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THE RELATIONSHIP BETWEEN PROBLEM SOLVING METHODS AND STUDENT LEARNING OUTCOMES

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Abstract. This study aims to determine the relationship between problem solving learning methods and student learning outcomes in trigonometry material. The type of research used in this study is descriptive quantitative, which is a study that aims to determine the magnitude of the relationship between problem solving learning methods and student learning outcomes in trigonometry material. The sample was selected using the cluster random sampling technique and obtained by 28 students. Research variables consist of problem solving methods (X) and learning outcomes (Y). The instruments used are tests and questionnaires. The test is used to determine student learning outcomes and questionnaires are used to determine the use of problem solving learning methods in the learning process. The data analysis technique used is Product Moment Correlation. The results of the data analysis obtained rhitung value = 0.7417 While the conversion results based on the rtabel value distribution table were obtained at the level of 5% which was 0.347 and at the level of 1 % of 0.478. So that it can be written into $r_{value} \geq r_{table}$ or $0.7417 \geq 0.347$ at the level of 5% and $r_{value} \geq r_{table}$ or $0.7417 \geq 0.478$ at the testing level of 1% or in other words, there is a strong relationship between problem solving learning methods and student learning outcomes in trigonometry material or a large coefficient of determination of 55.01%.

Keywords: Learning Methods, Problem Solving, Learning Outcomes, Trigonometry

Abstrak. Penelitian ini bertujuan untuk mengetahui hubungan antara metode pembelajaran *problem solving* dengan hasil belajar siswa pada materi trigonometri. Tipe penelitian yang digunakan dalam penelitian ini yakni deskriptif kuantitatif, yakni penelitian yang bertujuan untuk mengetahui besar hubungan antara metode pembelajaran *problem solving* dengan hasil belajar siswa pada materi trigonometri. Sampel dipilih menggunakan teknik cluster random sampling dan diperoleh 28 siswa. Variabel penelitian terdiri dari metode problem solving (X) dan hasil belajar (Y). Instrumen yang digunakan adalah tes dan angket. Tes digunakan untuk mengetahui hasil belajar siswa dan angket digunakan untuk mengetahui penggunaan metode pembelajaran *problem solving* dalam proses pembelajaran. Teknik analisis data yang digunakan adalah *Korelasi Product Moment.* Hasil dari analisis data diperoleh nilai $r_{hitung} = 0{,}7417$ Sementara hasil konversi berdasarkan tabel distribusi nilai r_{tabel} yakni diperoleh nilai t_{tabel} pada taraf 5% yakni sebesar 0,347 dan pada taraf 1 % sebesar 0,478. Sehingga dapat dituliskan menjadi $r_{hitung} \geq r_{(tabel)}$ atau $0{,}7417 \geq 0{,}347$ pada taraf 5% dan $r_{hitung} \geq r_{(tabel)}$ atau $0{,}7417 \geq 0{,}478$ pada taraf pengujian 1% atau dengan kata lain yaitu terdapat hubungan yang kuat antara metode pembelajaran *problem solving* dengan hasil belajar siswa pada materi trigonometri atau besar koefisien determinasi sebesar 55,01%.

Kata Kunci: Metode Pembelajaran, Problem Solving, Hasil Belajar, Trigonometri

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INTRODUCTION

Learning as part of the educational process must be carried out properly by all teachers (Keklikci & Saka, 2019). Teaching in the context of the standard educational process is not only about delivering the subject matter, but is also interpreted as the process of regulating the environment so that students learn (Haciomeroglu, 2019; Şahin & Doğantay, 2018). Another meaning of teaching is often termed learning (Sanjaya, 2009). The teaching and learning process is essentially a communication process, which is 'the process of conveying messages from the source of the message through certain channels/media to the recipient of the message (Fauzi & Lu'luilmaknun, 2019).

