



Articles

Audio Visual Assisted Problem Based Learning on Student Learning Outcomes in Class V Elementary Schools

Pajar Irawan¹, Muhisom², Nelly Astuti³

^{1 2 3}Universitas Lampung, Jl. Prof. Sumantri Brojonegoro No.1, Gedong Meneng, Bandar Lampung, Indonesia

* *Corresponding Author*. E- mail: pajarirawan18027@gmail.com

Article Info

Article History

Received : 14-02-2024

Revised : 22-05-2024

Accepted: 27-06-2024

Keywords:

Problem Based Learning,
Audio Visual, Learning
Outcomes

ABSTRACT

The aim of this research is to determine the effectiveness of implementing the *Problem Based Learning (PBL) learning model assisted by audio-visual media* on the learning outcomes of fifth grade elementary school students. The type of research used in this research is quantitative research. The research method uses a *quasi-experimental design* with a *Nonequivalent Control Group Design*. This experiment used two groups, namely the experimental and control groups. The population was 66 and the sample used was 22 class V A students and 22 class V B students. The sample was determined using a *purposive sampling technique*. Data was collected using tests in the form of multiple choice questions. Data were analyzed using normality tests, homogeneity tests, and hypothesis tests. The research results showed that the average *posttest score* for the experimental class was 82.5, while in the control class the average *posttest score* was 74. The results of hypothesis testing using the t test obtained a $t_{\text{calculated}}$ value of 8.781 and a t_{table} of 2.021. It can be concluded that the *Problem Based Learning (PBL) learning model assisted by audio visual media* can be applied to improve learning outcomes in science subjects for students grade V in elementary schools.

1. Introduction

In the learning process, teacher creativity is really needed to design learning models. So that teaching and learning activities become more interesting and varied. The learning model is able to develop activeness, creativity, innovation and enjoyable learning (Langitasari et al., 2021; Manasikana et al., 2022). One of these models is the *Problem Based Learning* (PBL) learning model. The *problem based learning* model is a learning model that the student-centered and requires students to be able to provide solutions to a problem that is the focus of learning (Ardianti et al., 2022; Hartono et al., 2023; Primadoniati, 2020; Ratnawati et al., 2020). Implementing the PBL model has difficulty enough to implement completely in elementary schools. This is because elementary school (SD) students are still at the concrete operational stage and still have difficulty to understand the abstract concepts, so they need help with learning media that is able to translate and guide students in understanding a problem or material (Sujana et al., 2021). Apart from learning models, teachers also need to innovate learning media (Siregar et al., 2022). Media that can help students and can be combined with the PBL model is audio-visual media. Audio visual media is media that contains sound elements and image element. For example videos, slides and so on (Maryam et al., 2020; Nurhasana, 2021; Salsabila et al., 2020). Audio visual media is a medium that helps convey teacher explanations to students so that learning objectives are conveyed well. *Audio-visual* media can attract students attention, thereby generating curiosity about the information being conveyed (Atminingsih et al., 2019; Saputro et al., 2021). It is hoped that audio visual media can improve the quality of students learning processes in learning which in turn will also improve their learning outcomes.

In the independent learning curriculum, the content of science (Natural Sciences) lessons has changed its name to IPAS (Natural and Social Sciences) (Islam et al., 2024; Ngazizah, 2023; Wiguna & Tristaningrat, 2022). This subject is one of the content that is able to provide learning experiences to students. In the science and technology lesson content, there are learning materials that invite students to study a number of events that occur in the natural surroundings. By combining two subjects into one, it is something new for students regarding the learning outcomes obtained by students in science subjects.

Based on observations, student learning outcomes are very low, especially in science and science subjects in grade V elementary school. This is shown by the students daily test scores which are presented in the following table 1.

