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The Effect of Mind Mapping Methods Types of Mind Map Syllabus on Mathematics Problem Solving Ability In Flat Side Space Construction Materials of Class VIII Students of SMP Negeri 1 Karangreja District Purbalingga

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Abstract: This study aims to determine whether there is an influence of the mind mapping syllabus method on the mathematical problem-solving abilities of the eighth-grade students of SMP Negeri 1 Karangreja, Purbalingga. Mathematical problem-solving ability is a quality possessed by someone to solve mathematical problems so that the goals to be achieved are resolved properly. One of the factors that influence the ability to solve mathematical problems is the model or method used in learning. The researcher chose to use the mind mapping method, a type of mind map syllabus, to improve students' mathematical problem-solving abilities. This study used quantitative research (experimental research) with a Quasi-Experimental Design. The population of this study were all of the eighth-grade students which consisted of 5 classes. The samples of this study were the students of VIII A which consisted of 26 students, and VIII B which consisted of 22 students. The data collection technique in this study used a test consisting of a pretest and a posttest. The data analysis of this study applied the t-test and the N-Gain test using the SPSS version 25. The results of this study indicate that there is an influence of the syllabus-type mind mapping method on the math problem-solving abilities of the eighth-grade students of SMP Negeri 1 Karangreja, Purbalingga. The N-Gain results show that the N-Gain of the experimental class is included in the high category with an average N-Gain of 0.70 and the control class is included in the medium category with an average N-Gain of 0.54. So, the increase in students' mathematical problem-solving abilities in the experimental class is higher than in the control class.

Keywords: Mathematics; Mind Mapping ; Problem Solving.

A. Introduction

Solving problem is a business process participant educate in framework find solution on given problem or he faced with use all knowledge, skills, and understanding possessed (Archi, 2020 :20). According to Polya, solving problem is something business look for road go out from something purpose which is not so easy quick can achieved (Heris, 2021:44). Ability is quality from someone who can do something (Ahmad, 2020:26). In finish problem math, students should can use the abilities it has. Can concluded that, ability solving problem mathematics is owned quality somebody for find solution or solve problem mathematics so that desired goal achieved resolved with ok.

Ability solving problem important owned student for reach objective learning. Objective learning math 2013 according Ministry of Education and Culture is increase ability intellectual

specifically ability level tall students, form ability student in finish something problem in a manner systematically, obtain results high learning, training student in communicate particular ideas in write work scientific, and develop character students (Agustami, 2021: 224). Importance ability solving problem mathematics is also emphasized in The National Council of Teachers of Mathematics (NCTM) stated that solving or settlement problem should become center from learning mathematics, because settlement problem is part from all activity math and is objective main from all instructions mathematics (Ahmad, 2020:19). Solving problem role important in the learning process math.

Then in ability solving problem, there a number of necessary indicator noticed as stated by Polya, there is four a must indicator achieved that is understand problem, devising a strategy or plan settlement problem, solve problem with using the strategy that has been planned, and checked repeat answer (Ahmad, 2020:24). High low ability solving problem can influenced various thing, for one thing is application method or the strategy used in the learning process (Ningsih, 2023:24).

Every participant educate expected capable solve problem with apply his knowledge. In life every day, us faced with demanding problem ability solving problem. Whole material mathematics own level ability solving each other's problems. One of them that is material mathematics get up room side related flat with solving problem nor life every day. on matter this student difficulty for identify problem about elements get up room side flat, define and apply a mathematical model or formula used as solution for reach desired goal. Besides that, students difficulty in hook between one formula with another formula, in matter This is formula wide surface and volume wake room side flat.

Based on observation introduction at SMP Negeri 1 Karangreja Regency Purbalingga on October 25, 2023 with do interview to math teachers class VIII, namely Mrs. Lasiana, S.Pd. state that student obtain low value when given task For do question. It because student not yet fully understand material that has delivered. Most student no can estimate and apply formula used for finish problem. Student not enough capable do calculation in a manner regular or not corrected return answers that have made. Besides that, students not enough learn and easy forget with material that has delivered.

One method that can used is method mapping (mind mapping) types mind map syllabus. Mapping deep thoughts (mind mapping). The app is very helpful for understand problem with fast because already mapped and got used for optimizing function brain student so that make learning become effective (Dyah, 2018: 11). According to Tony Buzan, method mind map can help in a number of aspect like plan, concentrate attention, compose mind, explained mind, remember with fine, study more fast and efficient, as well can practice picture in a manner as a whole (Sri, 2022:43). There are several type mind mapping that can used, for one that is mind map syllabus. Mind map syllabus often called mind mapping macro that is mind mapping that describes concept on size big and got pasted on the wall so that will understand and get remembered (Lestari, 2020:15). With mapping, students will more easy for learn something draft material so that can help student in understand problem.

