

**Judul Artikel: The effect of problem solving approach to mathematics
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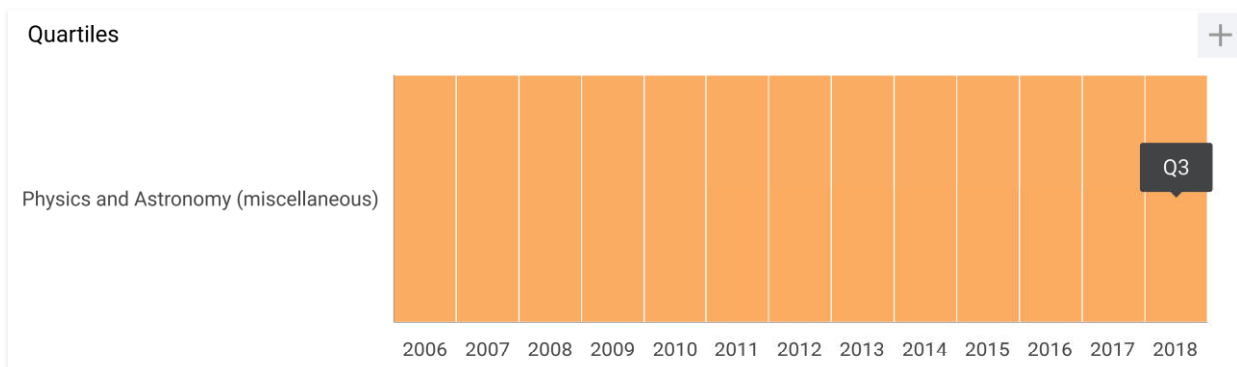
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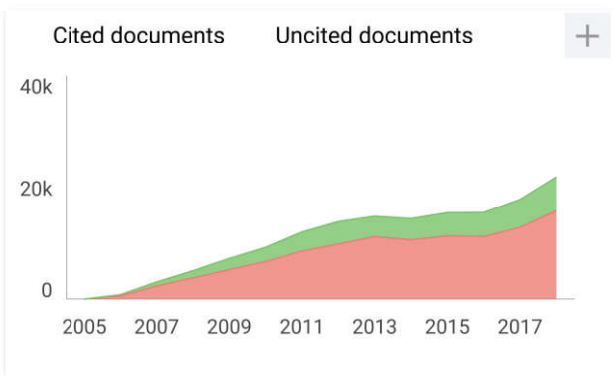
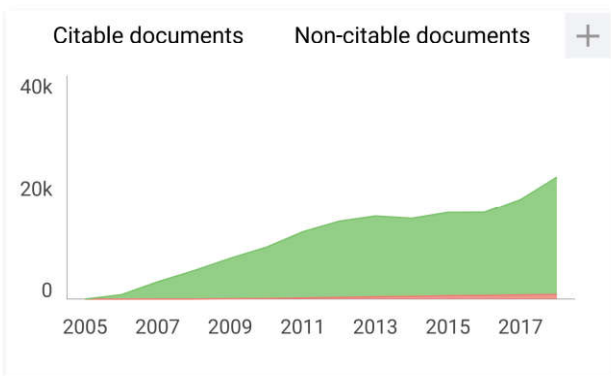
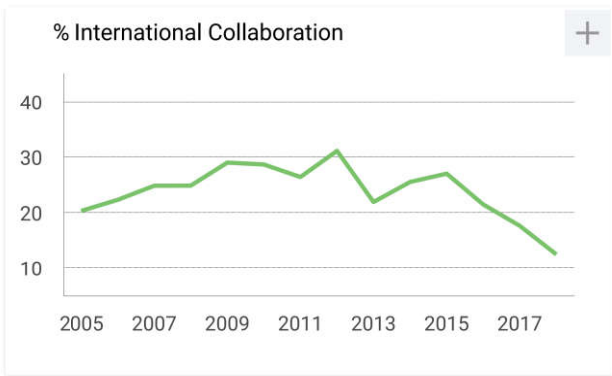
