

THE EFFECT OF THE LEARNING MODEL OF GIVING QUESTIONS GETTING ANSWERS AND THINK PAIR SHARE ON MATHEMATICAL LOGICAL INTELLIGENCE

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ABSTRACT

The objectives of this study are to: (1) analyze the influence of the Giving Question and Getting Answer learning model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan, (2) analyze the influence of the Think Pair Share learning model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan, (3) analyze learning models that produce mathematical logical intelligence that is more influential between the Giving Question and Getting Answer learning model or the model Learning Think Pair Share for grade X students of SMAN 1 Muntilan. This type of research is an experiment with a quantitative approach. The population used is tenth grade students of SMAN 1 Muntilan for the 2022/2023 school year. Data collection is done by testing. The tests used are paired sample t-test and independent sample t-test. The results showed that: (1) students' mathematical logical intelligence increased after the application of the giving question getting answer learning model, (2) students' mathematical logical intelligence increased after the implementation of the think pair share learning model, (3) the mathematical logical intelligence of students who were treated with the giving question getting answer learning model was better than students who were treated with the think pair share learning model.

Keyword: *giving question getting answer learning model, mathematical logical intelligence, think pair share learning model.*

PENDAHULUAN

According to intelligence is divided into eight, including intelligence: 1) verbal-linguistic; 2) logical-mathematical; 3) visual-spatial; 4) kinesthetic; 5) music; 6) interpersonal; 7) naturalist; and 8) existentialists [1]. One of the intelligences related to mathematics is logical-mathematical intelligence. Mathematical logical intelligence is a person's ability to count, reason, and solve problems logically [2]. People who have this intelligence are able to think of and compile solutions in a logical order [3]. Mathematical logical intelligence is the ability to process numbers, calculations, patterns, logical and scientific thinking. Based on the understanding of mathematical logical intelligence, it can be concluded that mathematical logical intelligence is a person's expertise or ability to count, reason, and solve problems logically and scientifically [4].

Indicators of mathematical logical intelligence are: (a) ability to classify, (b) ability to compare, (c) ability to calculate mathematically, (d) ability to reason inductively and deductively, and (e) ability to test hypotheses. Mathematical logical intelligence is one of the important factors in learning mathematics, because mastery of mathematical

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calculations and reasoning can make it easier for students to analyze and solve problems appropriately. Similarly, in mathematics learning activities, students with high mathematical logical intelligence have high learning outcomes. But in reality, there are still many students who are low in numeracy and the logic is still not good. This can be seen when students are given story questions that require identification steps first. Many students cannot answer correctly these questions because students are unable to identify problems in the questions. This is also experienced by grade X students of SMAN 1 Muntilan. Evidenced by the results of the pre-research test questions given. The results of the work can be seen in Figure 1.

$$\begin{array}{l}
 k = 2(p+1) \\
 80 = 2(p+q) \\
 \frac{80}{2} = \frac{2(p+q)}{2} \\
 40 = p+q \\
 p = 40 - q \\
 L = (40 - q) \times q \\
 L = 40q - q^2 \\
 a = -1 \quad b = 40 \\
 q = -\frac{b}{2a} \\
 = -\frac{40}{2(-1)} \\
 = 20 \\
 \text{lebar} = 20
 \end{array}$$

$$\begin{array}{l}
 \text{panjang} = 40 - x \\
 = 40 - 20 \\
 = 20x \\
 \text{lebar} = 20 \times 3 = 60 \\
 \text{panjang} = 20 \times 3 = 60
 \end{array}$$

Figure 1. Student pre-research test answers

In Figure 1, it can be seen that students are not precise in answering the pre-research test questions given by the researcher. Students have not been able to identify problems, solve problems mathematically, and have not been able to test hypotheses. Students should measure the length and width of a new rectangle from a square cut into three parts, but students answer the length and width without arranging them into rectangles first. This indicates that students have low mathematical logical intelligence.