According to Pandley, step learning use mind mapping that is convey material and goals learning, students learn draft about the material being taught, grouping student to in a number of group, students make map thought from material learned, students present results map mind,

guide student make conclusion, give question exercises, and tests after learning for know understanding concepts and abilities academic students (Akmalia, 2021:41).

Based on description above, research this aim for describe influence method mind mapping type mind map syllabus to ability solving problem mathematics on matter get up room side flat student class VIII SMP Negeri 1 Karangreja Regency Purbalingga.

B. Methods

Study This use method quantitative, type his research that is study experiment (quasi experiment) because There is influence (treatment) given certain. The intended treatment that is method mind mapping type mind map syllabus. Form design from study This is pre-test-posttest only control group design (Putu Ade and Gusti Agung, 2018: 10).

Table 1 Pretest-posttest only control group design format

Group	Pre-test	Treatment	Post-test
Experiment	T_1	X	T_2
Control	T_1	-	T_2

Description:
X: Treatment with use method mind mapping type mind map syllabus
T_1: Pretest
T_2: Post test

Study this conducted at SMP Negeri 1 Karangreja Regency Purbalingga and held in the even semester year 2022/2023, from March 16 to 31, 2023. Population in study this is whole student class VIII SMP Negeri 1 Karangreja Regency Purbalingga which has 5 classes. Sample in study this 2 classes are selected in a manner random use technique simple random sampling because of average ability student relatively same. As for the selected class that is class VIII A as class experiment and class VIII B as class control. Study this involve two deep class learning is given treatment different, where class experiment use method mind mapping type mind map syllabus whereas class control use method lecture.

Data collection techniques used in study This that is test made in form description. test used form pretest and posttest for know ability solving problem mathematics before and after learning with different treatment. Obtained data analyzed with using the N-Gain test and t test. The N-Gain score is done with do comparison from difference score pretest and posttest with difference ideal score and pretest. T test was performed for know influence method mind mapping type mind map syllabus to ability solving problem mathematics with compare results class average N-Gain value experiment and class control.

C. Results and Discussion

1. Results

Instruments used in study This that is t es description composed students of 4 items question with material get up room side flat cubes and blocks. Researcher do a validity test covers validity construction (construct validity) and validity content (content validity) obtained from opinion expert. For measure ability solving problem mathematics student before learning with different treatment, students given especially about the pretest first. As for the class pretest value data experiment and class control as following:

Table 2 Comparison results pretest class experiment and class control

No	Information	Pretest	
		Experiment	Control
1.	Top Rated	41.67	41.67
2.	Lowest Value	29,17	29,17
3.	Amount Student	26	22
4.	Average	33,25	33.05

Based on table on can is known that mark pretest from class experiment and class control before giving treatment different. Top rated from class experiment is 41.67, value lowest is 29.17 with the average value of 26 students is 33.25. Whereas for class control mark highest is 41.67, value the lowest is 29.17 with an average value of 22 students is 33.05. From these data can concluded that second class obtain nearly average value same and no own that difference too significant.

Then, after given learning with different treatment, students given question posttest. Following value data is presented posttest class experiment and class control:

Table 3 Comparison results posttest class experiment and class control

No	Information	Posttest	
		Experiment	Control
1.	Top Rated	87.5	81.25
2.	Lowest Value	70,83	50
3.	Amount Student	26	22
4.	Average	79.97	68,94

Based on table on can is known that mark posttest from class experiment and class control after being given treatment different. Top rated from class experiment is 87.5, value lowest is 70.83 with the average value of 26 students is 79.97. Whereas For class control mark highest is 81.25, value lowest 50 with an average value of 22 students is 68.94. From these data can concluded that grade point average experiment more tall compared to grade point average control.

For know enhancement ability solving problem mathematics student each indicator, following served achievement each indicators obtained from pretest and posttest results.

Table 4 Improvement Experimental Class Indicator

Indicator Ability Solving Problem Mathematics	**Percentage results pretest**	**Percentage results Posttest**	**Percentage enhancement**
Understand Problem	44.83%	100%	55.17%
Strategize or Plan Completion Problem	55.42%	91.33%	35.91%
Finish Problem	32.08%	74%	41.92%
Inspect repeat answer	0.33%	54.50%	54.17%
Average			46.79 %

From table, obtained that indicator understand problem increase more height and indicator strategy or plan settlement problem lowest increase.

