Double Loop Problem Solving Learning Model on Statistical Material at MTS NU Nahdlatul Atfhal Kudus

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Double Loop Problem Solving Learning Model on Statistical Material at MTS NU Nahdlatul Atfhal Kudus

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Abstract

At Mts NU Nahdlatul Atfhal Kudus, many students feel that statistical material is one of difficult subjects. It looks at their statistical test results. This research aims to assess the implementation of double loop problem solving learning model on statistical material at MTS NU Nahdlatul Atfhal Kudus in improving students' mathematical problem solving abilities. The study was conducted in class VIII A (double loop problem solving learning model class) dan VIII B (expository learning class). The method that used in this research is quasi experimental research with nonequivalent control group design. The research instrument used is mathematical problem solving test. Data analysis used a N-gain normalized test to see an improvement in students' mathematical problem solving abilities in both research classes, descriptive statistic, normality test and parametric and non parametric test. The findings of this research is based on Mann-Whitney U, students 'mathematical problem solving abilities on statistical materials by applying double loop problem solving learning model are higher than the students' mathematical problem solving abilities that applied the expository learning. This shows that double loop problem solving learning model can improve students' mathematical problem solving abilities. Based on this results, it can be concluded that double loop problem solving learning model is effective in statistical material

Keywords: double loop problem solving learning model, statistical material, mathematical problem solving abilities

1. Introduction

Mathematics is a subject that has an important role in human life. Any problem that occurs in everyday life definitely requires mathematics as one way to solve it. Mathematics learning is the process of interaction between teachers and students in a learning environment in order to acquire knowledge and mathematics abilities. Mathemathics lessons that focus more on teacher centered learning make passive students and monotonous. That learning is not interesting usually students quickly feel bored. This will affect the development of various mathematical abilities of students. Thus, teachers are required to design an effective and appropriate mathematical learning by applying innovative learning models that can develop students' mathematical abilities.

Research conducted by Purwaningrum and Latifah (2018) in elementary school 4 Puyoh with the subject of research is class V students showed that the average test result of students' mathematical problem solving abilities by using discovery learning under the minimal audience criteria. The minimal audience criteria in the classroom for the subject of mathematics is 75. The study also shows that students' mathematical problem solving do not reach a 75% classical completeness. In other case, Garfield & Ahlgren (1988) said that one of mathematics material considered difficuly by junior high school students is statistic

The results of the study conducted by Purwaningrum and Latifah (2018) are in line with the results of observation and interviews of teachers in class VIII at MTS NU Nahdlatul Atfhal Kudus which states that students' mathematical problem solving abilities is still low. Students feel difficult to solve stories related to mathematical problem solving abilities, such as statistical materials. It's because most students are not interested in learning mathematics. In general, mathematics learning that is held in schools is teacher centered learning who do not involve students in any learning process so usually they get bored. The teacher dominates the learning by giving all the information and the students are asked to listen to the material described. This is what makes many students who often sleepy during mathematics learning.

Based on the existence of the problem above, it is necessary to have a suitable learning model to be applied at the time of learning mathematics at MTS NU Nahdlatul Atfhal Kudus. That model must be student centered learning. Studenets centered learning is learning process that should place the teacher at the center to engage students in an active learning. One of learning models that requires students to always be active is doubel loop problem solving learning model. Doubel loop problem solving learning model is a learning model of mathematical problem solving approach that emphasizes students to find the main cause of the existence of a problem. This is in line with students' mathematical problem solving abilities that require

student to understand problems, plan or design problem solving strategies, carry out calculations and verify the truth of the outcome or solution. The application of the model in learning encourages students to be able to understand, interpret and evaluate mathematical ideas both orally and in writing. Mas'ad et al (2016) stated that doubel loop problem solving learning model invites students to be active in learning. This model focuses on complex and unstructured troubleshooting. In this model, students are encouraged to work on two different problems loops but both of them are related.