Improper learning models are one of the reasons for students' lack of mathematical logical intelligence. From the observations at SMAN 1 Muntilan, the learning model used by teachers tends to use direct and conventional learning methods where teachers are the source of learning. The learning resources used by teachers only come from student textbooks. For the reason that students will have difficulty in understanding the material if it is not directly explained by the teacher. This is contrary to the independent curriculum that has been implemented.

Based on the results of interviews with grade X mathematics teachers of SMAN 1 Muntilan, the lack of varied learning models used by teachers in learning makes students tend to be passive and the atmosphere is boring. This monotonous direct and conventional learning model is actually not worthy of full use in the learning process and needs to be changed. Learning with this model does not provide the widest opportunity for students to construct their knowledge. However, to change the learning model directly and conventionally is very difficult for teachers, because teachers must have the ability and skills to use the learning model.

One way to anticipate the weaknesses of this direct and conventional learning model is to modify it. One modification of this model is to use the Giving Question Getting Answer learning model. The selection of the Giving Question Getting

Answer learning model as a learning strategy can help students understand the subject matter. With group learning, students learn to work together, exchange ideas, to solve existing problems. In addition, it also provides opportunities for students to dare to ask questions and dare to answer or express opinions using their own language. With this, students will be more receptive to lessons and increase their confidence, and not afraid to ask things that are not understood. Giving Question Getting Answer model, students are more open to insight into the material learned so that they do not just receive material from the teacher but also play an active role in the learning process by conveying questions or opinions without fear [5]. This condition is also in accordance with the results of research conducted [6] that students' understanding with the Giving Question Getting Answer learning model is better than using conventional learning models where discovery activities are supported by group discussion activities that build concepts together in a cooperative group.

To increase students' attention and enliven the atmosphere, the learning model of giving questions getting answers is varied by giving rewards in the form of adding points if students are able to actively convey questions that have not been answered by their group and students who provide explanations to other students who do not understand the material. The steps of the learning model of giving questions getting answers are as follows: (a) The teacher makes pieces of paper twice the number of students, (b) give two index cards to each student (the two cards are a asking card and the answering card is used by students to ask questions to be asked, while the answering card serves to answer questions derived from other students' questions or questions from the teacher), (c) Ask students to complete the following statement;

Paper 1 : I still don't understand about

Paper 2: I can explain about

(d) divide students into small groups of 4 or 5 people, (e) each group selects the questions (paper 1) as well as topics they can explain (paper 2), (f) asks each group to read the questions they have selected (if there are students who are able to answer, they are given the opportunity to answer but if no one can answer, the teacher must answer), (g) ask each group to convey what they can explain from paper 2, then ask them to convey it to their friends, (h) this process is continued according to the time and conditions, (i) At the end of the lesson, the teacher and students deliver summaries and clarifications of the answers and explanations of the students, but if at the end of the lesson there is still one card in a group will be given consequences.

In addition to Giving Questions, Getting Answers, a learning model that can improve students' mathematical logical intelligence is the Think Pair Share learning model. The Think Pair Share learning model or often called TPS provides a lot of time to think, respond, and help each other so that it becomes one of the effective ways to vary class discussion patterns [7]. The TPS learning model improves student learning outcomes with high, medium and low mathematical logical intelligence [8]. Learning subjected to the TPS model with high, medium, and low mathematical logical intelligence resulted in better learning achievement than the group of students subjected to the conventional model with high, medium, and low mathematical logical intelligence [9].

The learning steps of the think pair share model, namely: (a) the teacher provides material and its explanation, (b) the teacher divides students into groups of four students each and gives assignments to all groups, (c) students think and solve problems given independently first (think), (d) students pair up with one of their group mates then discuss the problem (pair), (e) the two partners meet again in groups that four and share the

results of solving problems found in other groups (share), (f) teachers give awards to students who dare to give and share the results of discussions.

