



# Integrating Problem-Based Learning and Visual Media to Spark Science Curiosity in Fifth Graders

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## Abstract

This research was motivated by students who observed low interest in science learning, negatively affecting their cognitive learning outcomes. The issue stems from the conventional, teacher-centered lecture method, resulting in one-way communication that causes students to become bored and disengaged. This study aims to enhance students' interest in learning by implementing the Problem-Based Learning (PBL) model supported by visual media for 5th-grade students at elementary school SD Negeri 100706 Padang Lancat in Padangsidempuan City, North Sumatera, Indonesia. This research employs a collaborative Classroom Action Research approach with homeroom teachers. Data collection involved observation sheets and questionnaires. The findings indicate that the PBL model assisted by visual media significantly increased students' interest in learning science. Initial data revealed that only 26.67% of students were categorized as having a good interest in learning. In Cycle I, this percentage increased to 60%, and in Cycle II, it further rose to 87%, with students categorized as having good and very good interest in learning.



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## 1. Introduction

Learning is essentially an activity carried out consciously by a person, which changes his behavior through new knowledge and skills and positive attitudes and values [1]. Meanwhile, learning is a child's activity to gain knowledge and skills [2]. Learning can be defined as conveying information from teachers to students. According to Indonesian law number 20 of 2003, learning is the interaction process between students and educators and learning resources in a surrounding environment. Educators must meet qualifications according to the student level, subjects taught, and other instructional provisions [3].

Science learning is one of the subjects taught at all levels of education, including elementary school. In the Indonesian Regulation of the Minister of National Education (Permendiknas) No. 22 of 2006 concerning content standards, the definition of natural science is stated, namely that natural science is a science that is related to how to find out about nature systematically so that natural science is not just mastery of facts, concepts, or principles but is also a process of discovery [4]. Science learning in elementary schools needs serious attention from various parties, especially educators because science learning in elementary schools is the initial foundation for learning science at the next level.

A key factor influencing science learning is students' interest. Interest is a motivating force that directs attention toward specific people, situations, or activities, as it is a fundamental characteristic unique to each individual [5]. Interest in learning is the recognition of a connection between internal factors within an individual and external elements in their environment [6]. Students' interest in both learning and the material presented is crucial, as it impacts the achievement of learning objectives and cognitive outcomes. However, Wibowo noted that interest in science learning at the elementary school level remains relatively low [7]. This low interest in learning greatly affects outcomes, making it essential to engage students in meaningful learning activities [8].

One way that can be done to increase students' interest in learning is to use an exciting and effective learning model, such as the problem-based learning (PBL) model. The application of the PBL model is a learning model that involves students in learning to solve problems through the stages of the scientific method so that students can learn knowledge related to the problem and, at the same time, have the skills to solve problems. Meanwhile, according to Ngilimun, PBL is an appropriate alternative learning model where the conditions that must be maintained are a conducive, open, democratic, and fun atmosphere so that students can think optimally [9].

The PBL model is a method a teacher uses to invite students to explore a problem obtained from the real world or the virtual world based on the material being discussed and look for solutions from relevant information in groups by discussing through high-level thinking. The learning stage begins with giving a problem and continues with identifying the problem; the teacher organizes students to learn, students hold discussions to equate their respective opinions based on information obtained from various sources, and then design solutions and targets to be achieved at the end of the lesson [10].

Rizal et al. researched the PBL model and it demonstrated that it can enhance students' interest and learning outcomes in social studies. In their study, the average student learning outcomes in Cycle I were 78.03%, which increased to 86.42% in Cycle II [11]. Muchib's research also strongly supports these findings, showing that applying the PBL model with videos significantly improved students' interest and achievement in learning Indonesian, with interest levels rising from 74.19% in Cycle I to 83.87% in Cycle II [12].

