IMPLEMENTATION OF A PROBLEM-BASED LEARNING MODEL USING POP-UP BOOKS TO INCREASE STUDENTS' MOTIVATION AND ACHIEVEMENT IN NATURAL SCIENCE SUBJECTS

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Abstract: This research is based on the problem of low motivation and learning achievement among Class V students at SD Negeri 1 Sidoharjo. The research aims to determine the implementation of a Problem-Based Learning (PBL) model using pop-up books to increase student motivation and achievement in Natural Sciences (IPA) Class V SD Negeri 1 Sidoharjo—using Classroom Action Research—by implementing two cycles. The Classroom Action research the researcher uses consists of four stages: planning, action, observation, and reflection. The subjects in this study were 25 students of Class V SD Negeri 1 Sidoharjo—research using test and non-test instruments. The test consists of a written test and a non-test system consisting of observation sheets and questionnaires. Research data were analysed using a quantitative description. Research data showed that the results of learning motivation in Cycle I were 74% with the criteria "Good," and there was an increase in Cycle II of 85.8% with the criteria "Very Good." Data on student achievement in Cycle I obtained an average score of 74.11 with a classical completeness of 58% (Enough). In Cycle II, there was an increase in the average score of 83.88, with classical completeness of 86% (Very Good). So it can be concluded that implementing a PBL model using the pop-up book can increase student motivation and achievement in science subjects in Class V SD Negeri 1 Sidoharjo.

Keywords: Problem-Based Learning, motivation, achievement, Natural Science

INTRODUCTION

According to Jean Piaget's theory, elementary school is a basic level of education taken by students in the age range of 7–11 years. At this age, there is a process of student educational development when they are in the concrete thinking phase of finding solutions to problems (Valen & Satria, 2021). The development of

elementary school age is one of the developmental processes by which students prepare themselves to support their survival in the future (Ariston et al., 2018). In the development of elementary school age, students will experience developments in attitudes, knowledge, and skills in each of their learning activities.

Natural Sciences (IPA) is a branch of science based on natural phenomena that will become knowledge if it starts with a scientific attitude and scientific method. In learning science, Elementary School (SD) teachers must be able to present learning in which students not only act as recipients but also experience and experience firsthand when understanding this knowledge so that later it can be implemented in students' daily lives.

Based on the results of preliminary observations in class V SD Negeri 1 Sidoharjo, Sruweng District, Kebumen Regency, in the subject of Natural Sciences, the learning process still needed to be improved. In the results of the preliminary observation, the researcher found problems regarding mastery of the material, which could not yet be improved due to teacher-centred learning. There is no direct student interaction in the learning process. There needs to be an implementation of learning models and media that support student success. The absence of a sense of joy, enthusiasm, responsibility, and student involvement in finishing assignments and students' lack of interest in the running of the learning process cause low student learning motivation in the class.

Other data from the fifth-grade teacher at SD Negeri 1 Sidoharjo states that student achievement in science subjects is low because student learning outcomes in science subjects have not stayed within the Minimum Completeness Criteria (KKM) determined by the school, namely 75. According to the total of 25 students in grade V, 14 students (56%) scored below the KKM and 11 other students (44%) scored above the KKM. This means that students' scores are still low because most of them have not reached the KKM score or have not reached more than half of the number of students who have completed it.

Based on these considerations, the researchers tried to improve the learning process at SD Negeri 1 Sidoharjo through action research entitled "Implementation Of A Problem-Based Learning Model Using Pop-Up Books to Increase Students'

Motivation And Achievement In Natural Science Subjects in Class V of SD Negeri 1 Sidoharjo ".

From this background, the formulation of the problem in this study is "What is the implementation of the Problem-Based Learning model using pop-up book media able to increase student motivation and achievement in the subject of Natural Sciences in class V SD Negeri 1 Sidoharjo?" This research aims to "know the implementation of the Problem-Based Learning model using pop-up book media in increasing student motivation and achievement in the subject of Natural Science Class V SD Negeri 1 Sidoharjo", especially regarding the material "The Water Cycle and Its Impact on Events on Earth and the Survival of Living Things."