Pradipta et al (2016) states that the steps of double loop problem solving learning model as follows:

a. Identify the problem, not just the symptoms. At this stage, detection includes everything that is a factor of the problem to be solved.
b. Detect immediate causes and rapidly implement temporary solutions. These direct causes are more obvious, therefore easy to detect and can be searched for solutions to be applied quickly.
c. Evaluate the success of the temporary solution. At this stage an evaluation of the effectiveness and success of existing temporary solutions has been implemented.
d. Decide whether root problem analysis is required or not. At this step, students decided to perform a root cause analysis or sufficient up to this point, taking into account the results of previous evaluations
e. If needed, detection of the cause of the higher level problem is made. The higher-searched cause is higher than the cause that has been found previously.
f. Designing the root solution of the problem. The designed solution is certainly not a temporary solution anymore, but a solution that can solve the problem thoroughly.

Mathematical problem solving abilities need to be developed because these skills are necessary to solve problems in everyday life and survival in the future. As one of the mathematical abilities, Hendriana et al (2017) states that mathematical problem solving abilities consists of four activities:

a. Understanding the problem, which consists of identifying the known data, identifying the e required data, checking the data and compiling the problem to mathematical models.
b. Choosing strategy and executing strategy.
c. Performing calculations or solving mathematical models.
d. Interpreting the solution (outcome) to the original problem and checking the correctness of the solution

Based on the above description, the purpose of this research is to improve students' mathematical problem solving abilities in statistical materials by applying double loop problem solving learning model and to compare the students' mathematical problem solving abilities on statistical materials by applying double loop problem solving learning model with students' mathematical problem solving abilities by applying expository model.

. Thus, the problem in this research is whether students' mathematical problem solving abilities on the material statistics by applying the double loop problem solving learning model os higher than students' mathematical problem solving abilities by applying the expository model?

2. Method

One of the purposes of this studi is to compare the students' mathematical problem solving abilities on statistical materials by applying double loop problem solving learning model with students' mathematical problem solving abilities by applying expository model. Thus, the research conducted is quasi experimental research. It's because this research is done in schools and researchers are not likely to form classes at random so researchers use existing classes and accept research subjects as they are.

The research design used is nonequivalent control group design. The study design is illustrated as follows (Ruseffendi, 2005).

Experiment Class : O X O
Control Class : O O
Note =

O = Pretest and Posttest
X = Double loop problem solving learning model

There are two groups in nonequivalent control group design. The first group as the experimental class and the second group as the control group. The experimental group is the group that applied double loop problem solving learning model while the control group is the group that used expository learning.

The population of this study are all students at MTS NU Nahdlatul Atfhal Kudus. While the sample research is class VIII A 20 students and VIII B consits of 19 students. All students aged between 13-14 years.

Samples were taken by using purposive sampling technique. Data were collected by using a mathematical problem solving test, pretest and postest. The pretest and posttest have the same questions. The test is given before and after learning activities in the experimental and control classes. Data analysis used N-gain normalized test to see an improvement in students' mathematical problem solving abilities in both research classes, descriptive statistic, normality test and parametric and non parametric tests.

3.Results

Here is a the result of this research.

a. Descriptive Statistical of The Experiment and Control Class

Here is a description of the pretest, posttest and n-gain scores of students' mathematical problem solving abilities in the double loop problem solving learning model and expository learning.

Table 1. Description of Pretest, Posttes and N-gain Score of Experiment Class (Double Loop Problem Solving Learning Model)

Score	Eksperiment Class				
	N	Min	Max	Mean	STDV
Pretest	20	48	74	62,90	7,17
Posttest	20	68	88	78,95	6,39
N-Gain	20	0,14	0,61	0,44	0,13

Table 2. Description of Pretest, Posttes and N-gain Score of Control Class (Expository Learning)

Score	Control Class				
	N	Min	Max	Mean	STDV
Pretest	19	46	74	61,68	7,27
Posttest	19	60	86	74,16	7,15
N-Gain	19	0,11	0,58	0,33	0,12

Interpretation of data in Table 1 and Table 2 is the average of pretest, posttest, and n-gain score of students' mathematical problem solving abilities by using double loop problem solving learning model are lower than students' mathematical problem solving abilities by using expository learning. Standard deviation of n-gain score of students' mathematical problem solving abilities by using double loop problem solving learning model is higher than students using expository learning. Thus, the diversity of data in the expository learning class is less than double loop problem solving learning model class. In other words, the n-gain score data of the double loop problem solving learning model is more heterogeneous than the expository learning class.

