

**THE INFLUENCE OF PROBLEM SOLVING APPROACH WITH POLYA  
STEPS THROUGH TO UNDERSTANDING CONCEPT OF  
MATHEMATICS AT SMP N 3 SATAP JATIROTO  
WONOGIRI IN ACADEMIC YEAR 2013/2014**

**PUBLICATION ARTICLE**

**Submitted as Partial Fulfillment of The Requirements  
for Getting Bachelor Degree of Education  
in Mathematics Department**



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**2014**



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Program Studi : Mathematics

Judul Skripsi : **THE INFLUENCE OF PROBLEM SOLVING  
APPROACH WITH POLYA STEPS THROUGH TO  
UNDERSTANDING CONCEPT OF MATHEMATICS  
AT SMP N 3 SATAP JATIROTO WONOGIRI IN  
ACADEMIC YEAR 2013/2014**

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## ABSTRACT

### THE INFLUENCE OF PROBLEM SOLVING APPROACH WITH POLYA STEPS THROUGH TO UNDERSTANDING CONCEPT OF MATHEMATICS AT SMP N 3 SATAP JATIROTO WONOGIRI IN ACADEMIC YEAR 2013/2014

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The purpose of this research is to know the influence problem-solving approach with Polya steps through understanding the concept of the student.

This research is a research design experiments with the post test only. The population was eighth grade students of SMP N 3 SATAP Jatiroto Winogiri academy year 2013/2014. The sample was the entire population is a class VIII student as much as 25 experimental class VIII and class B many as 25 students as the control class. The research data is based on tests to determine the influence of students' understanding of mathematical concepts. Research instrument is given in the form of tests with the type description.

Data analysis use the t-test of both groups obtained t value of 2.1207, while the t table at 5% significance level of 2.0106. The results showed that the problem solving approach with polya steps significantly affect through understanding of concepts.

**Keywords :** *problem solving, understanding concept. Polya steps.*

## INTRODUCTION

Education is an effort to improve the quality of human life, which aims to humanize humans, mature, and change behavior for the better. Education is able to save humanity from the current global challenges. Therefore, education is a top priority to deliver generations better. So the quality of education becomes an important focus of education.

Looking at the importance of the development and optimization of understanding concepts in mathematics, hence the need for innovative efforts to resolve the problem. One solution is deemed able to resolve the issue with the student-centered approach (student centered learning). This approach has a variety of learning methods that require active participation from the students. These methods include: sharing information, learning from experience, learning through problem solving.

Troubleshooting can be interpreted as a learning activity that emphasizes the problem solving process scientifically. According Komariah (2011) there are three main features of the fragmentation problem. 1). Troubleshooting a network of learning activities in the implementation of problem-solving means there are a number of activities to do students. 2). Directed learning activities to solve the problem. 3). Troubleshooting done using a scientific approach to thinking.

Polya problem solving steps deemed able to cope with the problems of understanding the concept. This is supported by the theory of Ausubel, According Jaeng (2006) in Rudtin (2013:18) who echoed that receives and finding is the first step in learning. The second step is an attempt to remember what is learned or mastered then be used. Polya steps are considered able to cope with it because there are several stages in dealing with problem solving. Lunar (2011) mentioned that the method of problem solving Polya models can enhance students' ability in solving mathematical problems.

In studies Yuan (2013) also concluded that the four-step Polya help students solving math problems and students were able to use their reasoning abilities in solving process problems.

Yuan (2013:98) mentions in the book "How to Solve it" Polya step consists of four steps:

In it he Suggests that problems should be solved in four steps [12, pages xvi-xvii]: 1) Understand the problem. You must know what is known, what is not known, and the ultimate goal. 2) Devise a plan. See how you know what connects

to what you are trying to Determine. If there are no connections, find other problems that fill in the gaps. You should understand precisely how you will proceed. 3) Carry out the plan. Perform the mechanics of solving and check each step. Do you have a way of proving that your solution is correct? 4) Look back. Be sure to examine your solution to learn from what you have accomplished.

