The Project Based Learning Model Assisted with Audio Visual Media to Improve the Understanding of Science in Class IV Students in Primary School

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Abstract

This research is motivated by the class teachers at SDN 2 Kerjo, SDN 2 Salamrejo, and SDN 2 Sumberingin who are already skilled, but the obstacles experienced by the teachers are the difficulty in innovating in choosing sources and learning models so that students' scientific literacy has not been developed optimally. The type of research used is quantitative research with the Quasy Experiment method, this design has a control group but cannot function fully to control variables. External variables that affect the implementation of the experiment with the experimental design used is the Nonequivalent Control Group Design where the data in the study are in the form of numbers and analysis using statistics with the background of the obstacles experienced by the teachers, namely the difficulty in innovating in choosing sources and learning models so that students' scientific understanding has not been developed optimally. The purpose of this study is to determine the Effect of the Project Based Learning Model Assisted by Audio Visual Media to Improve the Science Ability of Grade IV Students in Elementary Schools. The sample used is the non-probability sampling technique. The samples used are SDN 2 Sumberingin, SDN 2 Salamrejo, and SDN 2 Kerjo. The number of samples from SDN 2 Kerjo is 12 students, SDN 2 Salamrejo 16 students, and SDN 2 Sumberingin 16 students. Based on the results of the hypothesis obtained from the pretest and posttest that sig. (2-tailed) <0.05, namely 0.000 (<0.05). The sig. (2-tailed) value is smaller than 0.05, so Ho is rejected. There is a difference in the average understanding of science before and after using the learning model. So it is concluded that the Project based learning model assisted by audio-visual media affects increasing the understanding of science in grade IV elementary school students.

Keywords: Project Based Learning, Audio Visual, Understanding Science

1. INTRODUCTION

21st-century learning is marked by the rapid development of science and technology, where students must have complex knowledge and skills such as problem-solving skills, critical thinking and communication skills (Sudirman, 2023). Science and

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technology are an inseparable unity, science creates new technology, and vice versa, technology plays a role in creating new knowledge. Students need knowledge and skills to survive in the 21st century, namely having a foundation of literacy or basic literacy, competence, and character.

Science is one of the subjects that can develop personality because it can foster critical thinking skills and independence. One of the objectives of the science subject in elementary school that must be developed is process skills (Novita, et al., 2019). This skill needs to be emphasized because it is a prerequisite skill that must be mastered by students to study other fields of study. The current objective of science learning (Aisyah, et al., 2023) is to equip students to be able to develop interest and curiosity so that students are motivated to study the phenomena around humans, understand how the universe system works, and have a reciprocal impact on human life, play an active role in maintaining, protecting, preserving the natural environment, managing natural resources and the environment wisely, developing inquiry process skills to identify, formulate and solve problems through real action and understanding the requirements needed by students to become members of a community and nation and understand the meaning of being a member of society, nation, and world, so that they can contribute to solving problems related to themselves and the environment around them, and develop knowledge and understanding of concepts in science and apply them in everyday life.

Understanding is the ability and capability to define and translate something to master it by understanding its meaning. According to (Novanto, et al., 2023), the indicators of the understanding aspect are; interpreting, exemplifying, classifying, summarizing, concluding, comparing, and explaining. This is further explained by (Fiteriani, et al., 2023) stating that in the learning process, students have begun to be directed not only to memorize the concepts of the material being taught but students are guided and led to be able to understand the concepts of the material more deeply. Understanding can be interpreted as mastering something with the mind. A student is said to understand something if he can provide an explanation or provide a more detailed description of it using his own words. Teachers should be familiar with student learning outcomes and understand aspects of conceptual understanding to be developed in learning to improve student learning outcomes.

In science learning, Grade IV Chapter 4, Changing Energy Forms. Students learn to identify various energy transformations in everyday life and create energy transformation simulations using simple charts or tools in everyday life (Fitri, et al., 2021). Students' mastery of science can affect their ability to innovate. Because education has an important role in realizing scientific literacy and the ability to innovate, especially in 21st-century education (Sutrisna, 2021). Teachers can give assignments in the form of reading and writing that students can use to analyze scientific concepts and phenomena (Fuadi, et al., 2020). Science learning can shape students to innovate and the need for scientific literacy skills (Marwah, et al., 2024).