Table 1. Data on Daily Test Scores for Class V Science Subjects

Class	Number of Students	Completeness			
		Complete (≥ 75)		Incomplete (< 75)	
		Amount	Percentage (%)	Amount	Percentage (%)
VA	22	8	36.36	14	63.64
VB	22	8	36.36	14	63.64
VC	22	9	40.91	13	59.09
Amount		-	-	-	-

Source: Documentation of daily test scores for odd semester class V elementary school for the 2023/2024 academic year

Based on the table above, it can be seen that there are still many grade V students learning outcomes in science and science subjects who have not been able to meet the criteria for achieving learning objectives (KKTP), with a $KKTP \geq 75$. V A, V B and V C classes show scores below the 50% percentage. It can be concluded that from the questions worked on, the majority of students got low science learning results. Based on the problems with learning outcomes, it is known that the causes of the use of learning models are inappropriate and not in accordance with students needs. Apart from that, the use of learning media as a tool to convey learning material has not been implemented optimally, so the learning process is less effective.

Problem based learning uses audio visual media as an effort to improve student learning outcomes in the learning process so that learning will be more innovative in accordance with 21st century learning. The use of *audio-visual* media used to assist the *problem-based learning model* will make students more interested in understanding the learning material because the material is presented in the form of learning videos.

There is research that examines the application of the *problem based learning model* (Arifin & Arif, 2022; Fitriani & Jusra, 2024; Surya et al., 2023). In these studies the focus is on improving creative thinking skills, Indonesian language competence and learning participation, so no one has discussed improving learning outcomes, especially for fifth grade elementary school students with science material. The aim of this research is to determine the effectiveness of implementing the *Problem Based Learning (PBL) learning model assisted by audio-visual media* on the learning outcomes of fifth grade elementary school students.

2. Method

The type of research used in this research is quantitative research. Quasi experimental research method (*quasi experimental design*) is with a *Nonequivalent Control Group Design*. This experiment used 2 groups, namely the experimental and control groups (Hayati et al., 2023; Prilliza et al., 2020). The design of this

research is a quasi-experimental design by looking at the differences in *pretest* and *posttest* between experimental and control classes. The population in this study was 66 class V students. The sample in this research was 44 students consisting of 22 students from class V B as the control class and 22 students from class V A as the experimental class. This is because there are the lowest science learning outcomes among the 3 class groups in class V. Sampling in this research was determined using a *purposive sampling technique* or with certain considerations. The research location is SD Negeri 6 Metro Barat.

The data collection technique used is a test in the form of multiple choice questions consisting of 20 questions whose validity and reliability have been tested. The test instrument to see students' abilities in learning outcomes refers to the cognitive domain. The cognitive domains used are C3, C4, and C5. The data obtained in this research is quantitative data in the form of student learning outcome scores before and after receiving treatment obtained from *the pretest* and *posttest* in the experimental class and control class. Quantitative data analysis are using the data analysis requirement tests through the normality test with using *the chi square test* (χ^2) and homogeneity test using the F-test with the help of *Microsoft Excel 2010*. After testing the data requirements, then continue with the hypothesis test using the t test.

3. Results and Discussion

Before learning begins, the experimental and control classes are first given a *pretest*. This is done to determine the initial abilities that students have before learning is carried out. After being given a *pretest* in the experimental class, it was then treated using a *problem based learning model* assisted by *audio visuals* and the control class used a *discoverer learning model assisted by visual media*. Learning activities were carried out in three meetings. Students are then given a *posttest* to determine learning outcomes after being given treatment.

Data was obtained from *pretest* and *posttest scores* in the experimental group and control group. A description of the research data can be seen in table 2 below.

Table 2. Description of research data

Data	Experimental Class		Control Class	
	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Posttest</i>
The number of students	22	22	22	22
The highest score	75	95	75	95
Lowest value	35	60	30	50
Number of Values	1210	1805	1155	1 620
Average	55	82.05	53	74

Table 1 show that before being given treatment, the average *pretest score* for students in the experimental class was 55 and the control class was 53. Many of the *pretest scores* in the experimental class and control class still did not reach the KKTP because students' learning outcomes were still low so they could not answer the *pretest questions* correctly. After applying the *problem based learning model assisted by audio visual media*, the average score of the experimental group showed an increase of 82.05, while the score of the control class after being treated with the *discovery learning model assisted with visual media* showed an increase of 74. The following is a description of the *pretest* and *posttest* results of learning experimental class students.