Mathematics is one of the very important materials, so that mathematics subjects are taught at all levels of education. In studying mathematics, many things need to be considered by the teacher, before delivering the material. One of them is the characteristic of his thought process (Kamsurya, 2020). Because in learning mathematics, mental activities in the form of thinking are needed in analyzing the relationship of material to one another or in analyzing various problems that arise in each learning activity (Mila, 2019). The environment is everything that is external to the individual self, because that environment is a source of information that is processed through the five senses (Yanti et al., 2018; Yetim Karaca & Özkaya, 2017). Especially for mathematics subjects, in addition to having concrete properties, a good understanding of concepts is very important. In classroom learning, there is a close relationship between teachers, students, curriculum, facilities and infrastructure (Saleh et al., 2018).

At SMA Al-Fiqri Telaga, students in learning mathematics are very difficult. Students do not use their thinking skills in analyzing or processing the material taught by the teacher in class, so students have difficulty in learning mathematics. The teacher in learning pays less attention to the abilities and thought processes of students, the teacher only teaches and delivers the material paying less attention to student understanding. In fact, the student's thinking process is one of the important indicators that needs to be considered by the teacher, in learning mathematics, so that students do not feel difficult in solving the problems given by the teacher.

The teaching and learning process in general does not use the right learning methods and is in accordance with the material taught. Such a teaching and learning process will make students become saturated. Conventional delivery of material, for example lectures, will make students saturated as a result of which learning motivation and learning achievement will decrease. In this case, the role of learning methods is very important, in order to assist

students in understanding the learning materials taught in class. In mathematics learning, both teachers and students are increasingly required to have high thinking skills and creative, honest and independent personalities. So that mathematics learning is needed and carried out which can improve student learning achievement and be able to educate students so that they can grow into humans who think creatively, independently, and excel.

Based on the results of discussions between researchers and teachers in the field of mathematics studies who have observed student activities, several problems were found in mathematics learning, namely the process of implementing mathematics learning, especially the subject of trigonometry, so far it still uses the lecture method, so that students are less able to express their ideas both in the form of problems and how to solve them and participate actively during the learning process, is like asking and answering questions. The results of learning mathematics are low, especially on the subject of trigonometry. This is because the mathematics learning process still uses conventional methods and does not utilize students' abilities in the problem-solving process.

The various problems above require appropriate solutions and handling so that learning can take place properly. One of the steps that will be taken is to use the problem solving learning method. The reason for using this method is because problem-solving-based learning is a learning method that focuses on teaching and problem-solving skills, which is followed by strengthening skills (Azmi et al., 2018). In this learning method, students not only solve problems in mathematics but are also required to be skilled in their ability and understanding in solving these problems (Windari & Winarti, 2019). By using this learning method, it is hoped that students can get maximum benefits both from the process and the learning outcomes (Nursyahidah et al., 2018)**.** This study aims to determine the relationship between problem solving learning methods and student learning outcomes.

METHOD

This type of research is descriptive quantitative, namely research that aims to determine the relationship between problem solving learning methods and student learning outcomes. The population is the whole of the subject of the study to be examined (Arikunto, 2010). The population in this study was all students of class X of SMA Al-Fiqri Telaga which consisted of 2 classes with 69 students. The sample is part of the number and characteristics possessed by that population (Sugiyono, 2014). The sample used in this research process is a population sample. The sample was selected using the cluster random sampling technique, so that class X^1 was obtained as a sample in this study.

The variables in this study consist of two, namely the free variable (X); problem solving learning methods and bound variables (Y); student learning outcomes. The instruments used in the study were tests and questionnaires. The test used in this study is in the form of student learning outcomes obtained after students learn trigonometry material using problem solving learning methods. Questionnaires are used to determine students' responses to the learning process using problem solving learning methods. The questionnaire used in this study was using a closed questionnaire, and was arranged using the Likert scale with 5 answer choices. The data analysis techniques used are descriptive statistical analysis and Product Moment Correlation analysis.

Hypothesis testing was performed using Pearson's product moment correlation analysis with the following formula:

$$r_{xy} = \frac{\mathrm{N}\sum XY - (\sum X)(\sum Y)}{\sqrt{(\mathrm{N}\sum \mathrm{X}^2 - (\sum \mathrm{X})^2)(\mathrm{N}\sum \mathrm{Y}^2 - (\sum \mathrm{Y})^2)}}$$

Where:

r_{xy} = Correlation index number "r" product moment
$\sum X$ = Total score X
$\sum Y$ = Total score Y
$\sum XY$ = The sum of the results of the multiplication of each score of X and Y
N = Lots of research samples (Ridwan, 2010).