Based on this explanation, this study aims to: (1) analyze the influence of the Giving Question and Getting Answer learning model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan on statistical material, (2) analyze the influence of the Think Pair Share learning model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan on statistical material, (3) analyze learning models that produce more influential mathematical logical intelligence between the Giving Question and Getting Answer learning model or the Think Pair Share teaching model for grade X students of SMAN 1 Muntilan on statistical material.

RESEARCH METHODS

The type of research applied to this research is a quantitative approach with experimental methods. The research design used was a quasi-experiment using a population of grade X students of SMAN 1 Muntilan. Sampling in this study was carried out using purposive sampling techniques. The samples selected were class X Phase E6 as the experimental class and class X Phase E7 as the control class. In the experimental class, they received treatment in the form of a Giving Question Getting Answer learning model. While in the control class received the treatment of the Think Pair Share learning model.

Data collection techniques in this study used tests. The test used is a mathematical logical intelligence test in the form of a description. The mathematical logical intelligence test question instrument is composed of 7 questions with statistical material. To find out the feasibility of the test instrument, the researcher calculates the validity, reliability, level of difficulty of the questions, and the differentiation of the questions, and questions that meet the requirements are taken. Based on the results of the test trial analysis, there are 5 questions out of 7 questions that meet the eligibility criteria standards.

Before the study was carried out, researchers first conducted an initial data analysis to find out that the sample had the same conditions as the pre-test. The initial data analysis carried out included normality tests and homogeneity tests. The normality test uses the Smirnov kalmogrov test while the homogeneity test uses the Livene test. Furthermore, a hypothesis test was carried out obtained from the post-test value of students' mathematical logical intelligence. The hypothesis test consists of a paired sample-t test and an independent simple-t test. The paired sample-t test is used to determine the difference before and after the learning model is applied in each experimental class and control class. The independent sample-t test is used to find out which learning model is better at improving students' mathematical logical intelligence. Before the hypothesis test is carried out, a prerequisite test is first carried out in the form of a normality test and a homogeneity test.

RESULTS AND DISCUSSION

A. Results

This research was conducted in March of the even semester of the 2022/2023 academic year at SMAN 1 Muntilan. The study began by conducting an initial data analysis to find out that the sample had the same condition. The initial data was taken using pre-test statistical material. The results of preliminary data analysis showed that both classes of samples, namely the experimental class and the control class, came from a population that was normally distributed and homogeneous. Then, both classes were given different treatment during the 4 meetings. At the 5th meeting, both classes were

given a post-test to obtain mathematical logical intelligence test data. Table 1. is the data of the results of pre-test and post-test mathematical logical intelligence.

Table 1. Pre-test and Post-test Results Data Mathematical Logical Intelligence

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Eksperimen	36	30	78	55,17	14,746
Posttest Eksperimen	36	80	100	90,50	5,224
Pretest Kontrol	36	28	74	47,11	11,439
Posttest Kontrol	36	66	96	80,56	6,971
Valid N (listwise)	36				

Before the hypothesis test is carried out, first carry out a prerequisite test, namely the normality test and the homogeneity test. The normality test was performed using the Kolmogrov-smirnov test with a significance level of 5%. Based on the calculation of the normality test in the experimental class, data were obtained in Table 2. next.

Table 2. Test Results Normality Data Pre-test And Post-Test Experimental Class And Control Class

Class		Sig	Information
Experimental	<i>Pre-test</i>	0,141	Normal
	<i>Post-test</i>	0,085	Normal
Control	<i>Pre-test</i>	0,2	Normal
	<i>Post-test</i>	0,71	Normal

Based on Table 2. Calculation with SPSS significance value (sig) of all data on the Kolmogrov-Smirnov test > 0.05 , then the conclusion obtained is that students in the experimental class and control class come from a normally distributed population. After the normality test is carried out and fulfilled, then the homogeneity test can be carried out. The homogeneity test was carried out using the Levene test with a significance level of 5%. Table 3. The following is a summary of the homogeneity test results of the experimental class and control class post-test pre-test data.

