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The Influence of Problem-Based Learning on Elementary School Students' Interest in Science

Arief Budhiman[1], Oriza Satifah[2], Fita Permata Sari[3]

[1,2,3] Department of Primary Teacher Education, STKIP Majenang, Indonesia

ABSTRACT

Elementary school students' problem-solving abilities must be developed so that they are accustomed to formulating solutions. This study aims to determine the effect of problem-based learning on students' interest in science at SD Muhammadiyah Majenang. The nonequivalent control group design was used in this quasi-experimental study. The participants in this study were fourth-grade students from SD Muhammadiyah Pahonjean and SD Muhammadiyah Cilopadang. Student questionnaires and documentation were used to collect data. The data analysis technique used a normality test, homogeneity test, and t-test. The Mann-Whitney test results show that the Asymp Sig. 0.000. This results that the problem-based learning model having an impact on SD Muhammadiyah Majenang students' interest in science. Teachers need to implement science learning using a problem-based learning model.

INTISARI

Kemampuan pemecahan masalah siswa SD harus dikembangkan agar terbiasa merumuskan solusi. Penelitian ini bertujuan untuk mengetahui pengaruh pembelajaran berbasis masalah terhadap minat belajar IPA siswa di SD Muhammadiyah Majenang. Desain kelompok kontrol nonequivalent digunakan dalam penelitian kuasi-eksperimental ini. Partisipan dalam penelitian ini adalah siswa kelas IV SD Muhammadiyah Pahonjean dan SD Muhammadiyah Cilopadang. Kuesioner dan dokumentasi siswa digunakan untuk mengumpulkan data. Teknik analisis data menggunakan uji normalitas, uji homogenitas, dan uji t. Hasil uji Mann Whitney menunjukkan bahwa Asymp Sig. 0,000. Hal ini menunjukkan bahwa model pembelajaran berbasis masalah berpengaruh terhadap minat IPA siswa SD Muhammadiyah Majenang. Guru perlu menerapkan pembelajaran IPA dengan menggunakan model pembelajaran berbasis masalah.

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Corresponding author:
Fita Permata Sari, Department of Primary Teacher Education, STKIP Majenang, Indonesia
✉ fitapermata@gmail.com

A. Introduction

Education is one of the important things in life, from toddlers to adults. The learning process requires something interesting to encourage further interest in learning [1]. The low interest in student learning can be caused by internal and external factors. Internal factors come from the students themselves as well as students' motivation and intelligence [2]. External factors that come from the student environment include the learning model used by the teacher in delivering the material [3]. The influence of inappropriate learning models can result in conditions of learning activities such as interest and student learning outcomes that tend to be low and monotonous [4]. Students who prefer to be lectured, few students want to ask questions, few students can answer questions, and students will feel bored, and sleepy during the learning process [5]. In addition, teachers also rarely provide examples of the application of subject matter in everyday life [6].

Sometimes during the learning process, students do not want to ask about their understanding of the natural science material presented by the teacher [7]. This is not only caused by the low interest in learning students but also by the students' self-confidence which is still not formed [8]. In addition to the student factor, the teacher factor also affects the students' low interest in learning about natural science subjects. Teachers mostly convey natural science material to students through a teacher center approach which is carried out using the lecture method only [9]. This of course will make it difficult for students to explore learning interests, scientific argumentation skills, and the ability to express their opinions [10]. In the minds of every student, there will also be unfavorable thoughts about natural science which is one of the theoretical subjects without application in everyday life. Thus, teachers need to modify the implementation of natural science learning by implementing a learning model that is more student-centered, innovative, and able to optimize student interest in learning.

The implementation of learning models that can facilitate students' interest in learning turns out to be closely related to the content of natural science subjects. This is because natural science is a science that seeks to find out about nature systematically [11]. That is, through natural science a person is not only required to be able to master a collection of knowledge in the form of facts, concepts, or principles but also to be able to carry out the discovery process [12]. With the existence of natural science subjects, it is hoped that it can be a vehicle for students to increase interest in studying themselves and their environment. Indeed, the right learning process in natural science subjects is by providing direct experience to develop the competence to explore and understand the environment scientifically [13].