Test criteria:

If $r_{value} > r_{table}$ then H_o rejected

If $r_{hitung} \leq r_{tabel}$ then H_o accepted

Table 1. Interpretation of the correlation coefficient of the value of "r"

Coefficient Interval	Relationship Level
0,00 to 0,199	Very low
0,20 to 0,399	Low
0,40 to 0,699	Enough
0,70 to 0,899	Strong
0,90 to ,00	Very Powerful

RESULTS

After the problem solving learning method is applied to mathematics learning as illustrated in the rpp. Furthermore, a test was held to determine student learning outcomes on trigonometric material taught using problem solving learning methods. Based on student test scores obtained student learning outcomes data presented in the following table.

Table 2. Classroom student learning outcomes

No.	Test Scores	Category	Frequency	Percentage (%)
1	85 – 100	Excellent	9	32,14
2	66 - 79	Good	12	42,86
3	56 - 65	Good Enough	7	25,00
4	40 - 55	Not Good Enough	3	10,71
5	0 – 39	Fail	0	0,00
	∑		**28**	**100**

From the table above, it can be observed that of the 28 students who took the test, there were 9 students (32.14%) scored with the excellent category, 12 students (42.86%) scored with the good category, 7 students (25.00%) scored in the sufficient category, 3 students (10.71%) scored in the less category, and none of the students scored with the failing category. In general, a graph of student test results obtained at the implementation of the final test can be seen in the following figure:

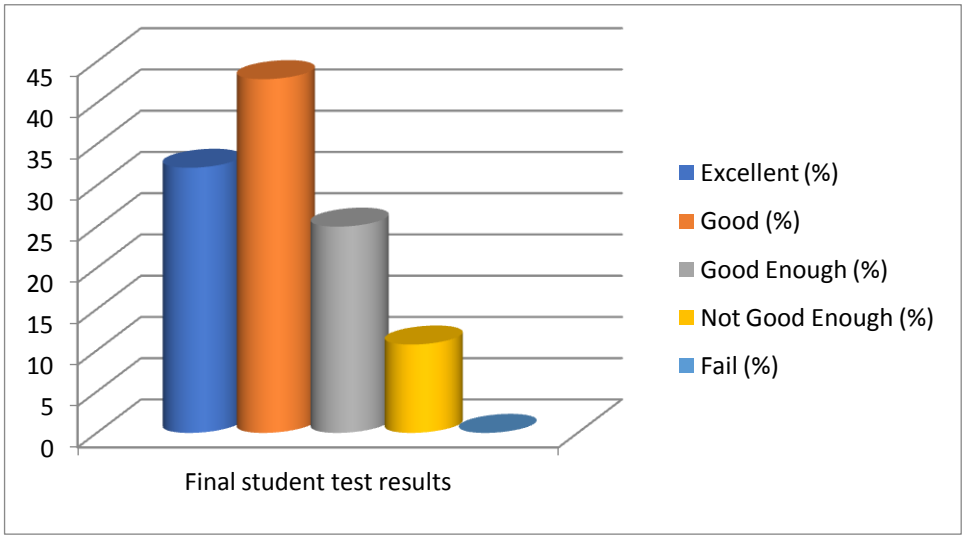

Figure 1. Graph of student final test results

Hypothesis Testing Results

Hypothesis testing was carried out using product moment correlation statistics. From the data collected in the form of student responses to the questionnaire and student learning outcomes data that have been analyzed using the Product Moment Correlation analysis obtained r_{value} = 0,7417 and $r_{table\ (5\%)}$ = 0,347 and $r_{table\ (1\%)}$ = 0,478.