Table 3. Summary of Homogeneity Test Results

Mathematical Logical Intelligence	Class	Sig	Information
<i>Pre-test</i>	Experimental	0.092	Homogen
	Control		
<i>Post-test</i>	Experimental	0,261	Homogen
	Control		

Based on Table 3. The results of the homogeneity test calculation in both classes have a significance above 0.05. That is, the research data is said to be homogeneous, so the significance test is carried out using parametric tests. The parametric tests are paired sample T-test and independent sample T-test.

1. Paired Sample T-test

The Paired Sample T-test is used to determine whether there is a difference in the mean in a population before and after the learning model is applied. This test is intended to answer the first and second research hypotheses, namely to analyze the influence of the Giving Question and Getting Answer learning model and the Think pair Share learning model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan on statistical material.

The Paired Sample T-test is performed using the SPSS program. The summary results of the calculation can be seen in Table 4.

Table 4. Paired Sample T-test Calculation Results

	95% Confidence Interval of the Difference		T	df	Sig. (2-tailed)
	Lower	Upper			
Posttest Experimental - Pretest Experimental	31.159	39.508	17.183	35	.000
Posttest Control - Pretest Control	30.381	36.508	22.164	35	.000

From Table 4. Above obtained a t_{count} score of 17,183 in the experimental class and t_{count} of 22,164 in the control class. When compared with the value of t_{table} with $df = 35$, which is 2.030, $t_{count} > t_{table}$. Then also obtained from the significance value of 0.0001 where this value is much smaller than 0.05, so it was concluded that there was a significant increase in the post test value of the experimental class and the control class between before and after the learning model was given. Thus the test decision determined is H_0 rejected and H_1 accepted, meaning that there is an influence of the use of the Giving Question Getting Answer model on mathematical logical intelligence on statistical material and there is an influence of the use of the Think Pair Share model on mathematical logical intelligence on statistical material.

2. Independent Sample T-test

To determine whether there is a difference in mean between two populations, a sample comparison is carried out. The hypothesis H_1 accepted and H_0 rejected if the value of Sig. (2- tailed) $\leq 5\%$ or 0.05. Conversely, the hypothesis H_1 rejected and H_0 accepted if Sig. (2- tailed) $\geq 5\%$ or 0.05 means that there is a significant difference in mathematical logical intelligence on the application of the Giving Question Getting Answer learning model compared to the application of the Think Pair Share learning model to grade X students of SMAN 1 Muntilan. The results of the Independent Sample T-test are presented in Table 5.

Table 5. Test Results Independent Sample T-test

Mathematical Logical Intelligence	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig	T	Df	Sig. (2 tailed)

<i>Pre-test</i>	Equal variances assumed	2.916	.092	2.590	70	.012
	Equal variances not assumed			2.590	65.923	0.12
<i>Post-test</i>	Equal variances assumed	1.283	.261	6.850	70	.000
	Equal variances not assumed			6.850	64.883	0.00

From these calculations, all assumptions are met, then the data seen in the Independent Sample T Test table is Equal Variances Assumed data. Obtained t_{count} of 2,590 in the pre-test and 6,850 in the post-test. When compared with the value of t_{table} with $df = 70$ which is 1.994, then obtained $t_{count} \geq$ obtained t_{table} namely obtained $2.590 > 1.994$ and $6.850 > 1.994$. Then also obtained from the significance value of 0.012 (pre-test) and 0.000 (post-test) where this value is smaller than 0.05, so that the test decision determined is obtained H_0 rejected and H_1 accepted, meaning that there is a significant difference in students' mathematical logical intelligence towards the learning model giving questions getting answers compared to the learning model with the think pair share learning model. So it can be concluded that the mathematical logical intelligence of students taught with the learning model of giving questions getting answers is better with the think pair learning model share in statistical material.

