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The influence of problem based learning model on interest and learning outcomes of science in grade IV students at wioi state Elementary School

Lady Carolina Pangalo, Roos MS Tuerah, Richard HD Pangkey
Faculty of Education and Psychology, Manado State University, Tondano, Indonesia

Abstract
This study aims to determine the effect of the problem-based learning model on the interests and learning outcomes of students of grade IV of Wioi Elementary School. The approach used in this study is quantitative. The type of research used is an experimental research type through a pre-experimental design research design in which there are independent and dependent variables. The technique of collecting interest data uses a questionnaire, while learning outcome data uses a subjective test. The data analysis technique uses paired sample t-test analysis with a significance level of 0.05 assisted by SPSS 26 for windows. The results show that there is an effect of the problem-based learning model on students' interests and learning outcomes.

Keywords: Problem based learning, interest in learning, learning results

Introduction

Education plays a very important role in the development of the whole Indonesian people. Education really needs to be developed from various sciences, because quality education can increase the intelligence of a nation. The important role of education is also written in Law of the Republic of Indonesia No. 2 of 1989 concerning the National Education System, which states that Education is a conscious effort to prepare students through guidance, teaching and/or training activities for their roles in the future. Education is an effort to provide guidance to students by educators to reach student maturity. Education can also be a provision of intelligence for children to be used when they continue their lives as adults (Wandi, 2017: 3). Then Rousseau (2013: 69) wrote that education provides us with provisions that are not available in childhood, but we need them in adulthood.

Education in Indonesia refers to a system based on active and creative learning, which aims to produce quality human resources who are ready to face the challenges of the times. One of the most crucial levels of education in the formation of character and potential of students is basic education, especially at the Elementary School (SD) level. At this level, the basics of knowledge, skills, and good attitudes begin to be formed, including in the learning aspect. Basically, effective learning is highly dependent on the methods used by teachers in managing the teaching and learning process. Various learning models have been introduced to improve the quality of student learning outcomes, including the Problem Based Learning (PBL) Learning Model. This learning model emphasizes providing real problems that are relevant to everyday life as a starting point for learning, which then motivates students to find solutions and understand existing concepts. PBL not only focuses on the transfer of knowledge, but also on the development of critical thinking skills, problem solving, and the ability to work in groups.

The problems often faced by students at the Elementary School level, especially in Grade IV, are low interest in learning and less than optimal learning outcomes. In grade IV of Wioi Public Elementary School, it shows that students' interest and learning outcomes in science are still relatively low. This can be seen from the learning outcomes data of formative assessment, mid-semester summative (STS) and final semester summative (SAS) in the subject of science obtained by grade IV students of Wioi State Elementary School in 2024 with a minimum competency criterion of 70. Science learning is always carried out monotonously, teachers only use lecture methods, limited teaching media only use media available around them, such as books and blackboards and sometimes students find it difficult to understand the material.

Then he conveyed and according to observations, the lack of student interest in learning can be seen from the attitude of students during the teaching and learning process, which is an external factor. To strengthen the reasons for this study, interviews were conducted with several parents of grade IV students. A1 and A2 explained that students did not do their own remedial work at home about the newly taught material and parents also paid less attention to their children at home to review the previous lesson at school. So, it can be concluded that teacher creativity is needed in using learning models, strategies and learning media. So, based on the background of the problem mentioned, the researcher took one of the problems mentioned earlier, namely the lack of use of learning models that are in accordance with the characteristics of the child. Therefore, it is necessary to conduct research on the influence of the problem-based learning model on the interests and learning outcomes of science students in grade IV of Wioi State Elementary School.

Methods

The type of research used is an experimental research type through a pre-experimental design research design. According to (Sugiyono, 2023) experimental research is a quantitative research method used if you want to conduct an experiment to find the effect of certain independent variables/treatments/treatments on dependent variables/results/outputs under controlled conditions. Experimental research through the One-Group Pretest-Posttest design approach aims to determine the treatment of

the subject/object of research to test the hypothesis. The sample in this study was taken using purposive random sampling, namely a sampling technique by determining certain criteria or samples taken according to the wishes of the researcher (Sugiyono, 2008). The sample in this study was class IV of Wioi State Elementary School. The independent variable is the use of the model, while the dependent variable is interest and learning outcomes. Non-test data collection techniques are observation and questionnaires, while test data is in the form of subjective tests. Instrument trials were carried out to determine the validity and reliability of the instrument for both questionnaires and subjective test questions. This trial was conducted at Wioi State Elementary School. The prerequisite test data analysis techniques include homogeneity tests, normality tests, and hypothesis tests.