The results of the observations conducted by researchers in Class IV of SDN 2 Kerjo, researchers found problems such as students having difficulty in identifying problems related to science, understanding elements of research design and their impact on results, and drawing conclusions from the results related to 3 science activities, the results of observations at SDN 2 Sumberingin, researchers found problems namely students having difficulty in compiling explanations about natural phenomena, applying and evaluating natural phenomena. The results of observations at SDN 2 Salamrejo,

researchers found problems namely students having difficulty in recognizing natural phenomena and drawing conclusions in solving science problems and connecting material with everyday life. Based on the results of interviews from the three elementary schools, it can be concluded that the class teachers are skilled, but the obstacles experienced by teachers are the difficulty of innovating in choosing sources and learning models so that students' scientific literacy has not been developed optimally.

Based on these problems, one solution that can be used to improve students' understanding of science is the Project-based learning model assisted by audio-visual media. The application of the Project-based learning model can provide a more meaningful and interesting learning experience for students by building their knowledge to produce projects based on real experiences from working together with others in a group and guidance from a teacher. Project-based learning is a learning activity that requires students to be active and think critically in reconstructing the knowledge they have in a project.

2. LITERATURE REVIEW

Project-based learning (PjBL) is a learning model that uses projects or activities in the learning process. Through PjBL learning, students can explore, evaluate, interpret, synthesize, and collect information. In PjBL, students are given complex and quite difficult but comprehensive and realistic projects and then can receive full support to help them complete the task (Berhitu, et al., 2020). This model is also designed to guide students through collaborative projects that integrate various learning resources (materials), which provide opportunities for students to explore learning content (materials) in various ways that are meaningful to students and collaborate in experiments. The PjBL learning model is a student-centered learning model. Project- based learning (PjBL) is a learning method that organizes learning through real-world projects (Aulia et al., 2024). PjBL is a learning activity that requires students to think actively, and critically to reconstruct previous knowledge in a project. The project-based learning model is one way to change learning that has been dominated by teachers to be dominated by students. This Project based learning model provides students with the opportunity to solve problems and improve aspects of independence, aspects of group cooperation, and aspects of psychomotor mastery (Nababan, et al., 2023) From the explanation above, it can be concluded that Project based learning (PjBL) is a learning model that is implemented by providing practical projects to students. The application of the Project based learning (PjBL) model can provide a more meaningful and interesting learning experience for students by building their knowledge to produce projects based on real experiences from working with others in a group and guidance from a teacher.

Audio-visual learning media (Rifmasari, et al., 2022) is an educational support media that combines sound (audio) and images (visual). The use of audiovisual media in learning activities provides stimulation to students in the form of sound and moving images to improve their cognitive abilities. In the learning process, the use of audio-visual media has several advantages, including attracting students' attention, increasing strong student learning motivation, and creating the impression of a good learning experience. In addition, it also trains students' ability to memorize lesson materials and improves their ability to concentrate on learning. Audio-visual media can create fun learning activities

by displaying animated images with sound to make them easier to observe and bring abstract concepts to life. Audio-visual media can be created or searched for using the Internet to use applications. Teachers can easily create audio-visual media because of the positive impact of sophisticated technology. Using audio-visual media can enrich the learning environment and encourage students to express their opinions to develop speaking skills (Fatimah, et al., 2022). From the explanation above, it can be concluded that audiovisual media is a message or information that combines audio media and visual media into one to support the learning process. This audiovisual media can be seen in pictures or writing using the sense of sight and the sound can also be heard through the sense of hearing.

