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The Effect of Applying the Probing Prompting Learning Model Based on a Scientific Approach to Student Learning Outcomes in Social Arithmetic Mathematics Learning

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ABSTRACT

Purpose of the study: The purpose of this study was to describe the effect of applying the probing prompting learning model based on a scientific approach to student learning outcomes at SMP N 9 Muaro Jambi.

Methodology: This type of research is descriptive research with a quantitative approach. The research design used was a random pretest posttest design. The research instruments are tests for the realm of knowledge and observation sheets for the realm of attitudes and skills. Data analysis to find out the average difference in the realm of knowledge used the one-tailed t test. Determination of increased learning outcomes using N-Gain. The description of the effect of applying the model is from the attitude and skills observation sheet.

Main Findings: The probing prompting learning model based on a scientific approach influences student learning outcomes.

Novelty/Originality of this study: As material for contributing ideas in order to develop the process of learning mathematics at the junior high school level or equivalent, especially in social arithmetic material.

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1. INTRODUCTION

Mathematics is one of the basic sciences that has an important role. Because mathematics is a means of forming students to think scientifically [1]–[3]. But the reality that has happened so far is that there are still many students who think that mathematics is nothing more than counting and playing with formulas and numbers [4]–[6]. It is not uncommon for complaints to arise that mathematics only makes students dizzy and is considered a frightening specter for students [7]–[9]. So heavy is the degree that mathematics bears.

Social arithmetic is one of the mathematics materials studied in class VII at junior high school (SMP). Social arithmetic material is material that is full of questions directly related to trading life in everyday life, such as: Calculating total value, Unit value and partial value as well as Purchase price, Selling price, Profit, Loss, Discount (Rebate) , Gross, Tara and Net [10]–[12]. Part of this social arithmetic sub-matter has actually been encountered by students in everyday life so that students should be able to construct the knowledge and experience they have of the social arithmetic learning that will be studied.

Based on the results of observations and interviews with Mathematics teachers for class VII at SMP Negeri 9 Muaro Jambi, it was found that in class VII social arithmetic learning students often scored below the minimum completeness criterion (KKM) set at 70. The low student learning outcomes in social arithmetic learning were influenced several factors such as: teacher-centered learning, students only hear material exposure from the teacher, without having to play an active role in the learning process. The learning that is carried out is

less challenging for students to add new knowledge, as well as the lack of teacher knowledge in managing appropriate learning models also greatly influences student learning outcomes [13]–[15].

To overcome this problem so that it is not sustainable, it is necessary to find the right learning. Innovative learning is an alternative that teachers can practice to boost the success of the teaching and learning process [3], [16], [17]. One of the principles of innovative learning that can be used is student centered to provide a learning experience that is both challenging and fun [14], [16], [18]. So that students construct their own knowledge based on the learning experiences they get. Constructivism is a philosophy of knowledge which emphasizes that our knowledge is construction (our own formation) [4], [14], [19]. Knowledge is not a fact that remains to be discovered, but a formulation that is created by people who are studying it [20]–[22].

One of the innovative learning models that can be practiced by teachers to boost the success of the teaching and learning process is the Probing Prompting learning model. The application of learning using the Probing Prompting learning model is learning by means of the teacher presenting a series of questions that are guiding and exploring so that a thinking process occurs that relates each student's knowledge and experience to the new knowledge being learned [11], [23], [24].

Prompting probing used is proven to increase student activity in class which is indicated by the increasing number of students asking frequently [25]–[27]. This increase is not only an increase in the ability and courage of students in asking questions, but also in terms of expressing opinions.

Based on this, the purpose of this study was to describe the effect of applying the probing prompting learning model based on a scientific approach to student learning outcomes at SMP N 9 Muaro Jambi

2. RESEARCH METHOD

In accordance with the problems and hypotheses put forward, the research to be carried out is descriptive research with a quantitative approach. Descriptive research is research that is intended to investigate the circumstances, conditions or other things that have been mentioned, the results of which are presented in the form of a research report. The quantitative research method is a research method based on the philosophy of positivism, used to examine certain populations or samples, the sampling technique used in this research is simple random sampling, the type of data needed in this research is quantitative data while the data sources in this research namely primary data and secondary data.

The data collection technique in this study is to use a test. The instruments used were test questions and observation sheets. The research design used in this study was "Random Pretest Posttest Design". The population in this study were all class VII students of SMPN 9 Muaro Jambi, yan. The type of data needed in this study is quantitative data, namely data related to the numbers obtained from the results of the pretest and posttest. In this study, the instruments used were test questions and observation sheets.

3. RESULTS AND DISCUSSION

3.1 Description of Pretest Results

After the questions are declared valid and can be used as instruments in the assessment of learning outcomes in the knowledge aspect, the pretest and posttest questions can be used in the sample class. On Thursday 24 March 2016, a pretest was conducted to find out the initial abilities of the experimental class, namely class VIIA, and the learning methods that would be taken next week were presented using the Probing Prompting learning model based on a scientific approach. Then distributed a list of names of group members who will be useful during the learning process with researchers. The following is the calculation of the average and standard deviation of the sample class pretest results in Table 1.