Problem-Based Learning (PBL) is a learning model involving students solving problems using the scientific method, which in turn gives students the knowledge and skills to solve problems (Syamsidah & Hamidah, 2018, pp. 13–14). According to Septiana et al. (2019), the PBL model encourages students to participate actively and work together with other students to achieve optimal results when solving problems. Khaki (Zhao et al., 2020) revealed that Problem-Based Learning encourages students to solve problems through research, discussion, independent study, and working together in small groups to help them learn more independently. Problem-Based Learning will place more emphasis on Learning because the syntax encourages students to develop science skills (Duda et al., 2019). According to Syamsidah & Hamidah (2018), in general, there are six steps to implementing problem-based learning, including "recognising the problem, creating problems, making hypotheses, collecting data, testing hypotheses, and making settlement choices."

According to Denessen et al. (2020), a way that the teacher can ensure that all students in the class can develop according to their potential is to meet the educational needs of each student by providing adaptive and different teaching. According to M. Zhang et al. (2020), the interactive form of books plays a vital role in attracting students' interest in learning. Pop-Up Book learning media, namely books, can move and interact through paper mechanisms such as rolls, folds, wheels, slides, and tabs. The books do not have to pop," but keep moving. Pop-Up Books are books that, when opened, can display 3-dimensional images, which makes them even more interesting to read (Rakhmawati et al., 2020). The preparation and creation of the Pop-Up Book begin with

analysing the essential competencies according to the material needed and then examining the material's contents in depth (Elmunsyah et al., 2019). After that, start building the framework of the book.

Learners, like students, are not subject to time or space restrictions in a learning environment. They can access relevant learning resources and services without interruption if they are still interested in learning (Lo et al., 2021). Learning motivation is encouragement through enthusiasm, direction, and student persistence in carrying out learning actions to achieve their learning goals. Without motivation, a person cannot act because motivation encourages a person to move (Ana Andriani & Subarkah, 2019). Indicators of learning motivation can be used when observing student motivation. Indicators of learning motivation, according to Sudjana (2013: 61), are as follows: interest in learning activities; enthusiasm of students in carrying out and completing assignments given; having students' responsibilities in completing assignments; reactions given by students to stimuli given by the teacher, both in the form of pleasure or satisfaction when doing the task. Increased learning motivation in students can also be caused by a large part of their curiosity and fantasy (Khan et al., 2019).

Learning achievement is an explicit criterion for evaluating the accuracy of specific knowledge (Q. Zhang & Yu, 2022), expressed in the form of changes students achieve in a learning activity and expressed in numbers, letters, sentences, and symbols. Learning achievement can also be defined as a measure of the success rate of students in meeting predetermined standards and achieving perfection in thinking and acting (Moh. Zaiful Rosyid et al., 2019: 8–9). Critical thinking ability is one of the components that influence student achievement. Students with strong critical thinking skills will achieve good learning outcomes (Nur Azizah et al., 2021).

RESEARCH METHODS

The research carried out by researchers used the type of Classroom Action Research using a spiral system introduced by MC Taggart. This action research design includes four stages:

1. Planning phase: the researcher and the teacher prepare a lesson plan, learning tools, and learning media.

2. Action phase: in the form of initial activities, core activities, and closing activities. Before the closing activity, there is an evaluation activity to measure learning achievement.
3. Observation phase: includes student observation, teacher observation, and observation of student learning motivation which is given through a questionnaire.
4. Reflection phase: consists of analyzing the results of student work, motivational questionnaires, and the results of observations.