Table 3. Frequency Distribution of *Pretest* and *Posttest* Scores for Experimental Class

No	<i>Pretest</i>		<i>Posttest</i>	
	Interval Class	Frequency (f)	Interval Class	Frequency (f)
1	35-41	4	60-65	1
2	42-48	3	66-71	2
3	49-55	4	72-77	3
4	56-65	5	78-83	5
5	63-69	3	84-89	5
6	70-76	3	90-95	6
The number of students		22		22
Average Value		55		82.05
Incomplete (<75)		21		3
Complete (>75)		1		19
Completion Percentage		4.55%		86.36%

Based on table 3, it can be seen that the *pretest* score of students who completed in the experimental class was 1 student and those who did not complete were 21 students with a completion percentage of 4.55%. The *posttest* scores of students who completed in the experimental class were 19 students and those who did not complete were 3 students with a completion percentage of 86.36%. The following description is the *pretest* and *posttest* learning outcomes of control class students.

Table 4. Frequency Distribution of *Pretest* and *Posttest* Scores for Control Class

No	<i>Pretest</i>		<i>Posttest</i>	
	Interval Class	Frequency (f)	Interval Class	Frequency (f)
1	30 – 37	5	50 – 57	3
2	38 – 45	3	58 – 65	4
3	46 – 53	3	66 – 73	2
4	54 – 61	3	74 – 81	8
5	62-69	4	82-89	2
6	70-77	4	90-97	3
The number of students		22		22

Average Value	53	74
Incomplete (<75)	19	9
Complete (>75)	3	13
Completion Percentage	13.64%	59.1%

Based on table 4, it can be seen that the *pretest scores* of students who completed the control class were 3 students and those who did not complete were 19 students with a completion percentage of 13.64%. The *posttest scores* of students who completed in the control class were 13 students and those who did not complete were 9 students with a completion percentage of 59.1%.

The experimental class and control class were given questions whose validity and reliability had been tested. These questions are given with the aim of finding out the students' abilities. The following are the average *pretest* and *posttest scores* for each class.

Table 5. Average *Pretest* and *Posttest Results* in Experimental Class E and Control Class

No	Data Study	Average		The Highest Score		Lowest Value	
		Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	Experimental Class	55	82.05	75	95	35	60
2	Control Class	53	74	75	95	30	60

Based on table 5, it is known that before the learning was carried out, the average *pretest result* for the experimental class was 55, while the *posttest results* for the experimental class experienced an increase after being treated with the *problem based learning model assisted by audio-visual media* at 82.5. As for the control class, the average *pretest result* was 53 after being given *posttest questions*. The control group experienced an increase but not as high as the experimental group, namely an average of 74. The following comparison is the average of *pretest* and *posttest scores* for the experimental class and the control class, which can be seen in Figure 1.

