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Application of Problem-Based Learning Model Assisted by Audio Visual to Improve Critical Thinking Skills of Elementary School Children

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Abstract: This study aims to examine the effectiveness of the Problem-Based Learning (PBL) model supported by audio-visual media in improving critical thinking skills of elementary school students in science subjects. The research was conducted at SDN Kalinganyar, Sumenep, using a quantitative experimental method with a saturated sampling technique involving fifth-grade students. Data collection was performed through tests and observation sheets, followed by statistical analysis using SPSS. The results show a significant improvement in critical thinking skills in the experimental class compared to the control class. The posttest average score of the experimental group reached 84.27, significantly higher than the control group's average of 70.60. Hypothesis testing using an independent sample t-test revealed a significance value of 0.000 (<0.05), indicating that the PBL model combined with audio-visual media has a statistically significant impact on students' critical thinking abilities. The use of visual media enhances student engagement, motivation, and understanding by providing contextual and multisensory learning experiences. This research concludes that integrating PBL with audio-visual support is an innovative and effective strategy for developing 21st-century learning skills, particularly in fostering critical thinking among elementary students.

Keywords: Audio-visual media; Critical thinking; Elementary education; Problem-based learning; Science learning

Introduction

Critical thinking is a key 21st century skill that needs to be developed early, especially in elementary school. With this ability, students can analyze information, solve problems logically, and make the right decisions based on data and facts. Thinking skills have now become a skill that has received more and more attention (Kim & Seidman, 2019). Even countries today have focused on education that is oriented towards developing thinking skills (Zohar & David, 2009). Critical thinking is one of the higher order thinking skills that is a top priority in global education (Ennis, 1985). Critical thinking skills are still considered to play an important role in supporting students' learning process (Mulnix, 2012; Paul, 2005). The learning process itself is a crucial element in educational activities, because it serves as the main means to realize educational goals. Without the learning process in educational institutions, educational goals cannot be achieved (Laksana et al., 2024).

Teachers play a key role in student success in the teaching and learning process. They must have good competence and ability in designing and implementing learning to achieve the desired goals. The interaction between teachers and students greatly determines student success (Simbolon & Koeswanti, 2020).

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In learning Natural Sciences (IPA), students are guided to gain understanding by collecting data through experimentation, observation, and communication to produce reliable explanations. In addition, critical thinking skills training aims to shape students into individuals who are able to think critically, solve problems, and think independently, so that they are ready to face various life challenges and can make the right and responsible decisions (Rohana et al., 2023).

In reality, learning in elementary schools is still dominated by traditional approaches that focus on memorization and one-way delivery of material, without adequate utilization of technology, so that the development of students' critical thinking skills is not optimal (Haleem et al., 2022). The 21st century brings a paradigm shift in education that challenges professional teachers to continue to innovate and improve the quality of the teaching and learning process (Fajar et al., 2020). In the implementation of thematic learning, there are still several obstacles that need to be overcome. One of the main obstacles is the lack of development of higher order thinking skills, such as critical thinking. This has an impact on the achievement of student learning outcomes which are still relatively low (Pratiwi, 2022).

To achieve maximum learning objectives, especially in science subjects, innovative learning media development and interesting learning models are needed (Puriasih et al., 2022). Science is the study of nature and is expected to help students develop logical and structured thinking skills to achieve new discoveries about nature. Science learning in elementary schools focuses on direct and real learning experiences, with an emphasis on process skills and scientific attitudes in exploring the surrounding environment (Sidabutar & Dharsana, 2018). Science learning also serves to help students develop the ability to solve problems and make the right decisions (Candra et al., 2017).

Science learning also encourages the development of creative and innovative thinking skills, thus forming students with good cognitive abilities (Dhaniawaty & Hardiyana, 2021). An interesting and effective learning model is needed to support the learning process. The selection of learning models must also consider the type and nature of the material presented so that students can understand more easily (Novitasari & Shodikin, 2020). The right learning model can help achieve learning objectives and provide guidance for teachers in carrying out a structured learning process.

The learning model is a crucial component in the teaching and learning process that is systematically designed with a structured conceptual scenario. The learning process can run in the intended direction if the learning model is applied appropriately. Conversely, choosing an inappropriate model can cause students to feel bored during learning, the material becomes difficult to understand, and the learning atmosphere becomes monotonous, thus reducing student learning motivation (Istijabatun, 2019). The Problem Based Learning model supported by visual media can be an effective choice in the teaching and learning process.

The Problem Based Learning model allows students to explore knowledge more broadly, while forming active and responsible student characters (Suryani et al., 2023). Audio-visual media, such as learning videos, are attractively designed and adapted to the environment where students live. Since elementary school students are still at the concrete operational stage and have difficulty in understanding abstract concepts, audio-visual based learning media is needed to help them understand the material better. Media such as videos function as tools that channel information through the senses of sight and hearing, so that they can support students in acquiring knowledge, skills and attitudes that are relevant to the surrounding environment. This approach helps elementary school students in understanding the material, solving problems, increasing learning motivation, and linking learning with the real world so as to encourage their active involvement (Ananda, 2017).

