

An Intensive Exploration of Students' Problem-Solving Abilities Using a Problem-Solving Learning Model

Miftahus Surur*, Susana Efrianti, Dassucik, Dyan Yuliana, Yesi Puspitasari

STKIP PGRI Situbondo, Indonesia

**Corresponding Email: surur.miftah99@gmail.com*

ABSTRACT

This research aims to test the problem-solving abilities of students who were taught in different ways, through problem-solving learning and group discussion models. The research design used a quasi-experimental design with a Non-equivalent Control Group Design (NCGD). The research subjects were students of class XI at MA Badrul Arifin Situbondo, who were determined by purposive sampling and obtained two research classes. The experimental group learned with a problem-solving learning model, while the control group learned using a group discussion model. The results showed that those who studied with the problem-solving model had better problem-solving ability than those with the group discussion model.

Keywords: *Problem-solving, group discussion, problem-solving ability*

1. INTRODUCTION

Problem-solving is part of the thought process. The first thing that needs to be done is to know the problem-solving process. This process means researching with controlled activities to achieve a target [1] [2]. Students who have studied the problem-solving process can be successful in every stage of their life due to their abilities to find solutions to difficulties and problems they face [3]. The problem-solving ability is considered necessary for students, especially high school students because it helps them in making the right decisions [4]. In addition, Polya defines problem-solving as an attempt to find a way out of difficulty to achieve a goal that cannot be achieved immediately [5]. Therefore, it can be said that problem-solving is a thought process conducted by students to solve or find a way out of their problems or issues at hand by using their previous knowledge or skills.

The results of observations and tests conducted by the researcher showed that the students' problem-solving abilities of class XI at MA Badrul Arifin were still relatively low. This can be seen from their abilities to relate theory to the problems posed. They have not been able to understand the existing problems well, thus they were unable to provide alternative solutions, to

determine priority solutions to be implemented, and to evaluate solutions that have been implemented. That being so, an appropriate method was needed in the learning process to overcome those problems.

Sumartini [6] argued that to improve students' problem-solving abilities, appropriate learning methods are needed to support them so that learning objectives can be achieved. One of the learning methods that can improve their problem-solving abilities is a problem-solving learning model. The Problem-Solving Model (PSM) is a learning model that focuses on improving problem-solving skills. Additionally, when faced with questions, students can perform problem-solving skills to select and develop response [7]. According to M. Asikin & Pujiadi [8], the problem-solving learning model has a positive influence on students' problem-solving abilities. It was also reinforced by Suhendri's research [9] which stated there was an effect of the problem-solving learning methods on learning outcomes. Besides, this model can encourage students to play an active role in learning and demands them to solve problems.

According to Mwelese & Wanjala [10], if the problem-solving learning model is taught correctly to students, then: (1) students will reflect on and recall previous knowledge or experience, to know whether or

not it can be implemented in their current situations or problems; (2) support the action of problem-solving with valid evidence or argument and not something ordinary; (3) consider other ways to solve a particular problem; (4) try various problem conditions to see if the same solution procedure will be needed in solving them. As a comparison, the researcher used the group discussion learning method where each student (a group of students) who had been determined, had been given the responsibility to discuss according to the theme or discussion. The reasons for choosing this method were because problem-solving and discussion methods are student-centered and both are oriented to build the students' knowledge. According to Arend in Surur & Tartilla [11], the steps for implementing the discussion method are clarifying the point and establishing a set, focusing and controlling the discussion, and being briefed.

2. RESEARCH METHOD

In this research, we used a quasi-experimental design method. The verification was obtained by comparing the experimental group with the control group. The design used in this research was the Non-equivalent Control Group Design (NCGD).

Table 1. One-Sample Kolmogorov-Smirnov Normality Test

		Unstandardized Residual
N		24
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	11,84771197
Most Extreme Differences	Absolute	,246
	Positive	,227
	Negative	-,246
Kolmogorov-Smirnov Z		1,203
Asymp. Sig. (2-tailed)		,111

a. Test distribution is Normal.
b. Calculated from data.

Furthermore, the research subjects were divided into two groups, namely the experimental and control groups. The experimental group learned with the problem-solving learning model and the other group learned with the group discussion method. This research also used the same class, that is class XI which was taught by the same teacher. Therefore, to measure

the initial abilities of the subjects, a pre-test was performed in both groups. Meanwhile, to determine the change in learning achievement after the experiment, a post-test was performed in both groups.

The subjects were from class XI IPS of MA Badrul Arifin with 49 students involved and divided into 2 groups, namely the experimental and control groups. The experimental group comprised of 24 students of class XI B and the control group comprised of 25 students of class XI C. The purposive sampling was used as a method to determine the research subject

This research was conducted in the economics class of XI at MA using research instruments in the form of learning tools, with the PSM for the experiment group and the discussion method for the control group, consisting of syllabuses, lesson plans and evaluation sheets.

