanding student concept (Fauzi, 2024).

Technology *Augmented Reality* (AR) plays a role in clarifying understanding of abstract concepts through interactive visual display. The use of AR can increase power student recall and engagement through experience multisensor (Athiyah, 2024). Technology combines real world elements with the virtual world so that creating experience is more interesting and deep. Through use of AR, participants can observe as well as interact directly with objects or previous concepts difficult they understand.

Teacher needs and context material must be analyzed before implementing AR to be effective For clarify draft abstract (Gestiardi, 2022).

Study show that AR can increase experience student learning and improving effectiveness learning. Use of AR in education has increased rapidly. For example, Arslan et al. (2020) developed an AR application for learning biology that provides an alternative more learning friendly environment, at the same time overcoming problems with ethical related use animal experiments. Garzón (2021) also identified various challenges in AR implementation, however gave an outlook about how technology can utilize more maximum in context education.

Lastly, the application of the developed learning media with AR technology has been carried out on various field studies or eye lessons, including in English and science learning in elementary schools. Nauko & Amali (2021) developed an AR application for introducing human anatomy, while Suttrisno et al. (2024) developed AR to improve scientific literacy of sixth grade students. Such as Fathuloh et al. (2025), AR media has been proven to be able to improve students' understanding of geometry through interactive and interesting visualizations.

AR gives benefits significant in learning distance far. Çetin & Türkan (2022) stated that online learning can increase student achievement and attitude in eye science lessons through use of AR. Meanwhile Sahronih et al. (2022) developed EduGame Media AR based is technology that is capable increase interactivity in the learning process, and can teach mark character education for school students base.

In addition, it is proven that AR is very effective in reducing student anxiety in learning, as found by Lubis et al. (2022) who said that book story illustrated AR based can reduce student anxiety in learning mathematics. AR also improves students' understanding in learning actively, as reported by Jesionkowska et al. (2020) in the context *Science, Technology, Engineering, Arts, and Mathematics* (STEAM).

However, even though AR can give various benefits, challenges, technical and acceptance from teachers still become obstacles in implementation. Sırakaya & Alsancak Sırakaya (2020) noted that teachers often face resistance in the use of AR, especially because of technical problems and lack of training. Some studies, such as that conducted by Ređep & Hajdin (2021), this show that element games available in AR capable grow interest as well as push innovation in the learning process, while Chang et al. (2022) the use of AR has been proven impact positive to results student learning is influenced by length of teaching and field study.

In the field of social and cultural, AR is also used as a means for broadening and deepening student learning. Mendoza-Garrido et al. (2021) use AR application for learning inheritance culture, and Tresnawati et al. (2021) introduction solar system with effective AR increase motivation and engagement elementary school students learn, even though Still face constraint technical and teacher acceptance, as expressed by Indahsari & Sumirat (2023).

Thus, the application of AR to the circulatory system material at MIN 3 Sambas aims to overcome students' difficulties in understanding abstract concepts that cannot be addressed through lectures. This media integrates AR, interactive videos, and blood circulation models to make learning more engaging and in line with the characteristics of madrasah students. In addition to improving understanding, AR also encourages active student participation. The research also examines teacher barriers and technical constraints, and presents environmentally friendly media as an alternative to physical teaching aids.

Methods

This study uses a quasi-experimental method with a post-test design. only control group as explained by Sugiyono (2014). The research was conducted in November 2024 in class VI of MIN 3 Sambas in the odd semester of the 2024/2025 academic year. The research population was all sixth grade students, while the sample was determined through a random sampling technique, resulting in class VI A as the experimental group and class VI B as the control group, each consisting of 30 students. The research instrument was a learning outcome test in the form of 20 multiple-choice questions compiled based on the learning outcomes of science and has been reviewed by experts to ensure its feasibility. The research data came from the results of student post-tests, initial observations, and interviews with colleagues regarding learning conditions.

The data collection procedure was carried out in four stages. First, the observation stage, which aims to obtain an initial overview of the conditions of science learning, the number of students, and obstacles in the learning process. Second, the preparation stage, namely the preparation of teaching modules, AR media, learning devices, and research instruments. Third, the learning implementation stage, which was carried out over three meetings: two meetings for learning activities according to the teaching module and one meeting for the post-test. Fourth, the evaluation stage, namely collecting learning outcome data through a post-test after all learning activities were completed. The test data were then analyzed using descriptive statistics to describe the distribution of learning outcomes and inferential statistics to determine differences in learning outcomes between the experimental and control groups.