Furthermore, the results of the test of students' mathematical problem solving abilities in the two classes of research are further analyzed to determine whether whether students' mathematical problem solving abilities on the material statistics by applying double loop problem solving learning model os higher than students' mathematical problem solving abilities by applying the expository model.

b. Pretest Score of Students' Mathematical Problem Solving Abilities Data Analysis in Experiment and Control Class

The analysis of pretest score data was performed to determine whether the pretest score of students' mathematical problem solving abilities in double loop problem solving learning model class and in expository model class before being treated equally or significantly different. Analysis of pretest score data to be performed in the form of normality test, homogeneity test and t- test. Normality test use Kolmogorov-Smirnov test, while for homogeneity test use Levine test. If the data qualifies for normality and homogeneity then use independent sample t-test.

1) Normality test of pretest score of students' mathematical problem solving abilities

Prior to statistical tests, normality tests were performed to determine whether the data in this research taken followed normal distribution. In this research, pretest data analysis of student in double loop problem solving learning model class and in expository model class will be analized first with normality test Kolmogorof Smirnov. This test is done with SPSS 17 program with 5% significance level (α = 5%). The results of the test are presented in Table 3 below

Table 3. Normality Kolmogorof Smirnov Result

Class	Statistic	df	Sig.	Conclusion
Double loop problem solving learning model (experiment class)	0,100	20	0,200	Data is normal distribution
Expository learning (control class)	0,099	19	0,200	Data is normal distribution

Table 3 shows the critical values for the two classes is 0,200 > significant (α = 0,05). So, it can be concluded that Ho is accepted. It means that the pretest data analysis of student problem-solving test that using double loop problem solving learning model and expository learning are normal distribution. So, the next step is to test homogeneity of variance to see the similarity of data variance of both groups

2) Homogeneity of variance test of pretest score of students' mathematical problem solving abilities

Homogeneity test will be analized with SPSS 17 program with 5% significance level (α = 5%). The results of the test are presented in Table 4 below.

Table 4. Levine Test Result for Homogeneity of Variance

Uji *Levene Statistic*	*Sig.*	Conclusion
0,011	0,917	Both classes have the same variance

Based on Table 4, the levine test showed a significance value of 0,917 which indicated that the data had homogeneity of variance.

3) Independent sample t-test

Since the data is normally distributed and has homogeneity of variance, the next step is doing

independent sample t-test at α = 0.05. The results of the test are presented in Table 5 below.

Table 5. Independent sample t-test

t_{count}	*df*	*Sig.(2-tailed)*
0,525	37	0,602

According to Table 5, the significance value of the independent sample t-test of the pretest score data is 0.602 > 0.05, so Ho is accepted. That indicate average difference of pretest result of students' mathematical problem solving abilities between two classes is not significant. Thus, the students' mathematical problem solving abilities in double loop problem solving learning model and in expository learning class is the same.

c. N-gain Score of Students' Mathematical Problem Solving Abilities Data Analysis in Experiment and Control Class

1) Normality Test of The Experiment and Control Class by Using Kolmogorof Smirnov

In this research, n-gain data analysis of student in experiment and control class will be analized first with normality test Kolmogorof Smirnov. This test is done with SPSS 17 program with 5% significance level (α = 5%). The results of the test are presented in Table 6 below.

Table 6 Normality Kolmogorof Smirnov Result

Class	Statistic	df	Sig.	Conclusion
Double loop problem solving learning model	0,152	20	0,200	Data is normal distribution
Expository learning	0,201	19	0,043	Data is not normal distribution

Table 6 shows the critical values for the double loop problem solving learning model class is 0,200 > significant (α = 0,05). So, it can be concluded that Ho is accepted. It means that the n-gain data analysis of student problem-solving test that using double loop problem solving learning model is normal distribution.