B. Discussions

Based on the current curriculum of education units, teachers are emphasized to organize learning activities with various strategies that innovate. By increasing innovation in learning activities, it can increase student interest in learning so as to produce the final output of learning in accordance with its objectives. One of the objectives of learning activities is to improve student intelligence. Like the ideals of the Indonesian nation as stated in the preamble of the 1945 Constitution, namely educating the nation's children. One of the necessary and important intelligences for the nation's children to have as students is mathematical logical intelligence. Mathematical logical intelligence is the basis of students in mathematics in particular, but not only in mathematics but also necessary in everyday life. Mathematical logical intelligence influences a person's first action in facing a problem [10]. Students who have mathematical logical intelligence are not shy about asking questions to find answers to something unknown and difficult to understand. Students who have mathematical logical intelligence will actively ask and compete to ask questions and answers, especially when combined with games such as puzzles and competitions [11]. Each student also has a different level of mathematical logical intelligence. This is influenced by the way parents are upheld when children are at an early age. But mathematical logical intelligence does not mean that it cannot be improved when you are a teenager or adult. By innovating every learning, especially in numeracy, mathematical logical intelligence will be honed and improved [12].

From the pre-test results, it shows that the mathematical logical intelligence of class X SMAN 1 Muntilan is in the medium category. One of the things that affects is the learning model that lacks innovation in every learning activity. Therefore, researchers

apply the learning model of giving questions, getting answers, and think pair share to improve the mathematical logical intelligence of grade X students of SMAN 1 Muntilan.

The learning process that takes place at SMA Negeri 1 Muntilan using the learning model of giving questions getting answers emphasizes students' mathematical logical intelligence on statistical material. In the learning model of giving questions getting answers, students are very active in participating in learning activities. The teacher first provides material to provoke their knowledge and memory of statistical material. Then students fill in cards about things that are unknown and things that are already known, then discussed it in groups. Cooperation carried out in groups allows for an exchange of ideas where students who have high mathematical logical intelligence can help other students who are a group with low mathematical logical intelligence. According to [13], the group formed in the giving questions getting answer model is intended to provide opportunities for students to discuss material that has been understood and material that has not been understood to their colleagues, especially students who have high cognitive abilities can help solve problems that are considered difficult clearly for their group mates who have lower cognitive abilities.

In addition, group learning with the model of giving questions getting answers makes students' confidence levels increase. Students can deliver it boldly and without hesitation. As research suggests that the giving question getting answer model that applies group learning makes it easier for students to express opinions and express their thoughts independently without fear [14].

With the giving question getting answer model, researchers can provide more understanding to students from the results of unanswered student questions in their group. This keeps students directly involved in the learning process. The giving question getting answer model trains students to raise questions and answers from students that involve their thinking skills [15]. In addition to being directly involved, the giving question getting answer model helps students to infer the results of answers from questions that have been asked by other students independently using their minds without fixating on the available text. Broadly speaking, students are able to involve their reasoning and thinking skills with questions that arise about problems and answers to problems given even though they still need help from teachers and other students. This model has a positive effect on students' interest and learning outcomes in mathematics with group learning with discussions and cooperation in solving problems make students try more to engage each other [16]. Also learning model of Giving Question Getting Answer affects students' mathematical reasoning by actively participating students in the learning process by expressing their opinions without hesitation and being able to complete problems given through discussions with his group [17].

The addition of competition to the Giving Question Getting Answer model by researchers makes students more interested in following each learning process. Students become more confident to volunteer to convey things they don't know yet and volunteer to answer questions from other students. With the interest that exists in students, it results in easy understanding of the material obtained. Competition makes students motivated in participating in learning, so that competition causes an increase in student achievement [18]. Besides that, adding competition to learning activities it makes students excited and motivated to actively contribute to the learning process, so that student learning outcomes increase [19].