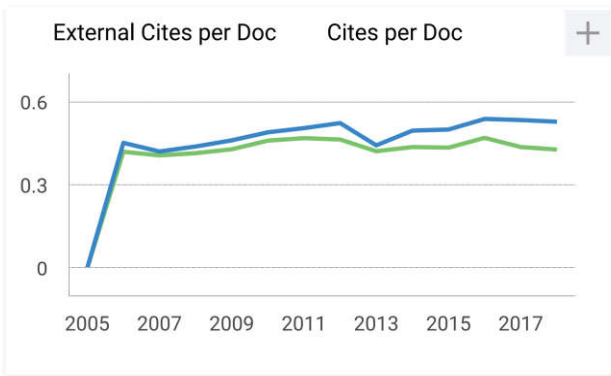
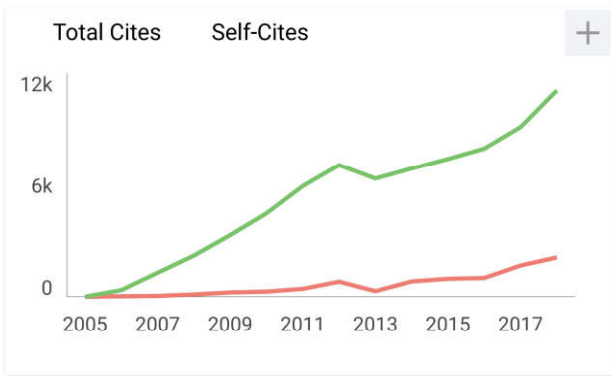
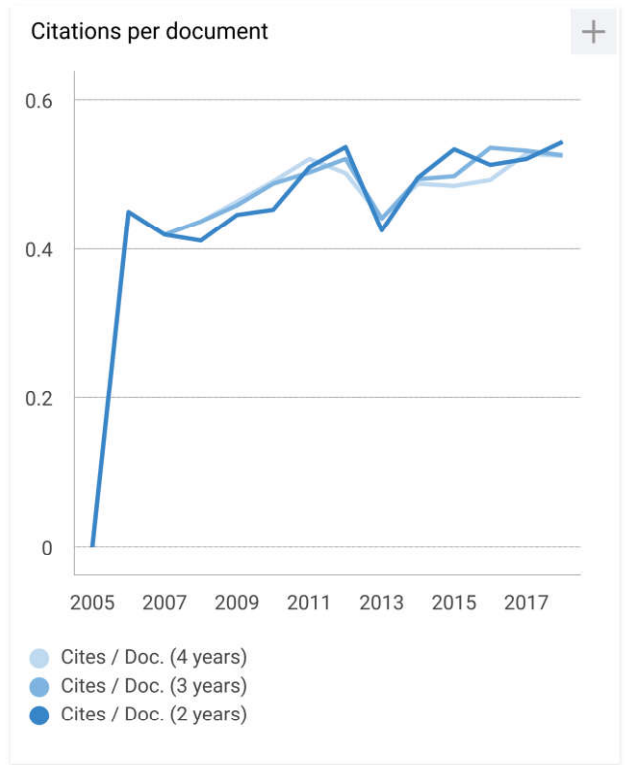
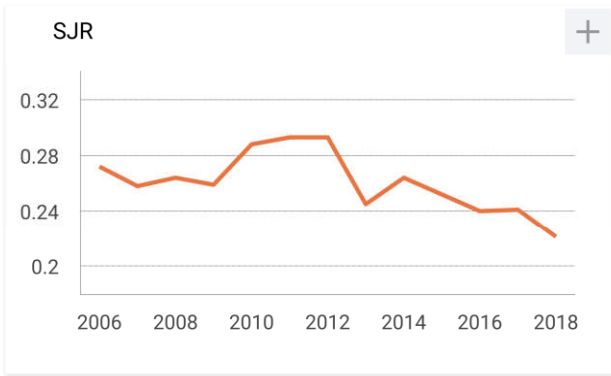
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The effect of problem solving approach to mathematics problem solving ability in fifth grade