Tabel 1. Analysis of the mean and standard deviation of the sample class pretest results

Class	Number of Test Participants	Average	Standard Deviation
(1)	(2)	(3)	(4)
Experiment	28	33,86	11,65
Control	27	33,04	12,87

Based on the data in the table above, the results of the initial study showed that the experimental class and the control class departed from the same initial conditions. The average pretest score for the experimental class was 33.86 and the average pretest score for the control class was 33.04. So it can be seen that the two sample classes have relatively the same average pretest scores before being given treatment or it can be said that the learning outcomes on aspects of student knowledge before treatment in the experimental class and the control class are the same. This is evident from the analysis carried out before taking the sample class on the raw scores of class VII semester exam results (population) it was found that the two sample classes selected were normally

distributed, homogeneous, and had the same average learning outcomes, meaning that the two sample classes were academically equivalent.

3.2 Analysis of Knowledge Aspect Learning Outcomes

Carry out a posttest to determine students' abilities after carrying out a series of Social Arithmetic lessons using the probing prompting learning model based on a scientific approach for 5 meetings. The posttest was carried out using questions that had been tested previously so that there were 25 multiple choice questions regarding Social Arithmetic material. The calculation of the average and standard deviation of the posttest results for each sample class is shown in Table 2.

Table 2. Analysis of the mean and standard deviation of the posttest results

Class	Number of Test Participants	Average	Standard Deviation
(1)	(2)	(3)	(4)
Eksperimen	28	81,00	7,90
Kontrol	27	76,30	8,94

After the data is obtained, then the hypothesis testing will be carried out. Testing this hypothesis is carried out using a similarity test of two averages t-test or commonly called the t-test. The assumptions that must be fulfilled to carry out the t-test are that the data is normally distributed and homogeneous. So before doing the t-test, the data is tested for normality and homogeneity. Because in this study there are pretest and posttest data that are used to determine the increase in student learning outcomes before and after the research is carried out, then the pretest and posttest data will be calculated by N-Gain to see the increase in student learning outcomes.

3.2.1 Normality test

The statistical test used is the Liliefors test. The normality test for the posttest values of the experimental and control classes obtained the following results (tables and complete calculations are in Appendix 36 for the posttest value normality test)

Table 3. The normality test results of the post test values

Liliefors test	Posttest	
	Experiment	Control
L_{count}	0,1231	0,1288
L_{table}	0,1658	0,1682
Information	Berdistribusi normal	

From the table above it can be seen that $L_o < L_{table}$. Based on this, it can be concluded that the posttest results of the experimental and control classes are normally distributed at the 95% level of confidence.

3.2.2 Homogeneity Test

The statistical test used in carrying out the homogeneity test of variance is the F test. With n1 = 28, n2 = 27, S12 = 79.91 and S22 = 62.37, Fcount = 1.28. Furthermore, with db1 = 27 and db2 = 26 obtained Ftable = 1.92. The results of the homogeneity test can be seen in the following table:

Table 4. Test the homogeneity of the posttest results of students in the experimental class and control class

Class	Number of Samples	Varians (S^2)	F_{count}	F_{table} (α=0,05)
Eksperimen	28	62,37	1,28	1,92
Kontrol	27	79,92		

From the table above it can be seen that Fcount <Ftable, namely 1.28 <1.92, it can be concluded that the experimental class and the control class have a homogeneous variance.

3.2.3 Two Means Similarity Test (Hypothesis Test)

After the learning results were obtained in the normal and homogeneous sample groups at the 95% confidence level, then a hypothesis test was carried out on the posttest data. From the calculation results in appendix 38, it is obtained: t count = 2.068 and t table = 2.007 with t count > t table, namely 2.068 > 2.007, then reject H0 and accept H1. So it can be concluded that the mean of the two samples is different, which means that because the average of the experimental group is higher than the average of the control group, it can be concluded that giving treatment to the experimental group has a significant effect.

3.3 N-Gain results of student scores

To show an increase in learning done, then the gain normality test (N-Gain) can be used. The N-Gain results of student scores can be seen in the table below:

Table 5. N-Gain results of student scores

Class	Average N-Gain	Interpretation Criteria
Experiment	0,72	g- tall
Control	0,65	g- currently

Based on the table above, it can be seen that the average N-Gain of the experimental class is 0.72, so it can be said that the increase in learning outcomes in the knowledge aspect of the experimental class is high. While the average N-Gain control class is 0.65, so it can be said that the increase in learning outcomes in the knowledge aspect of the control class is moderate.

4. CONCLUSION

Based on the results of research and data analysis and hypothesis testing, it can be concluded that there is a significant influence on student learning outcomes with the application of the Probing Prompting learning model based on a scientific approach to student learning outcomes in social arithmetic mathematics learning at SMP N 9 Muaro Jambi with an average student learning outcomes with the application of the Probing Prompting learning model based on a scientific approach is 81.0 and the average student learning outcomes with the application of direct learning based on a scientific approach is 71.6 and the results of the final analysis show that between classes the application of the Probing Prompting learning model based on a scientific approach and direct learning classes based on a scientific approach are obtained > ie 2.068 > 2.007 so that H1 is accepted. The calculation of the average N-Gain obtained an average N-Gain for the experimental class of 0.72 (g-high category) and the control class of 0.65 (medium g-category). The effect can be seen from the average student learning outcomes in the attitude aspect of self-confidence in the experimental class 72.81 in the good category and the control class 57.17 in the sufficient category. The average student learning outcomes in the skill domain of the experimental class were 66.01 in the good category and in the control class 51.96 in the sufficient category. So it can be concluded that the probing prompting learning model based on a scientific approach has an effect on student learning outcomes.

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