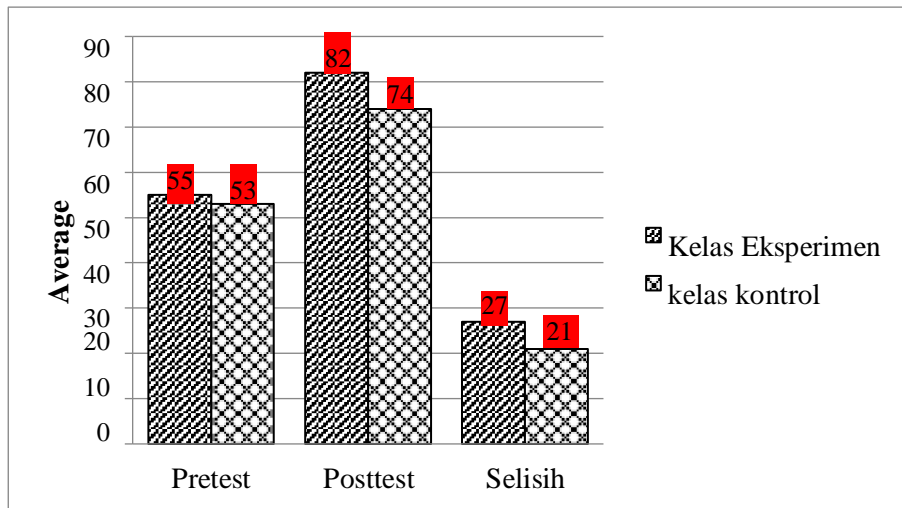


Figure 1. Comparison of the average *pretest* and *posttest* scores for the experimental and control classes

After knowing the scores of the experimental class and control class, then calculate the increase in student learning outcomes using the *N-Gain formula*. The results of the *N-Gain calculation* are then classified into high, medium and low according to Hake in (Febrinita, 2022). The following is the classification of *N-Gain* values for the experimental and control classes.

Table 6. Experimental and Control Class *N-Gain* Values

No	Category	Frequency		Average <i>N-Gain</i>		Difference
		Experiment	Control	Experiment	Control	
1	Tall	12	5			
2	Currently	10	14	0.7	0.5	0.2
3	Low	0	3			

Based on the table above, it is known that the *N-Gain data* for experimental class students in the "High" category is 12 students, 12 students in the "Medium" category, and 0 students in the "Low" category with an average *N-Gain* of 0.7. The control group included 5 students in the "High" category, 14 students in the "Medium" category, and 3 students in the "Low" category with an average *N-Gain value* of 0.5. The comparison category for the average *N-Gain value* can be depicted as in Figure 2 below.

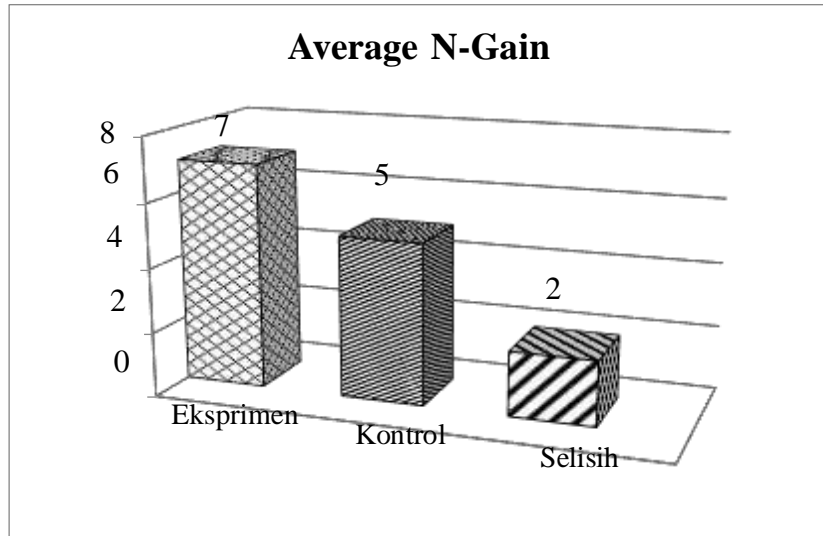


Figure 3. Histogram of Average N-Gain Comparison

The normality test uses the *Chi Square formula using the Microsoft Office Excel 2010* calculation tool to interpret the calculation results by comparing the calculated X^2 with the X^2_{table} for $\alpha = 0.05$ ($dk = k-1$). Data is said to be normally distributed if $\chi^2_{count} \leq \chi^2_{table}$, whereas if $\chi^2_{count} > \chi^2_{table}$ is not normally distributed. The results of the normality test calculation for *pretest data in the experimental class* were obtained $X^2_{count} = 3.787 \leq$ normally distributed. The results of the calculation of the *posttest data normality test in the experimental class* were obtained $X^2_{count} = 3.565 \leq$ Next, calculating the normality test for the pretest data in the control class obtained $X^2_{count} = 8.177 \leq$ normally distributed. The results of the calculation of the *posttest data normality test in the control class* were obtained $X^2_{count} = 5.626 \leq$