Next, following is upgrade data achievement each indicator ability solving problem mathematics students in class control:

Table 5 Improvement Control Class Indicator

Indicator Ability Solving Problem Mathematics	Percentage results pretest	Percentage results Posttest	Percentage enhancement
Understand Problem	44.67%	95.83%	51.16%
Strategize or Plan Completion Problem	53%	80.67%	27.67%
Finish Problem	34.50%	58.33%	23.83%
Inspect repeat answer	0%	40.92%	40.92%
Average			35.90%

From table, obtained that indicator understand problem increase more height and indicator strategy or plan settlement problem lowest increase.

Once obtained pretest and posttest data information then N-Gain test, normality test, homogeneity test, and t test were carried out.

Statistical data acquisition associated N-Gain scores with ability solving problem mathematics students in class experiment served in table following:

Table 6 Statistical data class N-Gain scores experiment

Ability N-Gain Score Data Solving Problem Mathematics Student	
Amount student	26
Highest score	0.79
Lowest score	0.56
Average	0.70

Based on table can we know that the average value of N-Gain class experiment is 0.70 which means there is enhancement ability solving problem mathematics student use method mind mapping type mind map syllabus.

Next is statistical data acquisition associated N-Gain score with ability solving problem mathematics students in class control served in table following:

Table 7 Statistical data class N-Gain score control

Ability N-Gain Score Data Solving Problem Mathematics Student	
Amount student	22
Highest score	0.71
Lowest score	0.29
Average	0.54

Based on table can we know that the average value of N-Gain class control is 0.54 which means no there is significant change to enhancement ability solving problem mathematics student with use method lecture.

Normality test is the prerequisite test used for know normal or nope something data distribution. Normality test used by researchers is with the Shapiro Wilk test because amount sample not enough of 50. Application to the Shapiro Wilk test is If significance (p-value) $< \alpha = 0.05$ means the data is not normally distributed and if significance (p-value) $\geq \alpha = 0.05$ means the data is normally distributed (Putu Ade and Gusti Agung, 2018:46). Research test results This as following:

Table 8 Normality test results

Tests of Normality				
		Shapiro-Wilk		
Class		Statistics	Df	Sig.
Gain Score	Experiment	0.923	26	0.053
	Control	0969	22	0.685
*. This is a lower bound of the true significance.				
a. Lilliefors Significance Correction				

Based on normality test results with Shapiro Wilk use the N-Gain value, accordingly with table above shows that mark probability (Sig) is over big from alpha values are 0.053 > 0.05 and 0.685 > 0.05 meaning that the data is normally distributed.

Homogeneity test is the test used for know uniform data set or the variance homogeneous (Putu Ade and Gusti Agung, 2018:46). Homogeneity test using SPSS version 25. With criteria testing If sig value < α = 0.05, then data variation is not homogeneous, if sig value ≥ α = 0.05, then homogeneous data variations. Following is hypothesis test results from study this:

Table 9 Homogeneity test results

Test of Homogeneity of Variances					
		Levene Statistics	df1	df2	Sig.
Gain Score	Based on Means	3,373	1	46	0.073

Based on table show that the homogeneity test use the N-Gain value is obtained more sig value big from the alpha value is 0.073> 0.05 which means H0 is accepted and H1 is rejected that is homogeneous data variations.

T test was performed for know is there is influence from method mind mapping type mind map syllabus to ability solving problem math. Study This using the independent sample t test (independent sample t test) to test the hypothesis. The t-test hypothesis is as follows:

H0 : $\mu 1 = \mu 2$ (Average ability value solving problem mathematics student class the same with ability average value solving problem mathematics class control).

H1 : $\mu 1 \neq \mu 2$ (Average ability value solving problem mathematics student class experiment no the same with ability solving problem mathematics class control).

Description:

$\mu 1$: The average value of ability solving problem mathematics experimental class.

$\mu 2$: The average value of ability solving problem mathematics class control.

Test criteria if sig value < α = 0.05, then H0 is rejected and H1 is accepted, vice versa if sig value ≥ α = 0.05, then H0 is accepted and H1 is rejected. As for the results from sample t test independent for N-Gain scores that have done using SPSS version 25 as following:

Table 10 Independent Samples Test t-test results

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	Q	Df	Sig. (2-tailed)	Mean Differences	std. Error Difference	Lower	Upper
Gain Score	Equal variances assumed	3,373	0.073	6.134	46	0.000	0.16171	0.02636	0.10865	0.21478
	Equal variances not assumed			5,908	33,954	0.000	0.16171	0.02737	0.10608	0.21735

Based on the results of the independent sample t test using the SPSS version 25 program above, it can be seen that the sig (2-tailed) value obtained from the NGain value is 0.000. The sig (2-tailed) value is 0.000 < 0.05, then H0 is rejected and H1 is accepted. This shows that the N-Gain scores of the experimental class and the control class are significantly different. Where the average N-Gain value for the experimental class is 0.70, it is greater than the average N-Gain value for the control class, namely 0.54. It can be interpreted that the syllabus type mind mapping method has an influence on students' mathematical problem solving abilities.