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Abstract. This study is an experimental research that aims to determine the effect of Problem solving approach to solving mathematical problems in fifth grade. The population in this study is all students of class V SD Islam Athirah Bukit Baruga academic year Makassar 2014/2015 consisting of four classes. The sample of research is two classes, namely experimental class and control class. Each class consists of 26 students. Both classes were obtained by purposive sampling technique. To obtain the required data, the study was conducted in both sample classes. A technique of data collecting was done by observation and test. Data analysis techniques used were descriptive and inferential statistical analysis techniques. The results obtained from the descriptive statistical analysis are: (1) The ability to solve the problem of mathematics of students who were taught by using Problem solving approach is in qualification capable with the average value of 74.7 and the standard deviation of 21.6; (2) Ability to solve math problems of students who are taught without using Problem solving approach in qualification less able with average score 55,7 and standard deviation 16,2. From the results of inferential statistical analysis obtained that ability to solve the problem of mathematics students who are taught by using Problem solving approach is better than who taught mathematics without using Problem solving approach. From the results of this study can be concluded that the application of Problem solving approach in learning mathematics affects the ability to solve mathematical problems.

1. Introduction

Mathematics is one of the subjects that can not be separated from human life. Humans need mathematics because mathematics is used for life, mathematics as a cultural heritage, mathematics for the workplace, and mathematics for the scientific and technical community [1]. The need for mathematics is crucial in the development of technology and science needed in this competitive era of globalization for survival. Given the importance of mathematics in human life, then the learning of mathematics needs to be well prepared. Using the right approach and method to learn effectively and efficiently.

Teaching activities that focus on student activities will have an effect on student learning to be more actively learning. And student-centered learning has been shown to bring students to higher levels of critical thinking, problem solving, increased attitudes to learning, and overall improvement in attendance [2]. If attention is focused on student learning activities then learning becomes more meaningful and efficient. Teacher's methods or activities in planning a strategy must still achieve the general objectives of learning such as student mastery of facts, concepts, principles, and skills. It is a real situation seen in



real life which requires a proper method and mathematical knowledge in order to be solved [3]. Teachers teach students how to solve problems and cultivate attitudes such as mathematics are both forms of student-centered activity.

The 2013 curriculum in mathematics lessons emphasizes the importance of problem solving as a procedure for analyzing the relationship between symbols, relevant information, and observing patterns [4]. Problem solving is a very important part of the mathematics curriculum because during the learning and completion process students are enabled to gain experience using their knowledge and skills for non-routine problem solving. Parallel to this, problem solving is the main focus of mathematics learning activities at school [5]. Understanding of problems, knowledge, skills, and teacher commitment is key in helping to overcome the difficulties of solving students' mathematical problems, as well as helping students succeed now and in the future [6]. However, the reality in the field shows that problem solving activity in the learning process of mathematics has not been used as the main activity. Learning with problem solving is considered the most difficult for both students in learning and from teachers who teach it.

For students, a problem solving approach should be studied in solving problems, students are expected to understand the problem solving process and become skilled in selecting and identifying relevant conditions and concepts, seeking generalizations, formulating a plan for completion and organizing previously owned skills. Teachers present problems because through problem solving students can practice and integrate concepts, theorems, and skills learned.

Problem solving for transferring concepts or skills to new situations, but activities in the classroom information from teachers and textbooks to new situations are very limited. Education devoid of teaching and learning of thinking skills and dis-contextualized learning environments, is merely knowledge gathering and remembering [7]. Then, skills such as problem solving are more permanent and more transferable than just knowledge received with information only. The transfer in question is how a teacher plans and presents classroom learning to his students. Development in the field of mathematics shows that students must acquire problem solving skills [8]. Therefore students need to have experience and problem-solving skills that are able to provide a vehicle for students to build ideas about mathematics and are responsible for their own learning. While these are all important mathematics skills, they are also important life skills and help to expose pupils to a values education that is essential to their holistic development [9].

Problems often faced by elementary students in the problem of stories consisting of one variable and four basic operations (addition, subtraction, multiplication, and division). So students assume that mathematics in the form of stories is the most difficult problem to solve. Another factor that causes students to experience this problem is learning in a thematic form that is not focused on the subject but based on the theme. Learning has several subjects so that the process does not use various approaches, and does not focus on developing certain problems such as solving problems in mathematics. The right solution for these problems by using a problem-solving approach or known as Problem Solving Approaches, the subject matter presented or delivered by the teacher will be more easily understood by students and more permanent.

This is consistent with the results of previous studies that the problem-solving approach is superior to the posing problem approach to high and low levels in problem-solving ability [10]. the advantage of this research is to look at three factors that influence students' mathematical problem-solving abilities. while the research that will be conducted will focus more on the influence of the problem-solving approach on students' mathematical problem-solving abilities. the method used is the same but different for the listed components. if the previous research looked at the influence of the Problem Solving and Problem Posing approaches and Learning Interests, this research was only limited to the effect of the problem-solving approach.