Science understanding is an explanation that contains an explanation related to the results of observations or experiments that have been carried out (Sidiqin, 2017). Science understanding is the ability to receive, absorb, and understand material or information obtained through a series of events or incidents that can be seen directly or heard that are stored in the mind which can later be applied in everyday life. Understanding plays an important role in the teaching and learning process and is the basis for achieving learning outcomes. Students are said to understand a concept if they can provide an explanation or provide a more detailed description of a concept using their own words. Meanwhile, according to (Harefa, D., Telaumbanua, 2020), science understanding is a student's ability to; 1) Explain concepts, meaning that students can reformulate what is communicated to them; 2) Use concepts differently in various situations; 3) Develop several consequences of the presence of the concept. Based on this description, it can be concluded that science understanding is a student's ability to explain concepts, use concepts, and develop concepts in understanding material in the form of theory so that students can understand learning materials when the teaching and learning process becomes more active.

3. METHODS

The research used is quantitative research with the Quasy Experiment method, this design has a control group but cannot function fully to control variables. External variables that affect the implementation of the experiment. The author uses Quasy Experiment and the experimental design used is Nonequivalent Control Group Design, this is because researchers want to know the effect of the learning model used with the same subject (Sugiyono, 2020).

The population used in this study was 305 students of grade IV in Karangan sub-district. (Source: Student data for the 2024/2025 school year KORWILDIKCAM Karangan) with a sample of 12 students of grade IV of SD Negeri 2 Kerjo and 16 students of grade IV of SD Negeri 2 Salamrejo as the experimental class and 16 students of grade IV of SD Negeri 2 Sumberingin as the control class with a sampling technique using the Non-probability sampling technique is a sampling technique that does not provide equal opportunities or opportunities for each element or member of the population to be selected as a sample (Sugiyono, 2020).

Data collection in this study used the test technique and observation of the implementation of the model, to measure an instrument, its level of validity must first be measured based on certain criteria, instrument testing using the SPSS version 25 application. The validity test in this study used the Pearson product-moment correlation

formula which uses a statistical formula, which is realized with a computer tool, namely the SPSS 25 program.

Next, a reliability test of the instrument items related to the issue of trust and determination of the questionnaire results is carried out, namely, a questionnaire is said to have a high level of trust if the questionnaire gives the same results. The reliability test of the instrument in this study uses the Cronbach alpha formula. The next step is to conduct a prerequisite test with the help of the SPSS version 25 application, the researcher uses the Shapiro Wilk Normality Test because the number of data is less than 50. Data is declared normally distributed if it has a significance value> 0.05. Furthermore, the homogeneity test uses the Levene test. How to interpret this Levene test is if the Levene Statistic value is 0.05, it can be said that the data variation is homogeneous.

Next, test the data hypothesis by measuring the effect of the project-based learning model assisted by audio-visual media to improve the science literacy of grade IV elementary school students. This study uses the independent samples test calculated using SPSS 25.0 (Statistical Product and Service). If T count < T table, then it can be stated that H_0 is rejected. So, the project based learning model assisted by audio-visual media does not affect increasing the scientific literacy of fourth-grade elementary school students. If T count > T table, then it can be stated that H_0 is accepted. So, the project based learning model assisted by audio-visual media affects increasing the scientific literacy of fourth-grade elementary school students.

4.   RESULTS

The designed instrument was then validated using Product Moment Correlation and instrument reliability test using the Cronbach alpha formula with the following results.

Table 1. Validity Test Results

Comparison	Number	Instrument Item
Valid	15	1,2,3,4,6,7,8,9,10,11,13,14,16,17.18
Drop	5	5,12,15,19,20

Ased on Table 1. that the validity results of the student learning outcome test on the material changing the form of energy are declared valid with a total of 15 statement items and are declared invalid with a total of 20 question items. The statements are declared valid because r count > r table. So the statements on the student learning outcome test on the material on energy and its changes are said to be valid for use in research.

Furthermore, the instrument items that were declared valid were subjected to reliability testing using Cronbach's alpha formula assisted by the SPSS application.