Learning with the Problem Based Learning model supported by audio visual media can create a more pleasant and interesting learning atmosphere. Audio visual media can increase student interest and motivation by presenting messages through a combination of sound and images that stimulate thoughts, emotions, and learning abilities (Lestari et al., 2018).

With visual and auditive stimuli, students can more easily understand abstract material, especially in science lessons that require in-depth understanding of concepts. In addition, audio visual media is also able to strengthen students' memory of the material presented, because information received through various senses tends to be more easily absorbed and remembered in the implementation of the Problem Based Learning model, audio visual media not only functions as a tool, but also facilitates students to develop critical thinking skills, analyze problems, and find solutions through an active and fun learning process. Thus, the combination of the PBL model and audio-visual media has great potential to improve the quality of learning and students' critical thinking skills in elementary schools.

This research focuses on the application of Problem Based Learning model with audio- visual media based on the surrounding environment to improve critical thinking skills and learning outcomes of elementary school students. The implications of this research

emphasize the importance of choosing an appropriate learning model to improve student achievement.

Method

Type of Research

This research uses quantitative methods with an experimental approach to describe the results of the study through statistical analysis (Sugiyono, 2012). quantitative research requires appropriate instruments to collect data and present research results in the form of accurate numbers (Anshorulloh, 2008).

This research applies the experimental method. According to Sugiyono (2012), experimental method is a research approach used to determine the effect of a particular treatment. In this study, the method was used to observe the effects resulting from the implementation of learning in the experimental group, which used a problem-based learning model in learning science with the subtheme of togetherness in diversity. The results were then compared with the control group who received learning with a direct teaching model.

Population and Sample

According to Sugiyono, (2021) population is a set of objects or subjects that have certain characteristics that match the research criteria. In this study, the population used was grade V A and V B students at SDN Kalinganyar, Arjasa District, Sumenep Regency.

In this study, a saturated sample was used. According to Sugiyono, (2012) defines a sample as part of a population that has certain characteristics. The selected sample must represent the population as a whole, especially if the population is too large to be studied as a whole due to limited funds, energy, or time.

This study used all students in grades V A and V B at SDN Kalinganyar, Arjasa District, Sumenep Regency as population and sample. According to Sugiyono (2012), saturated sampling technique is a sampling method that involves all members of the population as a sample. Therefore, this study uses a saturated sampling technique.

Result and Discussion

This research was conducted at Kalinganyar primary school, Arjasa sub-district, Sumenep district, using test instruments to collect data. Data analysis was used to compare the average critical thinking skills of grade V primary school students between groups using the Project Based Learning model with visual video assistance and groups using conventional learning models. This comparison aims to find out which learning model has a significant influence on students' critical thinking skills. The results of the pretest and posttest of the control class and experimental class are presented in the form of the Table 1.

Table 1. Description of Pretest and Posttest Data Control Class and Experimental Class

Parameters	Control Class Pretest	Control Class Pretest	Control Class Pretest	Control Class Pretest
Valid	30	30	30	30
Missing Mean	68.96	70.60	65.20	84.26
Median	67.00	70.00	65.00	84.00
Mode	63.13	47.97	112.09	93.03
Std. Deviation	7.94	6.92	10.57	9.64
Range	26.00	26.00	40.00	33.00
Minimum	57.00	57.00	43.00	67.00
Maximum	83.00	83.00	83.00	100.00

Source: Processed SPSS 2025

The pretest and posttest data in the control and experimental classes showed differences in the average scores. The control class had an average pretest score of 68.96 and posttest score of 70.60, while the experimental class had an average pretest score of 65.20 and posttest score of 84.26. In addition, the most frequently occurring value and the lowest value in both classes were also different. Before conducting further analysis, normality and homogeneity tests were conducted to ensure that the data met the prerequisites for analysis.

Data Normality Test

This study uses the Kolmogorov-Smirnov normality test with the help of SPSS software at a significance level of 0.05 to determine whether the data is normally distributed or not. If the significance value is greater than 0.05, then the data is considered normally distributed. The results of the normality test analysis with SPSS are as follows Table 2. From the Table 2, it can be seen that the significance values for the experimental and control classes are both greater than 0.05, namely 0.200 for the experimental class and 0.172 for the control class. Therefore, it can be concluded that the data in both classes are normally distributed.

From the Table 3, it can be seen that the significance values for the experimental and control classes are both greater than 0.05, namely 0.200 for the experimental

class and 0.172 for the control class. Therefore, it can be concluded that the data in both classes are normally distributed. With a probability value of 0.087 which is greater than 0.05, it can be concluded that the data variance of the two classes is homogeneous.