In general, the findings of previous studies explain effective problem-solving learning approaches that improve the problem-solving performance of high school students with learning disabilities [11]. However, from observations made at the Bukit Islam Baruga Athirah school unit, especially class V,

teachers have never used various approaches or methods to solve problems. Based on this, students' mathematical problem-solving abilities.

2. Experimental method

This research is quantitative research using the experimental method. This study included quasi-experimental (quasi-experimental) experiments. Variables in this study studied two variables, namely "learning approach" an independent variable (X) and "problem solving ability" a dependent variable (Y). The research design used is Non-equivalent Control Group Design. With this design, the results in the experimental and control groups were compared.

The population in this study that became the population is all students of class V in Islam Athirah Bukit Baruga Kota Makassar which amounted to 104 students. To determine the sample used the technique of nonprobability sampling, in "members of the population are not given the same opportunity or opportunity to be selected or selected as a sample member". Selection of this sample is done by using certain considerations, called purposive samples.

Sampling is done on the consideration that both groups are homogeneous because they are not grouped by achievement. The number of sample experimental class (V3) is 26 students consisting of 12 men and 14 women. While the number of control class samples (V4) is 26 students consisting of 13 men and 13 women.

Data collection in this study using observation and test. The test is given twice, pre-test (measuring the initial ability of students) and post-test (measure the ability of students after given treatment/treatment). Qualification of students' mathematical problem solving abilities using a 5-scale conversion guideline, which is very capable if the mastery level is 80 upwards, capable if the level of mastery is 70-79, quite capable if the mastery level is 60-69, less able if the mastery level is 50-59, and very less capable if the level of mastery 49 downward as suggested in the educational assessment book [12].

Observations were conducted to obtain data on learning activities taking place in the experimental class and control classes, observing the application of problem solving approaches to the learning process of Mathematics and for obtaining data on the ability to solve mathematical problems. The data presented in the following table will be the material analysis.

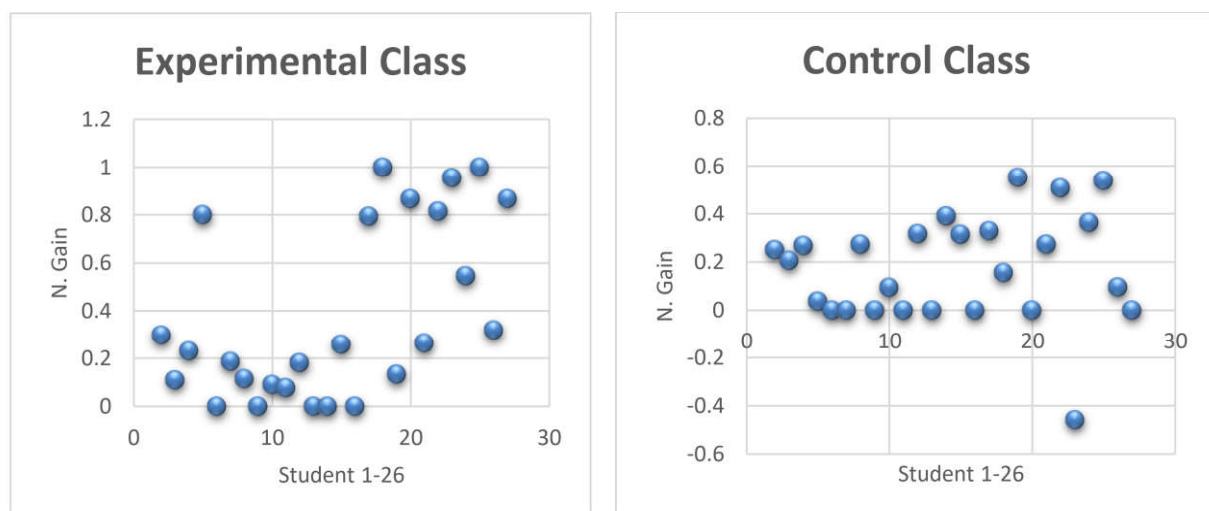


Figure 1. Description of Pre-test and Post-test Value Scores, as well as normal gain of experimental class and control class.