Table 2. Reliability Test Results

Cronbach alpha	N	Description
0.831	15	Reliable

The next stage is the learning outcomes of students in the experimental class and control class, with the scores obtained by students in the experimental class as follows:

Tabel 3. Results of Literacy Understanding Data Before Treatment

	N	Lowest Score	highest Score	Average	Standard Deviation	Variation
Control Class	16	65	77	70	3,44	11,86
Experiment Class	28	65	82	73,57	4,64	21,58

Next, giving treatment to the experimental class using a project based learning model assisted by audio-visual media and without using a project based learning model assisted by audio-visual media in the control class, presented in the following data.

Tabel 3. Results of Literacy Understanding Data After Treatment

	N	Lowest Score	highest Score	Average	Standard Deviation	Variation
Control Class	16	70	80	76,93	2,64	6,99
Experiment Class	28	80	93	87,93	3,83	14,72

After the data is obtained, the next step is to conduct a prerequisite test. The prerequisite test is a data testing stage before the hypothesis test is carried out in the form of normality and homogeneity testing to see whether the data calculations that have been carried out can be used in hypothesis testing or not. Based on the normality test table below, the acquisition of experimental class pretest data obtained a significance value of 0.149 and a significance value of the experimental class posttest of 0.642, the control class pretest obtained a significance value of 0.183 and a significance value of the control class posttest of 0.186. These results indicate that the students' Science Understanding test on the material of energy and its changes is normally distributed.

Tabel. 4. Normality Test Result

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Understanding Science	Pre Test Experiment	.156	28	.077	.945	28	.149
	Post Test Experiment	.092	28	.200[*]	.972	28	.642
	Pre Test Control	.160	16	.200[*]	.922	16	.183
	Post Test Control	.183	16	.156	.923	16	.186

Furthermore, the homogeneity test is used to determine the existence of data from two or more groups that are homogeneous (the same) or heterogeneous (not the same). This homogeneity test is carried out using the Levene test which is calculated using the SPSS 25.0 program with a significance level of 0.05. From the results that will be obtained if

the significance value shows > 0.05 then the data variant is homogeneous. The results of the homogeneity test can be seen as follows.

Tabel. 5. Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
Understanding Science	Based on Mean	1.096	3	84	.356
	Based on Median	.809	3	84	.492
	Based on Median and with adjusted df	.809	3	78.208	.493
	Based on trimmed mean	1.075	3	84	.364

The significance value in the pretest was 0.356 (> 0.05) and the significance value in the posttest was 0.364 (> 0.05), which means that the variance of students' Science Understanding of the material on energy and its changes was distributed homogeneously.

Furthermore, the homogeneity test is used to determine the existence of data from two or more groups that are homogeneous (the same) or heterogeneous (not the same). This homogeneity test is carried out using the Levene test which is calculated using the SPSS 25.0 program with a significance level of 0.05. From the results that will be obtained if the significance value shows > 0.05 then the data variant is homogeneous. The results of the homogeneity test can be seen as follows.

Tabel. 6. Hypothesis Results Using the Independent Sample Test Formula

		Levene's Test		t-test for Equality of Means					95% Confidence	
		F	Sig.	t	df	Sig. (2-tailed)	Difference	Error Differen	Lower	Upper
Understanding Science	Equal Variances assumed	6,577	0,014	8,378	42	0,000	11,348	1,355	8,615	14,082
	Equal variances not assumed			9,817	41,837	0,000	11,348	1,156	9,015	13,681

The results of the pretest and posttest show that sig. (2-tailed) <0.05, which is 0.000 (<0.05). The sig. (2-tailed) value is smaller than 0.05, so Ho is rejected. There is a difference in the average Science Understanding before and after using the Project based learning model assisted by audiovisual media to improve students' Science Understanding. So it can be concluded that the project based learning model assisted by audiovisual media affects improving the Science Understanding of grade IV elementary school students..

5. DISCUSSION

His research was conducted in class IV at SD Negeri 2 Kerjo and SD Negeri 2 Salamrejo as an experimental class which will be treated using the Project based learning

model assisted by audio visual media and class IV at SD Negeri 2 Sumberingin as a control class which will not be given treatment.