With this description, explaining that the learning model of giving questions getting answers applied in experimental classes affects the mathematical logical intelligence of class students from medium level to very good level. Factors that cause students in classes

taught using the giving question getting answer model have better mathematical logical intelligence, namely (1) student-centered learning, (2) learning is carried out in groups, (3) students are enthusiastic and happy to compete for points when successfully answering from other students' question cards, (4) students dare to convey material that has not been understood so that the teacher can help to understand it. In addition, the steps in the learning model of giving questions getting answers are able to facilitate students to improve mathematical logical intelligence shown by the results of the post-test mathematical logical intelligence.

In addition to the giving question getting answer model, the think pair share learning model also emphasizes improving students' mathematical logical intelligence. In learning activities, students are active. Similar to the giving question getting answer model, in the think pair share model the teacher provides material first to students, which is then continued with giving problems and solved with three stages of learning.

In the first stage, think is thinking independently to solve problems that have been received. Students are given time according to the weight of the problem given at each meeting by the teacher to solve it themselves. This trains students to believe in their abilities. By giving enough time and opportunities to think for yourself, it can hone students' ability to think deeply [20]. But at this stage many students cannot complete it and prefer to wait for the finish time so that it can be done together with their partners.

In the second stage, pairs where students in pairs solve problems in different ways of solving. The teacher deliberately paired the student with the high ability and the low one. This is so that students can help each other. With the differences, students can complement each other's shortcomings. In addition, by pairing students share creativity in how to solve problems to increase their mathematical logical intelligence. By applying a learning model in pairs, students with a better level of understanding help students with less understanding in solving a problem [21]. However, due to the first stage not being completed until finally there was an extension of time that was not in accordance with the predetermined scenario. This also hinders the third stage, namely share.

In the shared stage, students' group and share the results obtained to be discussed. The purpose of this stage is that students can actively participate in conveying the results in a good communication way and can evaluate together the results of the work that has been done. The share stage students can develop their social skills [22]. The distribution of work results in the think pair share model helped structure discussions to evaluate each other, thus limiting the opportunity for thoughts to digress because they had to report the results of their thoughts to their friends. When students are given time to share their answers with each other, students have active discussions. However, because the time has been used in the first stage and the second stage, the time provided at this stage is reduced. This resulted in immature results of the discussions carried out.

The number of changes in positions with different student conditions makes time wasted. This results in the think pair share learning model is not so optimal and easy to experience chaos. The think pair share learning model is too time-consuming when moving from pairs to groups which makes learning not conducive [23]. Switching from small groups to large groups takes up learning time which results in low class conduciveness [24].

After the three stages are completed, the teacher gives time for a question and answer session so that students can ask questions that are not understood. From the results of mathematical logical intelligence research using the think pair share learning model has increased. This is because: (1) student-centered learning, (2) ample time to think, (3) students actively discuss and help each other.

Although the think pair share model increases students' mathematical logical intelligence from the calculation results, classes given the think pair share model have lower mathematical logical intelligence compared to classes with the giving question getting answer model. This is because: (1) in the giving question getting answer model there is competition, (2) the amount of time wasted in the think pair share model, (3) in the think pair share model students are too dependent on their friends so they don't ask much about what they don't understand.

CONCLUSION

Based on the results of research that has been carried out on the influence of the learning model of giving question getting answer and think pair share on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan, it can be concluded that: (1) there is an influence of the use of the Giving Question Getting Answer model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan, (2) there is an influence of the use of the Think Pair Share model on the mathematical logical intelligence of grade X students of SMAN 1 Muntilan, (3) the application of the Giving Question Getting Answer learning model is better than the Think Pair Share learning model for grade X students of SMAN 1 Muntilan. The advice that can be given is that teachers need to choose the right learning models and media to improve students' mathematical logical intelligence. In addition, it is necessary to conduct similar research using other broader materials, therefore it is found about how far the influence of the application of the learning model of giving questions getting answers and think pair share on mathematical logical intelligence.

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