Results

Study experiments conducted at MIN 3 Sambas Research implemented in the odd semester year 2024/2025 academic year with a population of all sixth grade students. Research aims to analyze the influence of learning media AR based on results learning science for sixth grade students at MIN 3 Sambas. The sample study class VI A is made of group experiments and VI B as group controls, each consisting of 30 students. In the implementation research, class experiment (VI A) is given

treatment in the form of learning class experiment using AR media, while class VI B learning with the usual conventional media used by science teachers in madrasas.

Post-test was given to class experiments and controls for obtaining the results of data study as well as evaluate student's ability after treatment differently. Test choice double totaling 20 questions with circulatory organ material blood used as instruments. The data is then analyzed using statistics descriptive and inferential in order to interpret difference results in a scientific way.

Analysis results descriptive The post-test scores of students in grades VI A (experimental) and VI B (control) are presented in Table 1.

Table 1. An analysis descriptive post-test results in class experiments and controls.

Statistics	***Post-test* Score Class Experiment**	***Post- test* scores Class Control**
Total Smelt	30	30
Ideal Score	100	100
Highest Score	95	90
Lowest Score	65	50
Average Value	78	65

Based on Table 1, the post-test results show a score highest 95, lowest 65, and average 78. If mark results Study *post-test* from class experiments and classes control grouped to in the score interval certain, then obtained distribution frequency and percentage results Study as presented in Table 2 below.

Table 2. Frequency Distribution and Percentage of Class Post-test Scores Experiment and Control

No	**Interval**	**Category**	**Frequency**		**Percentage (%)**	
			Experiment	Control	Experiment	Control
1	93 – 100	Very good	3	1	10	3.3
2	84 – 92	Good	9	4	30	13.3
3	75 – 83	Enough	12	11	40	36.7
4	< 75	Less	6	14	20	46.7
		Total	30	30	100	100

Class post-test data classified experiments and controls according to KKTP indicators show level completeness student learning like seen in the table following.

Table 3. Categories Completeness Post-test Student Learning Class Experiment and Control

Interval	Category	Frequency		Percentage (%)	
		Experiment	Control	Experiment	Control
75 – 100	Completed	24	16	80	53.3
0 – 74	Not Completed	6	14	20	46,7

Before doing analysis inferential research. This, moreover, formerly carried out prerequisite tests analysis including normality test and homogeneity test as condition use *parametric test* in the form of *Independent Sample T-test*. All testing statistics done using SPSS software version 27, so that the data analysis process is easier accurate and can be accountable in a scientific way. The results are presented in Table 4.

Table 4. Summary of Statistical Test Results Inferential

Analysis Statistics Inferential	Testing Techniques	Significance (Sig)
Normality Test	Kolmogorov-Smirnov	Post-test experiment = 0.067 Post-test control = 0.083
Homogeneity Test	Homogeneity of Variance	0.083
Hypothesis Testing	Independent Sample T Test	0.001

Normality test done to know whether the post-test results data in the class experiments and controls normally distributed. Testing uses Kolmogorov-Smirnov method in SPSS. Analysis results show that the mark significance of class data experiment is 0.067 and class control 0.083, both are in the range of Sig > 0.05. Thus, the second data group is normally distributed, so that it fulfills assumptions of normality for T-test.

Homogeneity test aims to test whether variance of the results data learns on both groups' own similarity. Testing uses Homogeneity of Variance (Levene's Test) technique in SPSS. The results obtained show mark significance 0.083 > 0.05, so variance in the second group stated homogeneous condition.This ensures that the data is valid analyzed using *Independent Sample T-Test*.

Hypothesis test results with Independent Sample T-Test shows mark significance 0.001 < 0.05, which means there is significant use of AR media for results in student learning. Based on criteria testing, because mark significance ≤ 0.05, then H_0 rejected and H_1 accepted. Research in class VI MIN 3 Sambas shows existence influence significant to results of student learning, shown through difference scores between class experiments using AR media and classes control that uses method conventional.

Based on descriptive analysis, it was found that the average value of the control class was 65, while the average value of the experimental class was 78, which indicates that learning outcomes through the application of AR media have increased. In addition, the significance value of the hypothesis test with an independent sample test reached 0.001, which is smaller than the significance level of α = 0.05 (0.001 < 0.05). This indicates that H0 is rejected and H1 is accepted based on the testing criteria. Thus, it can be concluded that the use of *AR-based learning media* has a positive and significant impact on student learning achievement.

Discussion

Research results show that use of learning media AR-based provides influence significant to results learning of grade VI students of MIN 3 Sambas. Improvement post-test scores in class experiment compared to class control show that AR is capable of helping students understand circulatory organ material blood that is abstract, with display objects in a way three dimensional, interactive, and more concrete.

Prerequisite Test Analysis

a. Normality Test

The Kolmogorov – Smirnov test shows the significance value:
1) experimental class 0.067 > 0.05,
2) control class 0.083 > 0.05,
which means the data is normally distributed.