Natural science learning that is carried out using a problem-based learning model can help teachers apply natural science material in everyday life [14]. In the implementation of learning based on the problem learning model, the teacher only acts as a learning facilitator who provides natural science problems to students to solve them [15]. The application of problem-based learning models in natural science learning can accommodate students who have diverse learning interests [16]. Students who take part in natural science education based on problem learning models can increase their activity in class and their learning interest is more optimal [17]. This is because problem-based learning makes students think and act in a structured manner with a gradual pattern of activities to solve natural science problems [18].

Furthermore, each learning model has its advantages and disadvantages, so in the implementation of learning, it is necessary to vary the implementation of the learning model. This also occurs in the problem-based learning (PBL) model which has several advantages, one of which is being able to motivate students to have the ability to solve problems in real situations [19]. Students can build their knowledge through problem-focused learning and learning activities so that unrelated material does not need to be studied by students [20]. This reduces the burden on students by memorizing or storing information. Scientific activities occur through group work and students are accustomed to using various sources of knowledge [21]. Students can carry out scientific communication in discussion activities or presentations of their work [22]. Thus, this study aims to determine the effect of the problem-based learning model on the learning interest of the students of SD Muhammadiyah in Majenang.

B. Method

This quasi-experimental research was conducted using a nonequivalent control group design. This quasi-experimental research design is almost the same as the pretest-posttest control group design, only in this design the experimental group and control group are not chosen randomly [23]. The nonequivalent control group design used in this study can be shown in Table 1.

Figure 1. Nonequivalent control group design

Group	Pretest	Treatment	Posttest
EG	O	X	O
CG	O	X	O

Based on Table 2, it can be seen that EG is an experimental class. The experimental class in this study was 34 students of SD Muhammadiyah Pahonjean. CG is the control class in this study, namely 24 students of SD Muhammadiyah Cilopadang. X is the treatment given in this study which includes natural science learning that implements a problem-based learning model. Meanwhile, O is the implementation of the pretest and posttest used to determine the students' initial and final interest in natural science learning before and after the learning is implemented using the PBL model. The selection of samples or participants in this study was carried out by implementing a purposive sampling technique. This technique was chosen because students' interest in learning is quite low towards learning natural sciences, namely students from both schools. The two schools also rarely implement problem-based learning models.

Data collection techniques in this study were through student questionnaires and documentation. The questionnaire compiled in this study contains the main components such as student responses to the learning process before and after applying the problem-based learning model. Students were also asked for their views on the teacher's treatment during the learning process by applying a problem-based learning model. This questionnaire was filled out by fourth-grade students in the experimental class and the control class. Meanwhile, documentation is more focused on student activities during the natural science learning process that applies a problem-based learning model. After getting the data through student questionnaires and documentation, the data is then analyzed using various statistical tests. The statistical tests used to analyze the data in this study include the normality test, homogeneity test, and t-test.

C. Result and Discussion

This study used 2 classes, namely the experimental class and the control class. Research in the experimental class was conducted for two days. On the first day of application of the problem-based learning (PBL) model. Meanwhile, on the second day, questionnaires were distributed to students. The application of the problem-based learning (PBL) learning model at the beginning of the lesson is carried out by the teacher opening with greetings, after that the teacher motivates students so that students are more enthusiastic about learning. In the content section, the teacher provides an introduction to the material studied together as subject matter. Next, the teacher divides students into groups to discuss and present the results of discussing the problems of the learning material being studied. At the end of the lesson, the teacher concludes and closes with greetings.

The control class was conducted for two days, the first-day observing conventional model learning. On the second day distributed questionnaires to students through the application of natural science learning based on conventional learning models. This learning model is a learning model that focuses on the teacher being active or explaining the material and students listening [24]. Meanwhile, the data on student interest in learning natural sciences after learning is done by implementing PBL in the control and experimental classes can be seen in Table 2.

Table 2. The average percentage of students' learning interest questionnaire

Class	Percentage	Category
Control	69,80 %	Low
Experiment	82,30 %	Excellent

Based on the data presented in Table 1, it can be seen that the average percentage of students interested in learning natural sciences after learning implements a problem-based learning model. In the experimental class, the category is very high (very good) and the control class is in a low category. The average percentage of students' interest in learning questionnaire scores in the experimental class was higher than in the control class. This is by the findings of previous studies which stated that the PBL learning model can increase students' motivation and interest in learning so that the learning model can increase students' interest in learning [25].