The research data was obtained starting from giving assignments to find out the students' learning outcomes after being given treatment. Based on the research that has been done, it can be seen that when the treatment has been given using the Project based learning model assisted by audio visual media and an increase in the average obtained can be seen, for the control class the average value obtained was 76.94 and the experimental class was 88.29 after getting the students' learning outcomes in the control class and the experimental class, then the researcher conducted a prerequisite test, namely the normality test, homogeneity test, and hypothesis test.

Based on the analysis that has been done on the normality test in the control and experimental classes, normal data was obtained, so that the data was obtained from the population with a normal distribution. For the homogeneity test, it is also said to be homogeneous because the test obtained significance is more than 0.05 (> 0.05). The hypothesis test using the independent samples test was accepted because the significance value (2-tailed) between the control group and the experimental group was 0.000 <0.05. Thus, it can be concluded that there is a difference in students' Science Understanding between the control group and the experimental group, which means that there is a project based learning model assisted by audio-visual media that affects improving the Science Understanding of grade IV elementary school students.

This is supported by several relevant studies, including research conducted by LD Anggreni, I N. Jampel, K. S Diputra entitled "The Effect of Project Based Learning Model Assisted by Portfolio Assessment on Science Understanding" with the results of the study that there is a difference in Science literacy between the group of students who are taught the Project Based Learning model assisted by portfolio assessment and the group of students who are not taught the Project Based Learning model assisted by portfolio assessment. This is based on the average score of students' Science Understanding and the results obtained after conducting a t-test. The group of students who were taught the Project Based Learning model assisted by portfolio assessment obtained a higher Science Understanding score than the group of students who were not taught with the Project Based Learning model assisted by portfolio assessment.

Similar research was conducted by Sri Melindayani, entitled "The Effect of Project-Based Learning Model on Science Understanding Ability of Science Material of Grade V Students of Telkom Elementary School Makassar" with research results Based on the results of independent sample test sig (2-tailed) data analysis. A value of 0.00 was obtained which is smaller than the significance rate of 0.05 which means that there is an influence, thus H1 is accepted and H0 is rejected. This means that there is influence of the project-based learning model on the ability of Science Understanding in Science material of grade IV students of Telkom Elementary School Makassar.

Improving Science Understanding is very necessary in learning, especially in science learning in elementary schools. Improving Science Understanding is useful for students to solve everyday problems related to the material being studied.

6.   CONCLUSION

There is an influence of the use of Project based learning Model Assisted by Audio Visual Media to Improve the Science Understanding of Grade IV Students in Elementary Schools. Based on the results of the normality test using Shapiro-Wilk, the measurement data of students' test scores on the material of energy and its changes, the pretest of the experimental class obtained a significance value of 0.149 and the significance value of the posttest of the experimental class was 0.642, the pretest of the control class obtained a significance value of 0.183 and the significance value of the posttest of the control class was 0.186. These results indicate that the students' Science Understanding test on the material of energy and its changes is normally distributed.

Based on the homogeneity test, the significance value is > 0.05, which means that the data on students' scientific understanding on the material of energy and its changes are normally distributed. This is evidenced by the significance value in the pretest of 0.356 (> 0.05) and the significance value of the posttest of 0.364 (> 0.05), which means that the variance of students' Science Understanding of the material of energy and its changes is distributed homogeneously.

Meanwhile, based on the hypothesis test based on the results of the pretest and posttest that sig. (2-tailed) <0.05, namely 0.000 (<0.05). The sig. (2-tailed) value is smaller than 0.05, so Ho is rejected. There is a difference in the average Science Understanding before and after using the Project based learning model assisted by audiovisual media to improve students' Science Understanding. So it can be concluded that the Project based learning model assisted by audiovisual media affects improving the Science Understanding of grade IV elementary school students in the experimental group by 88.29 by using the implementation of the Project based learning model assisted by audiovisual media 76.94 which is not Project based learning assisted by audiovisual media. So it can be concluded that there is an increase in students' Science Understanding by 11.35.

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