According to statistical theory (Ghasemi & Zahediasl, 2012), data is considered normal if Sig > 0.05, making it suitable for analysis using parametric tests. This normality ensures that the distribution of post-test scores is consistent and representative of the population. Therefore, differences in learning outcomes can be legitimately analyzed using parametric tests.

b. Homogeneity Test

Homogeneity test results of The variances showed a value of 0.083 > 0.05, meaning that both groups had homogeneous variances. (Pallant, 2020) emphasized that homogeneous variances indicate that the baseline abilities of the two groups did not differ significantly, so that the differences in learning outcomes that emerged were truly caused by the treatment, not differences in initial abilities.

c. Hypothesis Testing (Independent Sample T-Test)

The significance value of the t-test is 0.001 < 0.05, so H_0 is rejected and H_1 is accepted. This means that there is a significant difference between the experimental class and the control class. The average of the experimental class (78) is higher than the control class (65), indicating that AR media has a real impact

on improving learning outcomes. (Cohen, 1988), a large mean difference reflects the existence of *an AR effect.* strong *size, indicating that the treatment has a significant influence on student learning performance.*

Research studies have proven that using *AR* in education can increase results student learning. In line with study This use of learning media proven AR- based increase results Study students in a way significant, both in viral and cellular material. (Thahir & Kamaruddin, 2021; Agustin & Wardhani, 2023). According to Lampropoulos et al. (2022), the use of AR can increase student activity in learning and help understand complex concepts. (Ashari et al., 2024). In addition, AR is capable of increasing student participation in learning, even though there is constrained access and capabilities technical, Kamińska et al. (2023).

Application of learning media proven AR-based activity increases participation actively and understanding student material in general significantly. Woromukti (2025) research shows that effective AR implementation increases skills think critical grade V students in the subject social studies lessons, as well as give impact positively in a way direct to development competence participant education. Hernanda and Aji (2024) showed that AR is effective in increasing study results, while Juwita et al. (2021) showed that AR is capable of displaying science materials such as Biology and Physics in general, clear, interactive, and contextual, so as to deepen student understanding. Nawwal and Setyasto (2025) In addition, the development of AR-based media has been proven effective to increase quality learning in various disciplines.

Implementation AR technology in education has a proven impact positive and significant to quality learning as well as results in student learning. Nawwal and Setyasto (2025) developed practical AR media For introduction to body organs, human and e-teaching materials, which are proven to increase student learning. In addition, Aprilia et al. (2025) showed that AR is capable of increasing the visualization school materials base, making it more interesting and easy to understand. Usmaedi et al. (2020) have developed application based *AR* as a learning medium interactive on the eyes English lessons at the level school basic, which is proven to increase effectiveness and quality of the teaching process. Juwita et al. (2021) emphasized that AR can in a way effectively increase results in study science, especially in visualizing material Biology and Physics.

The use of AR in education now is more noticed as innovation that supports development curriculum and education inclusive. Marín et al. (2022) revealed that prospective teachers in the education base see AR as valuable tools for increasing quality learning. In addition, Lampropoulos et al. (2022) analyzed 17 million tweets to understand the positive public attitude to the use of AR in education, which shows the existence of sufficient acceptance of technology. Study is continued by Bulut & Ferri (2023) reviewing 42 articles related to the use of AR in education mathematics, which

produces findings positive about its benefits, as well as challenges in its implementation.

Implementation AR in the world of education is recognized as effective means in increasing quality learning as well as competence of professional educators. Ashari et al. (2024) reported AR training for 15 teachers at UPTD SDN 72 Pakalu II for increased skills in using AR media. Octiva et al. (2025) added that training This aims to create learning interactive at school basis, while Utami et al. (2025) developed AR application to increase scientific literacy and experience student learning. Although student learning results increase, challenges like limitations, equipment and teacher training are still there. Perifanou et al. (2023) reviewed teachers' views on AR, identifying benefits and challenges, as well as needing development professionals for teachers.

Conclusion

Use of learning media AR-based provides a significant influence to improve learning results in learning science for grade VI students at MIN 3 Sambas. This is proven by the difference between the average Post-test score between the class experimental (78) and Control (65), completeness learned more highly in class Experiments (80%), as well as T-test results with Sig. 0.001 < 0.05, which confirms the effectiveness of AR in general statistics. AR media is proven to help students understand the concept of circulatory organs, abstract blood through visualization in three dimensions, and interactivity that encourages more cognitive involvement. This is in line with various studies previously confirmed that AR is an effective, relevant, and supportive medium learning, interactive learning in the Independent Curriculum, so worthy of recommendation for increased quality science learning in schools.

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