Meanwhile, in classes that do not use problem-based learning models, students' interest in learning tends to be lower because there is no variation in learning. This can be the cause of the lack of student interest in learning natural sciences. Furthermore, the data obtained after learning natural science based on the PBL model were then tested. The first test is the normality test. The normality test was conducted to determine whether the data were normally distributed or not. The results of the normality test can be seen in Table 3.

Table 3. The result of the normality test

Class	Result	Description
Control	0,441	Normal
Experiment	0,625	Normal

Based on Table 3, it can be seen that the normality of student interest in learning after natural science learning based on the PBL model in the control class and experimental class is 0.441 and 0.625. Based on these findings, it can be said that students' interest in learning after learning natural science based on the PBL model is normally distributed because >0.05. The next test is the homogeneity test. A homogeneity test was conducted to determine whether the data obtained were homogeneous or not. The results of the homogeneity test can be seen in Table 4.

Table 4. The result of the homogeneity test

Name	Signification	Criteria	Description
Students' learning interest	0,058	> 0,05	Homogenous

Based on Table 4, it can be seen that the results of the homogeneity test on student learning interest data are sig. 0.058. The homogeneity test criterion is if the value of sig. >0.05 then Ha (homogeneous data) is accepted. The data in this study is homogeneous because the significance value is 0.0588 which is greater than 0.05. Thus, based on normality and homogeneity tests, the data in this study were normally distributed and homogeneous. The data on student interest in learning natural sciences based on the PBL model was then tested using a paired t-test. The results of hypothesis testing using paired t-tests can be seen in Table 5.

Table 5. The result of the hypothesis paired- t-test

Class	Signification	Criteria	Description
Control and Experiment	0,000	< 0,05	Changing

Based on the data presented in Table 5, it can be seen that the significance value is 0.000 or <0.05. This shows that there is an effect of the PBL model on students' interest in learning natural sciences. This is a sense of preference and interest in a particular thing or activity, without anyone telling or forcing it [26]. This can also be generated by conducting learning that is more attractive to students. When students feel interested in learning, they will be happier to participate in learning [27].

Students' interest in learning is very important to generate enthusiasm for learning. One way to optimize student interest in learning natural sciences, namely the teacher can provide material in an interesting and not monotonous way, such as by applying the PBL learning model. Having the characteristics of students exploring their knowledge so that students are not fixated on the material given by the teacher [28]. This can make students knowledgeable about problems that are used in real life. In addition, they can easily understand natural science learning delivered by the teacher. This is one of the factors that the PBL learning model can affect students' interest in learning. The findings in this study are by the findings of previous studies which stated that the PBL learning model can increase students' motivation and interest in learning [29]. This is because students can feel the benefits of problem-solving and relate it to real life.

Other research also strengthens the findings of this study that there is an increase in student interest in learning natural science material using a problem-based learning model [30]. The application of the PBL model in learning natural sciences, especially physics, can also increase the effectiveness of student interest in learning so that student learning outcomes in learning also increase [31]. Student learning outcomes in learning natural sciences that implement problem-based learning models and students using conventional learning models have significant differences [32].

The PBL learning model has characteristics that present problems in everyday life and opportunities for students to solve these problems in class discussions [33]. This can increase the attractiveness of students during learning. Furthermore, students can also reconstruct their understanding of the concepts of natural science that they have learned. Meanwhile, interest in learning is very influential on student learning outcomes. These findings can be used as a basis for driving natural science learning to be able to facilitate student activities that are more active and able to solve problems that occur in daily life.

D. Conclusion

This research has been able to provide a new understanding of learning natural sciences. The process of learning natural sciences from basic education and higher education needs to be carried out in various ways, one of which is by implementing a problem-based learning model. This is due to the implementation of the problem-based learning model (PBL) in natural science learning can positively affect students' interest in learning. This finding is evidenced by the results of statistical analysis which shows that the value of the paired t-test hypothesis test has a significant result of 0.000. Through these findings, it is only natural that teachers need to carry out a science learning process that focuses on students as learning subjects. Teachers can also carry out natural science learning by implementing a problem-based learning model. The hope is that students are not only able to understand the concepts of natural science, but they can apply and be able to solve any problems that occur based on the concepts they already have.

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