Results and Discussion

Results

1. Descriptive Statistical Analysis

a. Descriptive Analysis of Learning Interest

From the results of research on students' learning interest through questionnaire distribution, the results of data processing were obtained using SPSS 26 For Windows. Based on the results of descriptive analysis on the variable of students' learning interest (Y1), it is known that the maximum value obtained by students is 94, and the minimum value obtained by students is 87. The average score (mean) obtained by students is 91.6667 with a range of 12, the variance obtained is 2.989, the standard deviation obtained is 3.448 from the ideal score that may be achieved by students. Frequency distribution of students' learning interest. In other words, the number of student respondents is 30 students. The results of respondents as many as 30 students related to overall learning interest from 4 indicators, namely for the frequency of SS answers of 22 with a percentage of 73.3% included in the interested category, the frequency of ST answers of 5 with a percentage of 16.7% included in the not interested category, the frequency of RG answers of 2 with a percentage of 6.7 included in the not interested category, and the frequency of TS answers of 1 with a percentage of 3.3% included in the not interested category.

Thus, based on the results of the scores of 30 students who were the research samples, the data obtained were grouped below. In conclusion, in general the average score obtained by students on the student learning interest variable is; Y1 = 91.66 categorized as very interested. So it can be concluded that the use of the problem based learning model on students' interest in learning in the subject of science in grade IV of Wioi State Elementary School, it can be seen that there is a positive increase seen from 4 indicators of student interest in learning, it turns out that there are two most prominent indicators, namely the indicator of enthusiasm and participation and activeness of students in learning and the indicator of students' desire to learn and this indicator can be seen from, The results of processing student respondent data / distribution of questionnaires containing 25 statement items given to grade IV students at Wioi State Elementary School.

b. Descriptive Analysis of Student Learning Outcomes

Student learning outcome data is Y2. Y2 pretest and posttest are data before and after treatment is carried out by applying the problem based learning model. the problem based learning model is given to 30 grade IV students of Wioi State Elementary School. The data is then processed using the SPSS 26 For Windows program. Based on the results of data processing for descriptive statistical analysis of learning outcomes as seen in table 4.5, it is known that the sample of class IV with a total of 30 students in the pretest results with the lowest value (minimum) 20, the highest value (maximum) 70, the average value (mean) 46.83, variance value 147.385 and standard deviation value 12.140. While the posttest results with the lowest value (minimum) 60, the highest value (maximum) 95, the average value (mean) 83.23, variance value 47.426 and standard deviation value 6.887. So, it can be concluded again that the results of learning science in grade IV students at Wioi State Elementary School when viewed from the results of the pretest before using the problem based learning model are in the very low category, but when viewed from the results of the posttest after using the problem based learning model, they are in the high category. This can be seen during the implementation of learning, namely the lack of student attention in the learning process, less compact in completing tasks, especially in discussions and less willing to ask questions, so that the learning process is less effective.

Based on the results of the posttest after being taught with the problem based learning model, student learning outcomes have increased significantly. This can be seen during the learning process, students are very enthusiastic about following the lesson, dare to ask questions, are able to complete individual and group tasks, and dare to express opinions. Of course, the classroom atmosphere becomes more effective and enjoyable because of feedback from students in the learning process and the interactions that occur in the classroom between teachers and students. The learning outcomes of Natural and Social Sciences at Wioi State Elementary School in grade IV showed an increase in the pretest percentage value (before the application of the problem based learning model) namely a frequency of 23 with a percentage of 76.7% included in the very low category, a frequency of 1 with a percentage of 13.3% included in the low category, a frequency of 3 with a percentage of 3.3% included in the medium category, and a frequency of 1 with a percentage of 6.7% included in the high category. This is due to the lack of interest and attention of students to learn which results in the learning process being carried out ineffectively. The learning outcomes of grade IV students at Wioi State Elementary School, after the Pretest of the learning outcomes of Natural Sciences, there were 25 students with a percentage of 83.3% who did not complete their learning outcomes, and 5 students with a percentage of 16.7% who had completed their learning outcomes. So it can be concluded that the completion of the pretest learning outcomes with an average value of 46.83% did not reach the expected KKM of 70.