This shows that the rhitung value is greater than the r_{table} (r_{table} = 0.7417 ≥ r_{table} (5%) = 0.347 or r_{value} = .7417 ≥ r_{table} (1%) = 0.478). Thus then Ho is rejected in the sense that H1 is accepted. So it is concluded that there is a relationship between problem solving learning methods and student learning outcomes in trigonometry material with strong categories. This

is because the r_{value} value obtained is in the strong category if interpreted in the table the value of *r*

To find out the magnitude of the relationship between problem solving learning methods and student learning outcomes in trigonometry material, it is sought through the coefficient of determination (r^2). From the calculation results, a value of $r^2 = 0.5501$ is obtained. This shows that there is a relationship between problem solving learning methods and student learning outcomes in trigonometry material with a contribution of 55.01% and the remaining 44.99% influenced by other factors.

DISCUSSION

Based on the results of the distribution of questionnaires, it showed responses from most students who agreed with learning mathematics on the concept of trigonometry using the problem solving learning method. In addition, the learning outcomes of the 28 class students who took the test in general, none of the students scored with the less category and failed. This condition illustrates that learning mathematics using problem solving learning methods supports student learning success. For students who already have an interest in learning, they will feel happy to be attentive in following the lesson.

Based on the results of hypothesis testing, it is known that mathematics learning using problem solving learning methods has a strong relationship with students' cognitive learning outcomes on the concept of trigonometry. The purpose of learning using the problem solving learning method is to communicate the learning experience, material that has been understood, material that has not been understood by mentioning the reason, and efforts or ways to overcome the problem faced. In addition, the problem solving learning method also aims to develop skills and habituate to express the results of student reflection on learning.

The results mentioned above are based on the results of hypothesis testing which is analyzed using the problem solving learning method. The results of the data analysis showed that the r_{value} was 0.7417. Meanwhile, the conversion results based on the r_{table} value distribution table obtained at the level of 5% which is 0.347 and at the level of 1% at 0.478. So that it can be written into $r_{value} \geq r_{table}$ or $0.7417 \geq 0.347$ at the level of 5% and $r_{value} \geq r_{table}$ or $0.7417 \geq 0.478$ at the test level of 1%.

The problem solving learning method (problem solving method) is not only teaching but also a method of thinking because in problem solving can use other methods that start by looking for data to draw conclusions. This learning is problem-based learning, namely

learning that is "learned centered" oriented and centered on solving a problem by students through a group work (Kamsurya & Saputri, 2020; Majid, 2013).

There is a relationship between student learning outcomes in mathematics learning and problem solving learning methods, in line with the advantages of problem solving learning methods, namely (1) this learning method can make education in schools more relevant to life, especially to the world of work, (2) the teaching and learning process through problem solving can familiarize students with understanding and solving problems skillfully, (3) this method stimulates students' thinking ability creatively and thoroughly in the learning process, students do a lot of mentality by highlighting problems from various aspects in order to find problem solving (Djamarah & Zain, 2013).

The coefficient of determination shows the magnitude of the relationship between variable X and variable Y. From the calculation results, it is known that the coefficient of determination r2 = 0.5501 which means that the magnitude of the relationship between the problem solving learning method and student learning outcomes in the trigonometry material of the SMA Al-Fiqri class is 0.5501 or 55.01% and the remaining 44.99% is influenced by other factors that are most likely to be interests, intelligence, talent, and motivation.

CONCLUSION

Based on the results of the research conducted, it can be that (1) there is a strong relationship between problem solving learning methods and student learning outcomes in trigonometry material. This is based on the results of the hypothesis test using the product moment correlation test, which obtained a r_{value} of 0.7417. Meanwhile, the conversion results based on the r_{table} value distribution table obtained at the level of 5% which is 0.347 and at the level of 1% at 0.478. So that it can be written into $r_{value} \geq r_{table}$ or $0.7417 \geq 0.347$ at the level of 5% and $r_{value} \geq r_{table}$ or $0.7417 \geq 0.478$ at the testing level of 1%, and (2) The magnitude of the strong relationship between problem solving learning methods and student learning outcomes in trigonometric material is 55.01 and the remaining 44.99% is influenced by other factors including interest, intelligence, talent, and motivation.

RECOMMENDATIONS

Based on the conclusions above, the author suggests (1) because the problem solving learning method has a strong relationship with student learning outcomes, teachers can always use the method to achieve better learning outcomes, especially in learning

trigonometry material mathematics, and (2) this research is still limited to trigonometry material, so other researchers should be able to carry out similar research in a broad context.