In excerpts of the book can be interpreted that the step Polya has four steps, namely initial step is see (understand the problem). Understanding in this case students need to know what is known, what is unknown and what the purpose of the question. The second step is plan (draft plan). The draft plan linking stage between existing data and it is not known to determine the next step. The third step is do (implement the plan), stage conduct problem-solving mechanisms and examine every step. Is there another way to prove that the solution is correct. The last stage is checked (see back). Looking at the results that have been done right or wrong.

By applying Polya step in solving the problem have several advantages, namely 1). Students are better able to think systematically by providing opportunities for students to find things on him. 2). Stimulate the development of student thinking progress to resolve the problems faced by the right. 3). Learn to analyze a fault. 4). Being able to search for a way out of a variety of difficulties. <http://rezeqiemaulidah.blogspot.com/2010/05/seminar-pendidikan-matematika.html>) accessed on 1 April 2014 ..

Based on the description above, researchers interested in conducting research entitled "Effect of Problem Solving Approach to Polya Steps to Understanding the Concept of Students in Smp N SATAP 3 Jatiroto Winton School Year 2013/2014".

## **RESEARCH METHODS**

The study was conducted using a sample of two classes, namely the experimental class and the control class. In the experimental class using a problem

solving approach with measures Polya and grade control using conventional approaches.

The population in this study was overall VIII grade students of SMP N 3 SATAP Jatiroto Wonogiri. The independent variable was learning to use a problem solving approach with Polya steps in the experimental class and the control class conventional approaches. The dependent variable in this study is an understanding of mathematical concepts eighth grade students of SMP N 3 SATAP Jatiroto Wonogiri.

The research instrument used was the final test understanding of concepts in the form of essays. Before the end of the test is given in advance about validated and tested, then the item analysis and calculation shows that the question about the reliability of the test is 0.. Means test questions test has a high reliability. Final test assessment format used analytic rubric.

Table 1. analytic Rubric

Question	Aspect	Scor	Answer
1	Understanding problem	0	Do not write what is known and asked
		1	Write what is known and asked to perfection
	Make the plan	0	There is no planning
		1	Doing the plan
	Doing the plan	0	Not doing
		1	Carry out the correct procedure, but wrong in the calculation.
		2	Perform the correct procedure and get the correct results
	Check	0	Not checking
		1	Checking

## RESULT AND DISCUSSION

The research data was processed by the research hypothesis using test data normality and homogeneity of variance, in which to test the normality of the data

using Lilliefors test and homogeneity test using the Bartlett test. This treatment aims to obtain numerical values of the differences arising between the use of problem-solving approach with measures Polya and conventional approaches to the understanding of mathematical concepts students. From this processing, we will get the level of difference between the results obtained in the experimental class and the control class.

Based on the results of research or post test results (appendix), for the class of experiments using a problem solving approach with Polya steps. Data obtained using a test that consists of 4 essay items. Data began understanding mathematical concepts students problem-solving approach can be seen in the frequency of distribution table below:

Table 3.1

Frequency Distribution List Mathematical Concepts Understanding Students with Problem Solving Approach to Polya Steps.

Interval class	f	fk
60-66.7	4	16%
66.8-73.5	6	24%
73.6-80.3	6	24%
80.4-87.1	0	0
87.2-93.9	5	20%
94-100.7	4	16%
Total	25	100%

The above table shows that 15 or 60% of students scored in the bottom of the class interval containing the median score. 10 students or 40% were in class interval containing the median score and the student 16% scored in the top of the class interval containing the median score.

Testing this hypothesis using the t test. t test requirement is that both groups should come from populations that are normally distributed and have homogeneous variances. Therefore, before performing the t test needs normality and homogeneity analysis as follows:

Testing normality of the data was conducted to determine what types of statistics used in hypothesis testing. If the collected data are normally distributed, we used parametric statistics. Conversely, if the data collected are not normally distributed, we used non-parametric statistics. In this study testing the data for normality using Lilliefors test at a significance level of 5%.