Research frequently examines the impact of the PBL model on enhancing students' interest in learning, with particular attention to the integration of PBL with instructional media. Instructional media, including

physical and digital tools, is crucial in supporting the educational process by helping teachers effectively deliver content and achieve learning objectives. Combining PBL with various instructional media can potentially increase student engagement and interest in learning [13]. The Indonesian Department of Education and Culture confirms that using media in the learning process can stimulate interest and motivation, facilitate understanding, reduce verbalism, and encourage systematic and rational thinking. It also helps students internalize and develop core values [14]. The learning media used in this context is visual. Visual media, which involves only the sense of sight, integrates facts and ideas clearly and effectively through words and images [15]. This media type is particularly suitable for concisely presenting information, catering to visual learners [16].

The research by Kustandi et al. highlights the effectiveness of visual media in enhancing students' experiences and achieving educational goals. Their findings indicate that incorporating visual media into the learning process boosts students' interest and helps them develop their visual learning skills. This approach is particularly beneficial for illustrating events or concepts that cannot be easily presented in a traditional classroom setting. Visual media aids in deepening students' understanding, reinforcing memory retention, and capturing their attention and interest [17].

Based on observations of class V at SD Negeri 100706 Padang Lancat, students' interest in learning science appears to be relatively low. Many students show minimal attention to the teacher during lessons, often engaging in side conversations, which leads to a lack of focus on the material. This behavior reflects a general disinterest in science. Indicators of student interest include enjoyment of the subject, attentiveness, a desire to seek out learning resources, and active participation in the learning process [18]. This study aims to improve student interest in science and evaluate the effectiveness of a PBL model supported by visual media in boosting engagement among class V students at SD Negeri 100706 Padang Lancat.

## 2. Materials and Methods

### 2.1. Research Location and Time

The research was conducted from January to March 2024 at SD Negeri 100706 Padang Lancat during the 2023/2024 academic year. The school is in Padang Lancat Village, Batangtoru District, South Tapanuli Regency, Indonesia. This location was selected to enhance student interest and learning outcomes in science, a subject with low-performance levels. This assessment is based on

observations of students' daily activities and academic results.

The researcher's residence's proximity to the research site facilitated the efficient use of resources, including funds, time, and energy. This geographic advantage contributed to the effectiveness of the research and the quality of the data collected.

## *2.2. Types and Methods of Research*

This study employs classroom action research. According to Hopkins, classroom action research is a form of reflective practice conducted by educational practitioners to enhance the effectiveness of their actions and deepen their understanding of classroom dynamics and teaching practices [19]. Classroom action research is research carried out directly in the target class to solve problems and improve the quality of learning practices [20]. Implementing action research is carried out in the classroom through self-reflection to improve performance and increase students' interest in learning [21]. The characteristics of this research involve real problems faced by teachers in the field [22]. The characteristics of classroom action research can be shortened to CIR (Collaborative, Inquiry, and Reflective).

The methods used in the study are quantitative and qualitative. The sampling method is purposive sampling, where students who are the object of research are members of the class being studied. This is based on data analysis methods such as tests and non-tests. Test data was analyzed quantitatively through descriptive statistical analysis [23]. Descriptive statistical analysis is used to find the average student score on the test through essay questions. Meanwhile, the descriptive qualitative method is oriented towards occurring phenomena or events. It is analyzed using scientific logic in the form of written or spoken words from people and behavior that can be observed and expressed through reports and descriptions obtained through literature and field studies, such as observations and interviews.

## *2.3. Research Setting and Subjects*

**Background** This research was conducted in class V of SD Negeri 100706 Padang Lancat, Batangtoru District, South Tapanuli Regency, during the science learning process using the PBL model assisted by visual media to increase student interest and learning outcomes. The subjects in this research were Class V students at State Elementary School 100706 Padang Lancat for the 2023/2024 academic year, totaling 14 students. The researcher developed the research subject because problems were found, as explained in the background.

## *2.4. Data Collection Instrument*

Data collection methods refer to researchers' techniques to gather information for their studies [24]. This research collected data through observation sheets, cognitive test questions, and questionnaires.