REFERENCES

Arikunto, S. (2010). *Prosedur Penelitian; Suatu Pendekatan Praktik*. Rineka Cipta.

Azmi, A. L., Wardono, & Cahyono, A. N. (2018). Mathematics Literacy on Creative Problem Solving with Realistic Mathematics Education Approach Assisted by e-Learning Schoology. *Unnes Journal of Mathematics Education*, *7*(3), 188–194. https://doi.org/10.15294/ujme.v7i1.24472

Djamarah, S. B., & Zain, A. (2013). *Strategi Belajar Mengajar*. Rineka Cipta.

Fauzi, A., & Lu'luilmaknun, U. (2019). Etnomatematika Pada Permainan Dengklaq Sebagai Media Pembelajaran Matematika. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *8*(3), 408. https://doi.org/10.24127/ajpm.v8i3.2303

Haciomeroglu, G. (2019). The relationship between elementary students' achievement emotions and sources of mathematics self-efficacy. *International Journal of Research in Education and Science*, *5*(2), 548–559.

Kamsurya, R. (2020). Learning Evaluation of Mathematics during the Pandemic Period COVID-19 in Jakarta. *International Journal of Pedagogical Development and Lifelong Learning*, *1*(2), ep2008. https://doi.org/10.30935/ijpdll/8439

Kamsurya, R., & Saputri, V. (2020). Influence of Auditory Intellectually Repetition (AIR) and Self Efficacy Learning Models on HOTS Problem-Based Problem Solving Ability. *Jurnal Ilmiah Mandala Education*, *6*(2), 125–133. https://doi.org/10.36312/jime.v6i2.1396

Keklikci, N., & Saka, Y. (2019). Exploring the interaction between Science teachers' self-efficacy beliefs and pedagogical discontentment: An attempt to understand why science education reform fails. *International Journal of Psychology and Educational Studies*, *6*(2), 1–14. https://doi.org/10.17220/ijpes.2019.02.001

Majid, A. (2013). *Strategi Pembelajaran*. Remaja Rosda Karya.

Mila, L. A. (2019). *Pengembangan media berbasis android pada pembelajaran matematika realistik*. 1–85.

Nursyahidah, F., Saputro, B. A., & Rubowo, M. R. (2018). A Secondary Student's Problem Solving Ability in Learning Based on Realistic Mathematics with Ethnomathematics. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, *3*(1), 13. https://doi.org/10.23917/jramathedu.v3i1.5607

Ridwan. (2010). *Dasar-Dasar Statistika*. Rosda Karya.

Şahin, M., & Doğantay, H. (2018). Critical Thinking and Transformative Learning. *Journal of Innovation in Psychology, Education and Didactics*, *22*(1), 103–114.

Saleh, M., Charitas, R., Prahmana, I., & Isa, M. (2018). Improving the Reasoning Ability of Elementary School Student Through the Indonesian Realistic. *Journal on Mathematics Education*, *9*(1), 41–54.

Sanjaya, W. (2009). *Strategi Pembelajaran Berorientasi Standar Pendidikan*. Kencana Prenata Media Group.

Sugiyono. (2014). *Metode penelitian pendidikan* (20th ed.). Alfabeta.

Windari, P., & Winarti, E. R. (2019). Student ' s Problem-Solving Ability through the Realistic Mathematics Education with Fun Card. *Unnes Journal of Mathematics Education*, *8*(3), 209–215.

Yanti, D., Widada, W., & Zamzaili. (2018). Kemampuan Pemecahan Masalah Open Ended Peserta Didik Sekolah Negeri Dan Swasta Dalam Pembelajaran Matematika Realistik Berorientasi Etnomatematika Bengkulu. *Jurnal Pendidikan Matematika Raflesia*, *3*(1), 203–209. https://doi.org/https://doi.org/10.31186/jpmr.v3i1.6284

Yetim Karaca, S., & Özkaya, A. (2017). The Effects of Realistic Mathematics Education on Students' Math Self Reports in Fifth Grades Mathematics Course conditions of the Creative Commons Attribution license (CC BY-NC-ND). *International Journal of Curriculum and Instruction*, *9*(1), 81–103.