1. Experimental Class Data

Based on the posttest in the experimental classes available and based on the calculation in (appendix) earned the big  $L_o$  0.1642 for significance level  $\alpha = 0.05$  and  $n = 25$  is obtained  $L_{table}$  0.173 thus it can be concluded that the hypothesis  $H_o$  accepted because  $L_o < L_{table}$ . This means that the sample was normal berdistribusi.

2. Data Control Class

Based on the posttest in the experimental classes available at (attachment) and based on the calculation in (appendix) earned the big  $L_o$  0.51557 For significance level  $\alpha = 0.05$  and  $n = 25$  is obtained  $L_{table}$  0.173 thus it can be concluded that the hypothesis  $H_o$  accepted because  $L_o < L_{table}$ . Hal To see the development of students' understanding of mathematical concepts used final test understanding of concepts given in class based on the calculation of the sample can be seen in the following table:

Variable	N	Value		Result
		$L_{hit}$	$L_{tab}$	
eksperimen	25	0.1642	0.173	Normal
control	25	0.1557	0.173	Normal

Testing Homogeneity of Variance Data

Testing homogeneity of variance was intended to obtain information on whether the two samples in this study had a homogeneous variance or not. Based on the results of tests that have been given in the testing homogeneity of variance.

Tests conducted by Bartlett test variance. Testing criteria is if  $H_0$  accepted  $H_0$  rejected if.

The results obtained by calculating the value of the test statistic = 1.3622937 price. For degrees of freedom = 1 is obtained, with the critique area so that  $H_0$  is accepted or can be inferred that the variances of the two populations are similar (homogeneous population). Calculations can be seen in the attachment.

Based on the test results show that the conditions for a t-test analyzes that include test data normality and homogeneity of test data has been fulfilled. So that hypothesis testing can use the t test.

T test used to compare the mean of the two groups of samples. This test is to prove that the two averages are significantly different so the research hypothesis can be accepted..

class	Mean	Varian	$t_{obs}$	$t_{tab}$	Result
Eksperimen	79.6	412.3333	2.1207	2.0106	signifikan
Control	68.8	236			

From the calculation, as embodied in the table above are known  $t_{obs} = 2.1207$ . to obtain price  $t_{table} = 2.0106$ . rejection criteria  $H_0$  rejected if  $t_{obs} > 2.0106$  or  $t_{obs} < -2.0106$ . so  $H_0$  can be rejected or that there is a difference between understanding the concept that students use problem-solving approach to the steps of Polya and conventional approaches.

## CONCLUSION

Based on the results of research and discussion it can be concluded that the material surface area and volume of prism and pyramid, there are different levels of understanding of mathematical concepts taught students approach to problem solving and Polya measures of teaching using conventional approaches. This distinction is evident by looking at the results of learning in a student group that is taught using a problem-solving approach to Polya measures student group compared with the conventional approach. This is in accordance with accepted testing criteria calculate  $H_0$  if  $t_{obs} < t_{table}$ . More available  $t_{obs} 2.1207$  and  $t_{table}$

is 2.0106 where  $2.1207 > 2.0106$  so that  $H_0$  refused and  $H_1$  accepted. raised conclusion that there are significant differences between students with an understanding of the concept of problem-solving approach to Polya steps and by using the conventional approach. Based on the above node, it can put some suggestions as follows:

1. Expected to teachers, so let use problem-solving approach to Polya steps to higher student conceptual understanding in mathematics. Because this approach gives better results than learning to use the conventional approach .. this is indicated by an average score of student understanding of mathematical concepts in experimental classes greater than the average score in the control class
2. Expected to the school, to mediate or facilitate a problem-solving approach to their use in any learning process can be well implemented.
3. Need for further research on problem solving approach langkah Polya measures for other material, particularly that have the same karakteristik material surface area and volume of prism and pyramid.

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