3. RESULTS AND DISCUSSION

The validity test was conducted on 25 respondents using 4 (problem-solving ability) essay questions with the numbers obtained in the first question was 0.519, the second question of 0.491, the third question of 0.430, and the fourth question of 0.471 so all of the questions were declared as valid because they were greater than 0.05. In the reliability test, the number 0.586 was obtained so that the question instrument was stated to be reliable because it was also greater than 0.05. As for the data normality test as a pre-requisite for data analysis aimed to determine whether the research data were normally distributed or not. The normality test used in this research was Kolmogorov-Smirnov. The criteria used to test data normality are (1) if the p-value (significance value) is greater than 0.05 (> 0.05), then the data is normally distributed, and (2) if the p-value is less than 0.05 (< 0.05), then the data is not normally distributed. The following table of normality test results is presented in Table 1.

Based on the data obtained from the table above, it can be concluded that the average data was normally distributed because it has a p-value of 0.111 > 0.05 which means the p-value is greater than 0.05.

In addition to the normality test, the research data was also conducted a homogeneity test to

determine whether the variants of several samples have shown the same value or not. The criteria used to test data homogeneity are (1) if the p-value (significance value) is greater than 0.05 (> 0.05), then the variance of several data samples is the same or homogeneous, and (2) if the p-value is less than 0.05 (< 0.05), then the variance of several data samples is different or heterogeneous (not homogeneous). The following table of the homogeneity test results is presented in Table 2.

Table 2 Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
5,063	1	47	,029

Based on the data obtained from the table above, it can be seen that the homogeneity has a p-value of $0.029 > 0.05$ so that the data can be said to be homogeneous. It means that the variance in this data is the same so that it can be continued for further data analysis.

In the beginning of the research, a pre-test was performed to determine the students' initial abilities in solving problems. The pre-test result of the experimental group showed an average value of 53.3 whilst in the control group, the average value of the pre-test result was 48. After the PSM was given to the experimental group and the discussion method was given to the control group, the students from both groups were again asked to do the post-test questions. The post-test result of the experimental group obtained an average value of 72.3, while in the control group the average value of the post-test result obtained was 62.8. It happened because the problem or question, which is the subject of discussion, did not have certain characteristics such as problem-solving. Characteristics of problem-solving questions in problem-solving include, interesting and challenging for students, requiring critical analysis, and allowing for variations in answers.

Table 3. T-test Results

Levene's Test for Equality of Variances		T-test for Equality of Means		
F	Sig.	t	df	Sig. (2-

		tailed)				
Learning outcomes	Equal variances assumed	5.063	.029	2.891	47	.006
	Equal variances not assumed			2.896	46.943	.006

Based on the data obtained from the table above, the p-value showed the number 0.006 two-tailed, which means $0.006 < 0.025$. It also means that there was an effect of the problem-solving learning model on the students' problem-solving abilities of class XI of MA Badrul Arifin Seletreng Situbondo in the 2019/2020 school year.

Based on the t-count

If t-count $>$ t-table, then H_a is accepted

If t-count $<$ t-table, then H_a is accepted

Based on Table 3 of the independent sample test above, the t-count = 2.896, means that the t-table = $2.021 <$ t-count = 2.896. It means that there was an effect of the problem-solving learning model on the students' problem-solving abilities of class XI at MA Badrul Arifin Seletreng Situbondo. There was a difference between students who learned with a problem-solving learning model and those who learned by using a group discussion approach. Therefore, it can be concluded that there was a significant effect of the problem-solving learning model on the students' problem-solving abilities of class XI at MA Badrul Arifin Seletreng Situbondo.

The problem-solving method encourages students to actively collaborate with groups in problem-solving attempts because its process requires a good understanding of concepts so that they can relate the theory to the problems. It is in line with Zulyadaini [12], who said that problem-solving can encourage students to actively organize creative ideas to solve problems. As well as Komariah [13], said that there is an effect of the problem-solving learning model on problem-solving ability. The ability to relate theory to the problems will make it easier for students to analyze problems and determine solutions to the problems they face. In the learning process, each student is required to express their opinion regarding the existing problems.

4. CONCLUSION

Based on the results of the research, it can be concluded that learning with the Problem-Solving Model (PSM) has a significant effect on the students' problem-solving abilities of class XI at MA Badrul Arifin. It is because learning with the PSM can attract students' learning interests, challenge them to find solutions for their problems, require their critical analyses, and allow them to have various answers. All of that was evidenced by the increased students' abilities to analyze problems, ask questions, express opinions, and finish calculations systematically.

As for further research, we recommend adding a moderator variable to determine the level of interaction between PSMs, condition variables, and problem-solving abilities. So that the next researcher gets a more specific description of students' problem-solving abilities and their relation to their characteristics.

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