Observation involves systematic and purposeful activities to gather the necessary data to address a specific problem. Tests consist of questions or practical exercises to measure individuals' or groups' skills, knowledge, intelligence, abilities, or talents. Questionnaires, which consist of written questions, are used to obtain information from respondents, often requiring them to report on personal matters or things they are knowledgeable about.

## *2.5. Validity Test*

In this study, content validity was employed to ensure that the test instruments accurately measured the intended educational objectives and the scope of the material [25]. Content validity refers to the extent to which a test measures a representative sample of the subject matter and educational goals it aims to assess. This type of validity is important in educational research, where the alignment between the test items and the learning objectives is critical for accurate assessment.

## *2.6. Research Procedure Steps*

Based on Kurt Lewin's model, classroom action research is a method teachers and researchers use to improve educational practices. Each action research cycle involves four main steps: planning, acting, observing, and reflecting [26]. In this study, two cycles were conducted, with each cycle comprising two meetings.

At the planning stage, activities are carried out: The researcher determines the material to be presented, namely heat and its transfer; the researcher prepares a lesson plan using the PBL model assisted by visual media; the researcher prepares learning resources (Integrated Thematic Book for the 2013 Curriculum, Heat, and its Transfer Grade V), The researcher prepares the tools or materials needed during the practicum, The researcher compiles and prepares data collection instruments, namely question sheets, questionnaires and observation sheets, The researcher plans success criteria for increasing student interest and learning outcomes (in this research the percentage is set at 75% ). After the planning has been prepared, the next step is to implement the planning into concrete actions, which are carried out in learning activities starting from the preliminary, core, and

Stage 1	• Orienting Learners to the Problem
Stage 2	• Organizing Learners for Learning
Stage 3	• Guiding Individual and Group Inquiry
Stage 4	• Developing and Presenting the Work
Stage 5	• Analyzing and Evaluating the Problem Solving Process

**Figure 1.** An overview of the stages in PBL.

closing stages following the RPP that has been designed. The observation or observation stage is carried out at the same time as the implementation of the action. Observations were conducted to see how students responded and were interested in learning to solve problems through observation sheets and questionnaires given each cycle. Reflection is carried out based on the results of observations and evaluations. The aim is to examine the shortcomings and obstacles of the actions taken in cycle I; apart from that, the reflection results are used as a basis or guideline for improving action planning in the next cycle so that these weaknesses can be corrected.

Then, Cycle II is carried out based on the reflection results in Cycle I. In cycle II, the actions aimed to correct deficiencies in cycle I. Activities in cycle II also go through the same stages as cycle I, which go through planning, implementation, observation, and reflection. Cycle II shows changes and increases in student interest and learning outcomes so that the cycle is terminated, and the research can be said to be successful. The implementation of PBL stages is visualized in Figure 1.

### 2.7. Research Analysis Technique

Analyzing data involves processing and interpreting information to align it with the research objectives, ensuring it conveys a clear and meaningful message [20]. For instance, the analysis of observation sheets is based on data gathered from observing student learning activities. The percentage of the data is calculated by determining the scores from these observations, which are based on specific aspects that are either marked as "Yes" (Done, score 1) or "No" (Not Done, score 0). The formula used to calculate the observation value is shown in Equation 1.

$$\text{Observation Value} = \frac{\text{Score obtained}}{\text{Maximum score}} \times 100 \quad (1)$$

The score obtained refers to the sum of the answers on the observation sheet, and the maximum score is determined by the total number of aspects observed.

Additionally, the analysis of questionnaire assessments follows a similar approach, with the percentage (NP) calculated as shown in Equation 2.

$$\text{NP Percentage} = \frac{R}{SM} \times 100 \quad (2)$$

Where NP represents the percentage value sought or expected, with R indicating the total score obtained by students, SM represents the maximum ideal score for the questionnaire, and 100 serves as a constant in the calculation.

Student learning interest is then assessed based on the following criteria [9]:

- 86%-100%: Very good interest in learning.
- 76%-85%: Good interest in learning.
- 60%-75%: Sufficient interest in learning.
- 55%-59%: Low interest in learning.
- <54%: Very low interest in learning.