The learning outcomes of Natural and Social Sciences at Wioi State Elementary School in grade IV showed an increase in the percentage value of the posttest (after the application of the assisted problem based learning model) namely frequency 1 with a percentage of 3.3% included in the very low category, frequency 1 with a percentage of 3.3% included in the low category, frequency 2 with a percentage of 6.7% included in the medium category, frequency 26 with a percentage of 86.7% included in the high category. The learning outcomes of grade IV students at Wioi State Elementary School, after the posttest of the

results of learning science there were 29 students with a percentage of 96.7% of students who completed and those who did not complete there were 1 student with a percentage of 3.3%. So it can be concluded that the completion of posttest learning outcomes with an average value of 82.23 has reached the expected KKM of 70. So it can be concluded that there is an influence of the problem based learning (PBL) learning model on the interests and learning outcomes in the subject of science of grade IV students of Wioi State Elementary School seen from the pretest scores that were not completed as many as 25 students with a percentage of 83.3% and students who completed as many as 5 students with a percentage of 16.7%. While seen from the posttest scores of students who did not complete as many as 1 student with a percentage of 3.3% and students who completed as many as 29 students with a percentage of 96.7%.

2. Inferential Analysis

Inferential analysis was conducted to determine whether there was an influence of the problem-based learning model on students' interests and learning outcomes, which was carried out through two stages, namely the first stage of normality testing, and the second stage of hypothesis testing of the Paired Sample T-test.

1. Normality Test

The normality test aims to determine whether the independent variables and dependent variables in the regression model follow a normal distribution or not. This test is carried out using the Kolmogorov-Smirnov (K-S) statistical analysis. The results of the Kolmogorov-Smirnov calculation with the help of the SPSS application are then compared with the significance of α (0.05). If the sig result> α (0.05), then the null hypothesis (H0) is rejected, meaning that the data follows a normal distribution. Conversely, if sig <α (0.05), then H0 is accepted, meaning that the data does not follow a normal distribution. In this study, it can be observed through the table that the Asymp. Sig. (2-tailed) data for the pretest and posttest results are 0.169. This value indicates that the results of the normality test produce a number greater than the significance level of 0.05 (5%). Therefore, based on these results, it can be concluded that the data used in this study are normally distributed.

2. Hypothesis Testing

A hypothesis is a temporary answer or assumption to a problem that has been formulated by the researcher. This hypothesis must be tested for its truth empirically. Hypothesis testing in this study was carried out using the Paired Sample t-Test, this test was carried out to determine whether there was an effect of the problem-based learning model (X) on student interest and learning outcomes (Y). If the significance value> 0.05 then there is no significant effect between the variables. However, if the significance value <0.05, then there is a significant effect between the variables. The testing technique used was the Paired Sample t-Test with a significance level of α = 0.05. Based on the results of data processing with SPSS version 26, the sig value (2-tailed) of 0.001 <0.05 is obtained, so it can be concluded that there is a difference between students' interests and learning outcomes in the pretest and posttest data. These results clearly indicate that there is an influence of the problem based learning model on students' interests and learning outcomes in class IV of Wioi State Elementary School. Therefore, the alternative hypothesis (H1) is accepted, while the hypothesis (H0) is rejected.

Discussion

This research is an experimental research where the form of this research is pre-experimental design, the design used is one-group pretest-posttest design. In this process, learning in each meeting is adjusted and implemented with the learning steps that have been arranged in the research procedure and using learning tools that have been prepared by the teacher. This research was conducted with the aim of seeing the interests and learning outcomes of students who are taught through the problem-based learning (PBL) learning model in the science subject of class IV of Wioi State Elementary School. Based on the results of the descriptive analysis of the problem-based learning model on students' learning interests in the science subject of class IV of Wioi State Elementary School through the distribution of questionnaires to students, it can be seen from the results of the processed SPSS 26 data, including the very interested category. This research is in line with research conducted by (Duha, 2024) that based on the results of the student learning interest questionnaire through the problem-based learning (PBL) learning model, it has reached the target in the high category.

Based on the results of the frequency distribution of student respondents regarding overall learning interest from the processed data of 4 indicators of learning interest from 23 students with 25 statements, it is known that the frequency of SS answers is included in the interested category, the frequency of ST answers is included in the not interested category, the frequency of RG answers is included in the not interested category, and the frequency of TS answers is included in the not interested category. This study is in line with research conducted by (Saputri *et al*. 2022) which states that students have a high learning interest category of 12 students with a percentage of 60%, while students' learning interests are in the very high category of 8 students with a percentage of 40%. This shows that fourth grade students of Wioi State Elementary School have a high interest in learning. The high interest of students in learning can increase students' enthusiasm for learning in participating in learning activities in class. This is in line with research conducted by (Wicaksana *et al.*, 2020) which states that the application of the problem-based learning model during learning using e-learning edmodo can increase students' interest in learning by providing opportunities for students to actualize themselves in the learning process.