The data analysis technique uses a t-test to know the difference of problem solving ability of student mathematics, N-gain is used to know the improvement of problem solving ability of student math and effectiveness of learning. The t-test is intended to answer the problem as well as to test the research hypothesis about the presence or absence of a significant positive influence from the problem solving approach to the ability to solve mathematical problems in grade V SD Islam Athirah Bukit Baruga Makassar.

3. Result and discussion

Through this research, to know how far the influence of Problem solving approach to the ability to solve students' math problems. This effect can be seen by comparing problem solving abilities in the experimental and control groups after being given different treatment. Student's ability before being given treatment is seen from the pre-test result and the ability after being given treatment is seen from the post-test result. Meanwhile, to see how far the effect of treatment given can be seen from the difference in the ability to solve student problems in each group of test results given.

3.1. Ability to solve student math problems before being given treatment

Pre-test data obtained from the experimental group and control group aimed to determine the initial condition/ability to solve student problems in each group.

Table 1. Description score initial test (Pre-test).

Group	N	Min	Max	Mean	Std. Deviation
Experiment	24	20	85	55.3	18.445
Control	21	8	76	39.8	19.139

Based on table 1 above, it is clear that the average score of preliminary experimental group data is 55.3 with a maximum score of 85 and a minimum score of 20. While the average score of the control group's initial data is 39.8 with a maximum score of 76 and a minimum score of 8.

3.2. Application of treatment

Applying the problem solving approach can have a positive impact on the students of the experimental class. This can be proved from the observation result, the observation result shows the students become better and able to solve the math problem in the learning. This can be seen in the table below:

Table 2. Observed aspects (Student).

Observed Aspects	Percentage (%)		
	Meeting I	Meeting II	Meeting III
Student attention to teacher explanation	72 %	86,1 %	81,9 %
The activity of students in the learning process	52 %	76,4 %	79,2 %
Enthusiastic students in following the lesson	65,3 %	77,8 %	79,2 %
Improved student ability to solve problems	50,7 %	73,6 %	76,4 %
Understanding of student material that has been given	49,3 %	58,3 %	79,2 %

Based on table 2 it is seen there is a percentage increase in every aspect observed in each meeting so it can be concluded that the application of problem solving approach needs to be applied or given to the students because it can give a positive influence on the learning situation or beneficial for the better learning process. Agree with Ortiz "A true problem solving process will allow students to be flexible,

intuitive, and creative” [13]. The positive impact of applying the problem solving approach makes students better in math lessons.

3.3. Ability to solve mathematical problems after students are given treatment

Post-test data of mathematical problem solving ability of experimental group and control group aims to know the final condition the problem solving ability of mathematics of student and to know whether there is the influence of Approach Problem solving approach. The result of data obtained based on experimental group data and control group is presented as follows:

Table 3. Description of end-test statistics (*Post-Test*).

Group	N	Min	Max	Mean	Std. Deviation
Experiment	22	35	100	74,7	21,574
Control	20	25	76	55,7	16,216

Based on Table 3, it is seen that the average score of post-test data of the experimental group is 74.7 with a maximum score of 100 and the minimum score is 35. While the average score of control group final data is 55.7 with a maximum score of 76 and the minimum score 25. There was a significant difference between the mean post-test of the experimental class and the control class of 16.03. In accordance with the data obtained in the table then will be tested normality and homogeneity of variance of the data before hypothesis testing.

Normality test conducted on each group with the aim to know the population of normally distributed data or not. Based on the results of data analysis using Kolmogorov Smirnov Normality test obtained calculation result for the experimental class value of $P\text{-Value} \geq \alpha$ is $0,138 \geq \alpha$ and control class value $P\text{-Value} \geq \alpha$ is $0,200 \geq \alpha$ (significance level $\alpha = 0,05$). So it can be concluded to accept H_0 or a normally distributed population.

It is followed by a homogeneity test to find out whether the data to be analyzed meets the variance (homogeneous) variance. Based on data analysis result using Levene's Test For Equality of Variances obtained a value of $P\text{-Value} \geq \alpha$ is $0,087 \geq 0,05$. So it can be concluded to accept H_0 or Variance of both Homogeneous groups. So homogeneity testing is fulfilled and it can be concluded that both groups have the same ability, in this condition the hypothesis test can be done.