Qualitative data analysis in this study has four stages. The first stage is data collection, which is the data in this study collected from observations during the activities. The second stage is data reduction and categorization; after collecting data, the next process is to reduce the data by grouping the data based on the research time in the implementation of each cycle. The third stage is data display. At this stage, the data obtained from the data reduction results is designed and included in a table or narrative form to make it easier to conclude. The fourth stage is drawing conclusions based on the observations made.

## 3. Results and Discussion

This study evaluates the increase and development of student interest in science learning by applying the PBL

**Table 1.** Comparison of increased student interest in learning.

Criteria	Pre-Cycle	Cycle I	Cycle II
Very Good	0%	20%	26.67%
Good	26.67%	40%	60%
Enough	53.33%	40%	13.33%
Low	20%	0%	0%
Very low	0%	0%	0%

model, assisted by visual media, in the fifth grade of SD Negeri 100706 Padang Lancat. The PBL model is designed to engage students in solving problems through the scientific method, enabling them to acquire relevant knowledge while developing problem-solving skills. PBL is especially suitable for elementary students in science learning because it fosters a fun and engaging learning environment, which is crucial for enhancing student interest. Increased interest in learning positively influences student learning outcomes [27]. Therefore, the PBL model was chosen to boost student interest and academic performance.

In this research, visual media played a significant role in supporting the PBL model. Visual media, defined as tools that engage the sense of sight and effectively combine facts and ideas through words and images [15], not only make learning more enjoyable but also help students grasp abstract concepts more easily.

The findings indicate that using the PBL model, assisted by visual media, effectively increased student interest and learning outcomes in science among the fifth graders at SD Negeri 100706 Padang Lancat. Questionnaire results consistently increased student interest and learning outcomes across all sessions. These findings align with previous research and perspectives from earlier studies, which also demonstrate that implementing the PBL model can enhance student interest and learning outcomes. In Rizal's study, student learning outcomes improved from an average of 78.03% in the first cycle to 86.42% in the second cycle [11]. Similarly, the research by Mathaningrum & Hardini revealed that student interest in learning increased from 17% in the low category, 60% in the medium category, and 0% in the high category during the first cycle, to 0% in the low category, 11% in the medium category, and 89% in the high category in the second cycle. Furthermore, student learning outcomes improved significantly, with the percentage of students completing the first cycle increasing from 33% to 89% in the second cycle [28].

Based on the implementation results in cycles I and II with the application of the PBL model assisted by visual media in learning Natural Sciences, heat material, and its transfer, students' interest in learning has increased. The

increase can be seen in students' responses to indicators of learning interest. In this research, four indicators of student interest in learning are feelings of happiness, interest, attention, and student involvement during learning activities.

Several factors influence the increase in student interest in learning. These factors include those originating from within the student, the school environment, and the family environment [29]. During research activities, researchers can see the influence of these factors on increasing students' interest in learning. One of the factors that greatly influenced students at the time of this research were factors originating from the school environment, such as the learning atmosphere. A fun and challenging learning atmosphere can create learning intentions and increase students' interest in learning, especially in science learning, which is considered abstract, so teachers need to look for more varied learning methods to make learning more interesting.

The use of the PBL model, supported by visual media, has significantly increased student interest and learning outcomes in science education, as shown in Table 1. Initially, only 26.67% of students exhibited a high level of interest due to the conventional and teacher-centered methods used at that time, which led to boredom. To address this, researchers implemented the PBL model with visual media in Cycle I, resulting in an increase in student interest to 60%. In Cycle II, this percentage further rose to 87%.

Applying the PBL model can enhance students' interest in learning by connecting classroom activities with real-world events. The PBL model is characterized by initiating learning with a problem directly related to actual events, allowing students to transform abstract concepts into concrete understanding [30]. The PBL model has several advantages, such as increasing learning activities and developing students' interest in learning continuously, even though formal education has ended [31].