Classroom Action Research was carried out in April through two cycles, each with two meetings. Class Action Research took place at SD Negeri 1 Sidoharjo. The research subjects were fifth-grade students at SD Negeri 1 Sidoharjo, Sruweng District, Kebumen Regency, with 25 students (13 male and 12 female). The researcher found that there were problems with students' motivation and that their learning achievement still needed to improve, which made the researcher choose this class as the subject.

Data collection techniques include test techniques, observation techniques, and questionnaire techniques. This research instrument uses two methods: tests and non-tests. Tests are questions asked of students to measure their answers (Sudjana, 2013: 35). This test is carried out through oral tests, written tests, and action tests, which usually evaluate student learning outcomes. The test is used to obtain data on the achievement scores of fifth-grade students at SD Negeri 1 Sidoharjo. Tests are given after completing learning activities or at the end of learning. Non-testing is an assessment of student learning outcomes that is carried out without testing students but by carrying out systematic observations. Non-test assessments in this study used questionnaires and observation sheets.

This research is considered successful if the Learning Motivation of fifth-grade students increases through the implementation of a PBL model using pop-up book media, reaching at least 80% of the students with "Good" criteria. There is an increase in implementing a PBL learning model using pop-up book media; at least 80% of students achieve the Minimum Completeness Criteria (KKM), namely 75.

Data analysis in this study used both tests and non-tests. The data comes from teacher activity sheets, student activity sheets, student learning motivation questionnaire sheets, and student achievement sheets. Measuring data analysis of motivation to learn can be done by:

1. Look for the final value obtained.
2. Find the average through the formula:

$$X = \frac{\sum x}{N}$$

Where:

X = average value,

∑x = sum of all scores, and

N = amount of data

3. Look for scale calculations and determine the criteria
4. Determine the percentage of motivational completeness with the formul

$$NP = \frac{F}{N} x\ 100\%$$

Where:

NP = percentage of completeness,

F = the number of students achieving the mastery indicator of learning motivation,

N = number of students.

Measuring learning achievement can use the following methods:

1. look for the value of individual achievement
2. Find the average through the formula:

$$X = \frac{\sum x}{N}$$

Where:

X = average value,

∑x = sum of all scores, and

N = amount of data

3. Determine the percentage of motivational completeness with the formula:

$$NP = \frac{F}{N} x\ 100\%$$

where:

NP = percentage of completeness,

F = the number of students achieving the completeness achievement indicator,

N = number of students:

4. Define criteria

RESULTS AND DISCUSSION

Research Result

Implementation of research at SD Negeri 1 Sidoharjo, Sruweng, and Kebumen Regency in class V in Natural Science Subjects (IPA) The study investigated implementing a Problem-Based Learning model using pop-up books to increase motivation and learning achievement in science subjects in class V SD Negeri 1 Sidoharjo with action research activities. Classroom Action Research was conducted in two cycles, each with two meetings. The first cycle starts on April 10, 2023, and April 12, 2023; the second cycle starts on April 13, 2023, and April 15, 2023.

The results of this study were obtained from teacher activity observation sheets, student activity observation sheets, motivational questionnaire sheets, and evaluation sheets given at each meeting. Observation sheets for teacher and student activities are used as a substitute for assessing teacher and student activities during learning activities. Questionnaire sheets are used to measure student motivation in science subjects. Evaluation sheets are used when measuring student achievement results during learning activities. The following are the results of measuring student motivation and achievement:

Student Learning Motivation Questionnaire Results

Student motivation questionnaire sheets are given at each meeting to determine student learning motivation results. The result can be described as follows:

Table 1. The results of the learning motivation questionnaire

Results	Cycle I	Cycle II
The average percentage of motivation	74%	85,8%
Criteria	Good	Very Good

The graph of the results of the student learning motivation questionnaire can be described as follows:

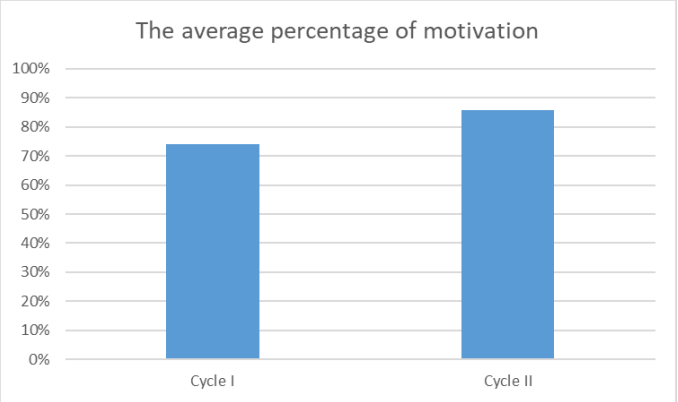

Figure 1. The average percentage of student learning motivation completeness

Based on the results of Cycle Research I, the average percentage of learning motivation was 74% (Good). However, it did not indicate the average percentage of learning motivation that had been determined. Therefore, there needs to be an improvement in increasing the average percentage indicator of learning motivation so that researchers can improve cycle II. Cycle II obtained a percentage of completeness of learning motivation of 85.8% (Very Good). So, the results of student learning motivation have met the specified criteria and indicators.

Student Achievement Results

Research results on learning achievement are carried out every time students finish learning activities. The results of this achievement were obtained from an evaluation sheet in the form of a written test. The results of this study's evaluation are used to measure the value of student achievement in class V SD Negeri 1 Sidoharjo. The results of the average acquisition of learning achievement scores are as follows:

Table 2. The results of calculating the average value of learning achievement

Results	Average value Cycle I	Average value Cycle I
The average value	74,11	83,88
Description	Under KKM	Above KKM

The graph of the results of the average student learning presentation is described as follows:

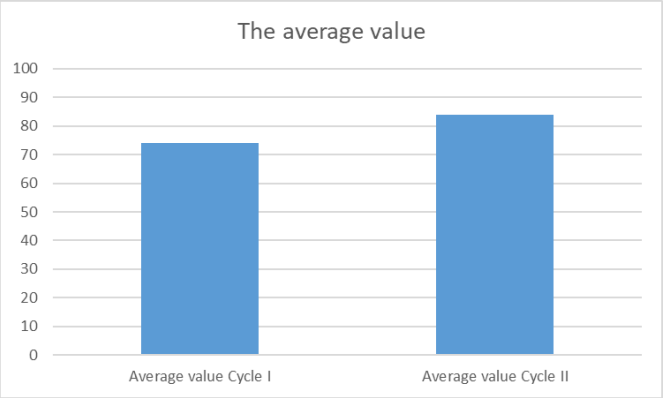

Figure 2. The results of the average value of student achievement

It is known that the average value of students in cycle I, which is 74.11, is below the KKM. In cycle II, the result was 83.88, with the criteria above the KKM. Thus, in cycle II, the average value of student achievement has increased based on the Minimum Completeness Criteria (KKM) that have been determined.

Table 3. Percentage of classical completeness of learning achievement

Results	**Cycle I**	**Cycle II**
Percentage of achievement completeness	58%	86%
Criteria	Enough	Very Good

The graph of the percentage of classical completeness of student achievement is shown as follows:

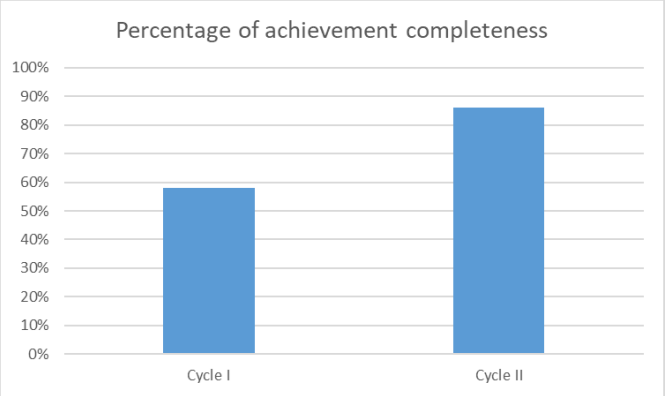

Figure 3. Percentage of classical completeness of learning achievement

It is known that the percentage of classical completeness of student achievement in Cycle I is 58% (Enough). Thus, there is a need to improve the classical completeness of learning achievement in Cycle II. Then, in Cycle II, the completeness results were 84% (Very Good). It was concluded that in Cycle II, the percentage of classical student achievement results had increased according to predetermined indicators.

Discussion

The Problem-Based Learning (PBL) model is knowledge learning that focuses on authentic problem-learning and problem-solving (Duda et al., 2019). This action research shows that the implementation of a PBL model using the pop-up book can increase student motivation and achievement in science subjects at SD Negeri 1 Sidoharjo. This is evidenced by data collected from motivational questionnaires and student achievement results. The results of the questionnaire proved that students' motivation in Cycle I was only 74% (Good). After making improvements in Cycle II, there was an increase in student motivation of 85% (Very Good). This increase in motivation was due to the encouragement of students to try the pop-up book model and the media applied by the teacher. The increase in motivation is measured based on the indicators in the questionnaire given at each meeting. The indicators of this questionnaire consist of an interest in learning activities, student enthusiasm in carrying out and completing assigned tasks, student responsibility in completing assignments, and reactions given by students to stimuli provided by the teacher, whether in the form of pleasure or satisfaction when doing assignments. Tokan & Imakulata (2019) state that student learning motivation, both internal and external, will influence their learning

behaviour. Students who are motivated and interested in what they are learning and can acquire knowledge and skills will, of course, concentrate more on the problems they face (Arias et al., 2022).

Likewise, with learning achievement, the implementation of a PBL model using pop-up books in Cycle I was implemented using large groups and without tutoring from the teacher. According to the results obtained in the first Cycle, the average value of learning achievement is only around 74.11 (below the KKM). It gets a completeness percentage of only around 58% with the "Enough" criterion. In Cycle II, the teacher tries to improve by reducing group members and guiding student learning activities to enhance learning achievement. In Cycle II, there was an increase in the range of 83.88 (above the KKM) and 84% completeness with the "Very Good" criterion. Learning achievement is an explicit criterion for evaluating the accuracy of specific knowledge (Q. Zhang & Yu, 2022) in the form of student changes in a learning activity. Based on the increase in learning outcomes obtained by students in Cycle II, it was concluded that the implementation of a PBL model using pop-up books increased student achievement in class V SD Negeri 1 Sidoharjo.

CONCLUSION

Problem-Based Learning (PBL) involves many cognitive challenges because students try to understand problem situations, explain the causes of problems, decide on essential facts to investigate, and generate hypotheses for solutions (Duda et al., 2019). According to the results of the classroom action research conducted in April 2023 for two cycles and two meetings, implementing the PBL Model using the pop-up book increased student motivation and achievement in the Class V Natural Sciences (IPA) Subject at SD Negeri 1 Sidoharjo. It was proven from the motivational data results that Cycle I was initially 74% (Good) and then 85% (Very Good) in Cycle II. Then, the learning achievement results were obtained from the initial Cycle I, ranging from 74.11 and only getting completeness of around 58% (Enough) to around 83.88 with 86% completeness (Very Good) in Cycle II.

This research can be used as input for organisations and teachers at SD Negeri 1 Sidoharjo to build problem-based learning using pop-up books for Natural Science subjects. The advantage of this research is that it can be used as a reference in

developing learning that can increase motivation and achievement in learning Natural Sciences at SD Negeri 1 Sidoharjo. The weakness of this study is the cost of making the pop-up book, which is quite large, and the explanation of the learning steps could be more optimal.

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