The data of problem solving ability in Mathematics subjects obtained in experimental group and control group research can be seen as follows:

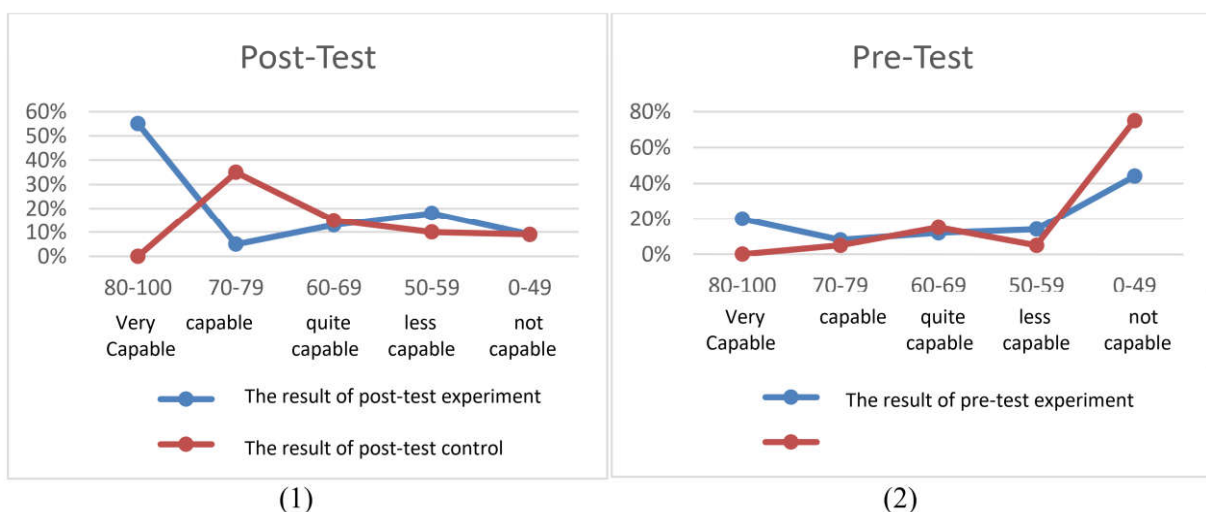


Figure 2. Graph of percentage ability to solve student math problems (1) pre-test and (2) post-test.

Based on the data above shows that the ability to solve mathematical problems when doing pre-test in the experimental group or control group that is still many students who have not reached qualification able. In the experimental group as much as 16% in poor qualifications, 44% in the qualifications have not been able from 25 students and the control group as much as 5% in qualifications less able, 75% in qualification has not been able of 20 students. Furthermore, the post-test showed an increase in the experimental group, with highly qualified students from 20% to 54.54%. For qualification has not been able to appear to decrease significantly from 44% to 9.09% in the qualification. In the control group also increased in qualification from 5% to 35% and the decrease in the percentage of students in the qualification has not been able from 75% to 8%, but not as significant as the changes in the more significant experimental group towards the more positive.

Further testing conducted hypothesis in this study was tested using T-test where previously held testing data requirements. Based on the independent table of the test sample sig (2.tailed), obtained a value of 0.003 smaller than the significance level of 0.05 which means that there is a difference in average problem solving abilities in the subjects of Mathematics in class V between the experimental group and the control group. It is also found that the average of N-gain experimental class (0.45) is greater than the mean of N-gain control class (0.23). The treatment given to the experimental class has successfully influenced and improved the results of students' math problem solving abilities.

Thus, through the analysis results can be concluded that there is a significant influence on the application the Problem solving approach to the ability to solve mathematical problems in class V SD Islam Athirah Bukit Baruga Makassar. This is line with the research by Cai and Nie which found that "Classroom troubleshooting activities are used as instructional approaches that provide a context for students to learn and understand math so that student's problem solving abilities develops" [14]. The findings of this study help to conclude that there is no significant difference between students in their thinking abilities and problem-solving abilities in terms of gender, but on the other hand, the results show there are significant differences in location and age [15]. To improve students' mathematical problem-solving abilities, more attention to the factors that can influence them.

4. Conclusion

Ability to solve mathematical problems of students before applying the approach Problem solving is still low with an average of 55.3 different from the average ability to solve mathematical problems of students after applying the problem solving approach from low to moderate with an average value of 74.7 on the eyes math lesson in grade V SD Islam Athirah Bukit Baruga Makassar. It was concluded that there was a significant and positive influence on problem solving ability in mathematics subjects in class V SD Islam Athirah Bukit Baruga Makassar.

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