Homogeneity test is calculated using the F-test formula, the decision rule is if $F_{count} < F_{table}$ then the variance is homogeneous, whereas if $F_{count} > F_{table}$ so the variance is not homogeneous. The significance level set is 0.05. The calculation results obtained the calculated F value for the experiment, namely calculated $F = 0.623 < F_{table} = 2.09$. The calculation results show that the calculated F value for control is calculated $F = 0.414 < F_{table} = 2.09$. So it can be concluded that the population has a homogeneous variance.

Next, the researcher tested the hypothesis using the t test. The test criteria is if $t_{count} < t_{table}$ then H_a is rejected, but conversely if $t_{count} > t_{table}$ then H_a is accepted. Based on the results of the t test, it is known that the calculated t is 8.781, while the t_{table} at the 5% significance level is 2.021. Because the calculated t value $> t_{table}$ ($8.781 > 2.021$) and is significant $0.000 < 0.05$, H_0 is rejected and H_a is accepted. So it can be concluded that the PBL learning model assisted by *audio-visual* media is

effective on the learning outcomes of fifth grade elementary school students.

This research has conformity or similarities with several other studies which are used as references and support this research, namely (Suwarni, 2019) shows that the application of the *Problem Based Learning learning model* with *Audio visual* media can improve student learning achievement. This is evident from the results obtained initially reaching an average value of 69.68, in cycle I reaching an average value of 75.31 and in cycle II reaching an average value of 81.25. The percentage of student learning completeness has also increased. At the beginning of learning, students' learning completion only reached 46.87%. In cycle I there was an increase to 75.00%, and in cycle II student learning completion increased to 96.87%.

Then the research results (Setianingrum et al., 2024) are based on the test results obtained by carrying out the initial test (*Pretest*) and final test (*Posttest*) which were carried out by the researcher using the t test that the t_{count} of (16.502) shows a higher value than the $t_{\text{table value}}$ ($t_{0.05, 22} = 2.074$) so that H_0 is accepted and H_a is rejected, from the results of the t test calculations, there is an implementation of the *problem based learning model* assisted by audio visual media on the learning outcomes of water cycle material in class V at SDN 24 Pendopo.

Research results from (Jannah et al., 2020) this research shows that the *audio-visual* assisted *problem-based* learning model is effective when applied in the learning process and can improve student learning outcomes in elementary schools. Thus it can be said that the *Problem Based Learning Model* and the media *Audio visuals* can improve student learning outcomes, especially in science material content at elementary school level. In line with the opinion of Mareti & Hadiyanti, (2021) the *Problem Based Learning (PBL)* model, it is learning that applies problems that occur in the real world to build students to think critically in searching for concepts and solving problems from the subject matter. At the beginning of the learning process, students are given a problem to solve, and then they investigate and analyze the problem to find a solution (Aprina et al., 2024; Kusuma, 2018). Thus, the teacher's role in learning is to present various problems and questions, as well as provide facilities to support investigations carried out by students.

4. Conclusions and Suggestions

There is significant effectiveness in the application of the *problem based learning model assisted by audio visual* media on the science and science learning outcomes of fifth grade elementary school students. It can be proven through the results of hypothesis testing using the t test, obtained a calculated t value of 8.781 and a t_{table} of 2.021 because the $t_{\text{calculated t value}} > t_{\text{table}}$ means H_0 is rejected and H_a is accepted. It means the *problem based learning (PBL)* learning model assisted by *audio visual* media can be applied to improve learning outcomes for class V science and science subjects in elementary schools.

5. Author Contributions

PI contributed to carrying out research, collecting data and analyzing data. M contributed in guiding the creation of the manuscript and analyzing the manuscript on methods, results and discussion. NA contributed to guiding and analyzing the manuscript in the introduction and conclusion.

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