The research indicates that students' interest in learning increased using the PBL model supported by visual media. Visual media helps capture students' attention, a key indicator of learning interest. Incorporating visual media into the PBL model can enhance students' engagement in learning activities. This boost in interest suggests that students are more engaged when learning is varied and interactive. This approach highlights how factors within the school environment, such as a stimulating learning atmosphere, can positively influence students' motivation and interest in learning.

Table 2 presents a comparison of observations of teacher activities. The teacher observation sheet recorded 20



Table 2. Comparison of observations of teacher activities.

No	Implementability	Cycle I Meeting I	Cycle I Meeting II	Cycle II Meeting I	Cycle II Meeting II
1	Yes	15	16	18	20
2	No	5	4	2	0
Completion Percentage		75%	80%	90%	100%

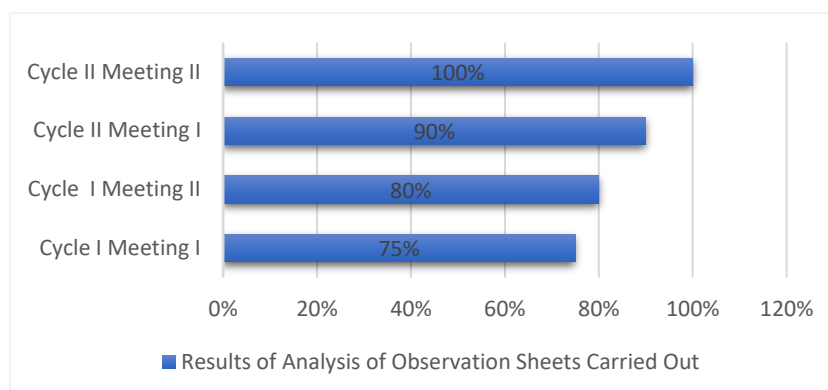


Figure 2. Analysis results of the PBL model observation sheet assisted by visual media.

Table 3. Comparison of student activity observations.

Implementability	Cycle I Meeting I	Cycle I Meeting II	Cycle II Meeting I	Cycle II Meeting II
Average	56.67	64.81	79.63	82.96

items related to the learning process using the PBL model with visual media. Overall, the implementation of these items improved with each meeting. This can be seen from the first cycle of the first meeting, which was based on the results of the analysis of the teacher observation sheet, which carried out only 15 items with a percentage of 75%. Meanwhile, in cycle I, meeting II, from the analysis of teacher observation sheets, only 16 items were completed with 80% completeness. Then, in cycle II, meeting I, the analysis results of the teacher observation sheets were only 18 items with 90% completeness. In cycle II, meeting II, the teacher observation sheet analysis results increased to 20 items with 100% completeness. The improvements made from the 20 items of the teacher observation sheet at each meeting can be seen in Figure 2.

Table 3 compares the increase in the implementation of student observations using the PBL model assisted by visual media at each meeting. From the student observation sheets, there were 18 items during the learning process using the PBL model assisted by visual media; generally, what was implemented at each meeting increased. This can be seen from the first cycle of the first meeting from the results of the analysis of student observation sheets carried out by students with an average of 56.67. Meanwhile, in cycle I, meeting II, the results of the analysis of student observation sheets carried out had an average of 64.81. Then, in cycle II, meeting I, the analysis results of student observation sheets were carried out with an average of 79.63. In cycle

II, meeting II, the results of the analysis of student observation sheets that were carried out increased by an average of 82.96.

#### 4. Conclusions

Based on the results of research conducted in class V at SD Negeri 100706 Padang Lancat, it can be concluded that The PBL model assisted by visual media can increase interest in learning science in class V students at SD Negeri 100706 Padang Lancat from initial conditions to cycle II. The increase in students' interest in learning can be seen from the average score and the percentage of students who complete the test from pre-cycle to cycle II. From the initial conditions, it is clear that the percentage of students who have good learning interests is 26.67%. Then, in cycle I, the percentage of students with a good interest in learning increased to 60%. Then, in cycle II, the percentage of students with a good interest in learning increased significantly, reaching 87% of the total.

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