While, based on Table 1, the critical values for the expository learning class is 0,0043 < significant (α = 0,05). So, it can be concluded that Ho is not accepted. It means that the n-gain data analysis of student problem-solving test that using expository learning is not normal distribution. Thus, we use non parametric statistical test, Mann-Whitney U, to see whether students 'mathematical problem solving abilities on statistical materials by applying double loop problem solving learning model are higher than the students' mathematical problem solving abilities that applied the expository learning. Mann-Whitney U test is done with SPSS 17 program with 5% significance level.

2) Mann-Whitney U Test

The result of non parametric statistical test of Mann-Whitney U is presented in Table 4 below.

Table 7. Mann-Whitney U test Experiment and Control Class Data

Class	Average		Sig. Mann-Whitney U (1-tailed)
	Rank	N-gain	
Double loop problem solving learning model	24,45	78,52	0,006
Expository learning	15,32	77,78	

Based on Table 7, the result of non parametric statistical test of Mann-Whitney U is 0,006 < significant (α = 0,05). So, it can be concluded that Ho is not accepted. It can be concluded that students 'mathematical problem solving abilities on statistical materials by applying double loop problem solving model is higher than the students' mathematical problem solving abilities which applied expository learning.

4. Discussion

The results in this research is students 'mathematical problem solving abilities on statistical materials by applying double loop problem solving model is higher than the students' mathematical problem solving abilities which applied expository learning. This is in line with the results of research conducted Pramana et al (2016) stating that through double loop problem solving learning model, there is an increase in mathematics learning achievement of students of grade VIII B, Junior High School 4 Singaraja. In addition, a study was conducted by Nurjanah et al (2016) states that double loop problem solving learning model can develop various of mathematical abilities students.

Double loop problem solving learning model begins by asking students to look for the cause of a problem. Then they solve the problem according to the cause of the problem. Activities are performed in two separate loops. The first loop is intended to detect the cause of the problem. After that, students are asked to design and implement a temporary solution. The second loop asks students to find a higher-level cause of the problem and they are asked to plan and implement the solution. That's the main solution. Double loop problem solving learning model makes students enthusiastic to study statistical material in class. Students worked the given problem and actively discussed with other students in class. The main characteristic of the double loop problem solving learning model is learning which focuses on giving problems to be discussed by students so as to train students to think creatively. Double loop problem solving learning model provides opportunities for students to determine their own learning goals. This leads to an

improvement in students' mathematical problem-solving abilities.

These findings suggest that double loop problem solving learning model should be applied to other mathematical topics other than statistics. This model requires a relatively long time, so the teacher should be better able to understand the problem-solving problem that is considered difficult because students are not familiar with nonroutine problem. This research is conducted at junior high school level so it is open for advanced researcher to develop this research. Alternatively, teachers can use double loop problem solving learning model with technology assisted learning to make mathematics learning more interesting for students.

5. Acknowledgement

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6. References

1. Garfield, J., & Ahlgren, A. (1988). "Difficulties in Learning Basic Concepts in Probability and Atatistics: Implications for Research". Journal for research in Mathematics Education, 44-63.
2. Hendriana, H., Rohaeti, E. E. & Sumarmo, U. *Students' Mathematical: Hard Skills and Soft Skills*. (PT Refika Aditama, Bandung, 2017)
3. Mas'ad., Nizaar, M. & Putra, A. M. (2016). "The Effect of Double Problem Solving Learning Method on Students' IPS Learning Outcomes Class VIII SMP Negeri 3 Mataram Lesson Year 2015-2016. Paedagoria. **14** (2): 73-77.
4. Nurjanah, S. Kartika, E. & Mulyati, T. "Approach to Double Loop Problem Solving on Improving Student's Mathematical Creative Thinking Ablities", ejournal.
5. Pramana, K. A. I., Suharta, G. P. & Parwati, N. "Application of Double Loop Problem Solving (DLPS) Model In Effort Improving Student Achievement of Junior High School Students Mathematics". ejournal. **2** (10).
6. Purwaningrum, J. P & Latifah, N. A. (2018). "Student Error in Low Mathematical Abilities in students' mathematical problem solving abilities test. Anargya: Jurnal Ilmiah Pendidikan Matematika. **1** (1)
7. Ruseffendi. E. T. *Dasar-dasar Penelitian Pendidikan dan Non Eksakta Lainnya*. (Tarsito, Bandung, 2005)

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