Table 2. Normality Test

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest A (Control)	0.136	30	0.167	0.934	30	0.064
posttest A (Control)	0.135	30	0.172	0.949	30	0.157
Pretest B (Experiment)	0.134	30	0.178	0.951	30	0.185
posttest B (Experiment)	0.114	30	0.200*	0.952	30	0.192

Source: Processed SPSS 2025

Table. 3 Test of Homogeneity of Variance

Parameters	Levene Statistic	df1	df2	Sig.
Based on Mean	3.027	1	58	0.087
Based on Median	3.082	1	58	0.084
Based on Median and with adjusted df	3.082	1	54.367	0.085
Based on trimmed mean	3.018	1	58	0.088

Source: Processed SPSS 2025

Hypothesis Testing

Hypothesis testing was conducted using the independent t-test at a significance level of 0.05 through the SPSS application. If the significance value is less than 0.05, it can be concluded that the differentiated project-based learning model has an effect on students' critical thinking skills. Conversely, if the significance value is greater than 0.05, then there is no significant effect, in accordance with the hypothesis proposed in this study.

Ha: There is an effect of the application of problem-based learning model assisted by audio visual to improve the critical thinking skills of elementary school children.

H0 : There is no effect of the application of problem-based learning model assisted by audio visual to improve critical thinking skills of elementary school children.

Table 4. Differential Test of Posttest Averages of Control and Experiment Classes

Class	N	Mean	Std. Deviation	Std. Error Mean
posttest _Control	30	70.60	6.926	1.265
Posttest_Experiment	30	84.27	9.645	1.761

Source: Processed SPSS 2025

The analysis results show that the experimental class has a higher average critical thinking ability (84.27) than the control class (70.60), which shows a significant difference between the two classes.

Table 5. Independent Samples Test

Parameters	Levene's Test for Equality of Variances				
	F	Sig.	t	df	Sig. (2-tailed)
Results equal variances assumed	3.027	.087	-6.304	58	0.000
Equal variances not assumed			-6.304	52.626	0.000

Source: Processed SPSS 2025

The results showed that the significance value of 0.000 (<0.05) proved that the problem-based learning model through visual video has a significant effect on students' critical thinking skills. Thus, Ha is accepted and Ho is rejected, which confirms that this learning model is effective in improving the critical thinking skills of grade V students in science subjects.

Discussion

The results showed that the application of problem-based learning model with audio-visual aids can improve the critical thinking skills of fifth grade students in science lessons. This is reinforced by the results of the t test which shows a significance value of 0.000 <0.005. Thus, the alternative hypothesis (H_1) is accepted and the null hypothesis (H_0) is rejected. Therefore, it can be concluded that the application of the *Problem Based Learning* model assisted by audio visual has a significant effect on improving the critical thinking skills of grade V elementary school students in science subjects. This finding shows that a student-oriented learning model and using appropriate media can improve critical thinking skills and learning interactivity. Thus, the Problem Based Learning model with audio visual aids has the potential to be an innovative learning strategy option to improve the quality of science learning at the elementary school level.

The application of problem-based learning model can help students develop critical and advanced thinking skills. Meanwhile, audio-visual media can

improve learning efficiency by displaying live examples, making the learning process more enjoyable and triggering challenges for students (Kurniawan et al., 2020; Melindawati & Suryani, 2021). Audio-visual media acts as a supporting tool that helps students analyze problems and stimulates them to be more sensitive to issues relevant to learning objectives. The use of this media in delivering material is also able to increase students' focus, enthusiasm, motivation, and memory during the learning process. In addition, this media provides information in visual and audio forms that make it easier for students to understand concepts and encourage the development of higher order thinking skills (Herlina et al., 2020).

The utilization of audio-visual media in science learning based on Problem Based Learning is proven effective in creating a more interesting and contextual learning atmosphere. This media presents a multisensory learning experience, making it easier for students to understand everyday problems and at the same time improve critical thinking skills through activities such as observing, interpreting, and evaluating information. This learning encourages students to actively process information and find solutions, not just receive material. Thus, the Problem Based Learning model combined with audio-visual media can be an appropriate strategy to develop students' critical thinking, collaboration, and creativity, in accordance with the demands of 21st century learning (Pratiwi, 2022).

Conclusion

This study shows that the application of the Problem-Based Learning (PBL) model supported by audio-visual media significantly improves the critical thinking skills of fifth-grade students in science subjects. This is evidenced by the results of an independent sample t-test, which produced a significance value of 0.000 (<0.05), indicating a significant difference between the learning outcomes of the experimental class and the control class. The average posttest scores of students in the experimental class (84.27) were higher than those in the control class (70.60), indicating that the PBL approach supported by visual videos is effective in improving students' critical thinking skills. The student-centered problem-based learning model encourages students to think analytically, evaluate information, and seek solutions. The use of audio-visual media has also been proven to enhance learning efficiency and appeal by presenting material in a contextual and multisensory manner. This media facilitates concept understanding, increases learning motivation, and supports the development of higher-order thinking skills. Thus, the combination of PBL and audio-visual media is an innovative learning strategy relevant to 21st-century learning needs and can improve educational quality, particularly in science education at the elementary school level.

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Conflicts of Interest
The authors declare no conflict of interest.

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