If students have a high interest in learning, students pay more attention to the material that has been explained by the teacher, do assignments seriously, and actively discuss in the learning process. Based on research (C. K. Dewi *et al* ., 2023) and (Saputri *et al* ., 2022) states that the high interest in learning of students is also seen from the students' perseverance in learning, then students will do assignments according to the instructions that have been given properly and on time and the students' attention in the learning process so that the material taught by the teacher can be easily understood. From several indicators of student learning interest, it can be seen that: students' desire to learn and students' enthusiasm as well as students' participation and activeness in learning are the most prominent indicators of student learning interest in class IV of Wioi State

Elementary School. In line with the statement of research results (Dewi *et al* ., 2023) stated that during the learning process using the problem based learning model assisted by concrete media, a good response was obtained on all indicators of active aspects, feelings of pleasure, participation and interest, getting a good response with an average percentage above 80% which shows a positive impact and makes students able to think critically in solving problems, so that this model can increase students' interest in learning.

If students' interest in learning is high, then their learning outcomes will follow. Researchers apply the problem-based learning model to improve learning. The problem-based learning model is a learning model in which students can work together in groups or collaborate to solve a problem that is truly felt to be a problem related to everyday life or the real world (Dewi *et al.* 2022). From the descriptive statistical data, it is known that the results of the science learning of grade IV students of Wioi State Elementary School have significant differences, seen from the pretest and posttest before and after the application of the problem-based learning model. The average pretest is included in the very low category. While the average posttest was found to be included in the high category. However, the posttest score is greater than the pretest score. This can be seen from the average score obtained by students in the posttest, which is included in the high category. While in the pretest, the average score obtained by students is included in the very low category. The results above show an increase in the science learning outcomes of grade IV students of Wioi State Elementary School. This study is in accordance with research (Yuza *et al.* 2021) student learning outcomes in cycle I averaged 65.96 increasing to 80.34 with a good category in cycle II.

From the results of the study conducted by the researcher entitled the effect of the Problem Based Learning learning model on students' interests and learning outcomes in the subject of science in grade IV of Wioi State Elementary School shows the influence of the problem based learning model on interest and learning outcomes which can be strengthened from the results of the normality test calculation using Kolmogorov Smirnov analysis and hypothesis testing using paired sample t-Test analysis. The normality value for the pretest and posttest results is 169, so the data used in this study can be considered normally distributed. The hypothesis test of the paired sample t-Test, obtained a significance value of 0.001 which is less than 0.05, meaning that H0 is rejected and then H1 is accepted. The results of the analysis above show the influence of the use of the problem-based learning model on students' interests and learning outcomes in line with the results of the observations made by the researcher. Previous research related to the problem based learning model on interest and learning outcomes has been conducted by Pujiyanti *et al* ., 2021 and Musa'ad *et al* ., 2023 with different figures located in the analysis of data on increasing interest and learning outcomes where Pujiyanti *et al* ., 2012 and Musa'ad *et al* ., al. as much as the N-Gain number, and the one sample T-test hypothesis test while the inferential analysis used by the researcher is the one Kolmogorov smirnov normality test analysis and the paired sample t-Test hypothesis test.

Based on the pretest data obtained student learning outcomes, there were 25 students who had not completed and there were 5 students who completed, while the posttest data obtained student learning outcomes, there was 1 student who had not completed and there were 29 students who completed. The results of the study clearly show that there was a significant increase in the interest and learning outcomes of grade IV students at Wioi Elementary School after the application of the problem-based learning model. This is in accordance with the results of the study (Yuniati, 2020) showing that the results of the first cycle of action were 50% of students who had not completed it with an average score of 68.75%, while in the second cycle there were 100% of students who had completed it with an average score of 86.25%. The results of the descriptive statistical analysis and inferential statistics obtained can be concluded that there is an influence of the problem-based learning (PBL) learning model on students' interests and learning outcomes in the science subject of Class IV SD Negeri Wioi seen from the results of the pretest and posttest there was an increase. This is in accordance with the results of the study (Kadir *et al.* 2024) showing that the problem-based learning (PBL) learning model is able to increase students' interests and learning achievements seen from the results of the pretest which showed that students' learning achievements reached 46.83% and increased in the third cycle with a daily test score of 83.23%.

Conclusion

Students' interest and learning outcomes before the implementation of the problem-based learning model in the pretest with an average value of 46.83 while in the posttest there was an increase with an average value of 82.23. The results of the hypothesis test analysis using the paired sample T-test on the effect of the problem-based learning model on interest and learning outcomes of science, showed that the value (sig = 0.001) was less than 0.05, namely (0.001 <0.05). Based on the results obtained, it can be concluded that H0 is rejected and H1 is accepted, so there is an effect of using the problem-based learning model on students' interest and learning outcomes in the science subject of grade IV of Wioi State Elementary School.

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