2. Discussion

Study this done for know is there is influence or no from application method mind mapping type mind map syllabus to ability solving problem mathematics material get up room side flat in class VIII SMP Negeri 1 Karangreja Regency Purbalingga. In implementation study use two class as sample study that is class VIII A and class VIII B, where class VIII A as class experiment and class VIII C as class control. In implementation research, later will given different treatment between class experiment and class control. Experiment class will given treatment use method mind mapping type mind map syllabus and class control use method lecture. The material taught at SMP Negeri 1 Karangreja is material in the even semester that is get up room side flat. As for the things studied in study This is ability solving problem mathematics student.

Based on results research that has done, is known that class experiment totaling 26 students with mark the highest pretest is 41.67 and the value the lowest is 29.17 with an average value of 33.25. Whereas class control with a total of 22 students mark highest pretest is 41.67 and value the lowest is 29.17 with an average value of 33.05. From the results pretest second class the show that ability solving problem mathematics student class experiment and class control in relative condition the same.

Once given different treatment in learning, next is gift the posttest was carried out for know results from treatment that has given. From the results posttest class experiment that is

class VIII A was obtained mark highest is 87.50 and value lowest 70.83 with an average of 79.97. Whereas class posttest results control that is grade VIII B grades highest is 81.25 and value the lowest 50 with an average of 68.94. From the results the can is known that there is significant difference from results posttest second class.

Besides it, for know enhancement ability solving problem math too reviewed from each the indicator. On class experiment, the average percentage of ability solving problem mathematics indicator understand problem at first by 44.83% to 100% meaning there is enhancement of 55.17%, indicator strategy or plan settlement problem at first by 55.42% to 91.33% meaning there is enhancement of 35.91%, indicator finish problem at first by 32.08% to 74% meaning there is enhancement of 41.92%, and indicators inspect repeat answer at first by 0.33% to 54.5% mean There is enhancement of 54.17%.

On class control, the average percentage of ability solving problem mathematics indicator understand problem at first by 44.67% to 95.83% meaning there is enhancement by 51.16%, indicator strategy or plan settlement problem at first by 53% to 80.67% meaning there is enhancement of 27.67%, indicator finish problem at first by 34.5% to 58.33% mean there is enhancement of 23.83%, and indicators inspect repeat answer at first by 0% to 40.92% meaning there is enhancement of 40.92%.

After getting results, next ie hypothesis testing is done with using the normalized N-Gain test by t test. Before that normality test and homogeneity test were carried out use N-Gain value. From the results analysis of normally distributed data with (p-value) $\geq \alpha = 0.05$, namely $0.053 > 0.05$ and $0.685 > 0.05$. Data is also homogeneous with sig value $0.073 > 0.05$. From the N-Gain data obtained class control get an average of 0.54. With thus $0.7 > 0.54 > 0.3$ and if categorized as enter into the category moderate N-Gain value. Meanwhile in class experiment obtained an average N-Gain value of 0.70 and if categorized as enter into the category high.

Then test the t independent sample test done for test hypothesis with compare class average N-Gain value experiment and class control that has normally distributed. From the results of the t independent sample test using SPSS version 25 was obtained sig.(2-tailed) value of 0.000 which is more small of 0.05, that is There is difference in average ability solving problem mathematics use method mind mapping type mind map syllabus and use method lecture in the learning process math. From the results of the t test, it can be concluded H0 rejected and H1 accepted because it, method mind mapping type mind map syllabus influential to ability solving problem mathematics on matter get up room side flat student class VIII SMP Negeri 1 Karangreja Regency Purbalingga.

This is in line with research conducted by Rahmawati (2019) which stated that the mathematical problem solving abilities of students who received learning using the mind mapping method assisted by Edmodo blended learning improved better than students who received conventional learning. This research is also in line with research by Shubuhan Syukri Hasibuan and Sundut Azhari Hasibuan (2020) which states that learning using the mind mapping method is effective in improving the mathematical problem solving abilities of class X students at MAN 1 Medan. Apart from that, this research is also in line with research by Eva Fitria Ningsih (2023) which states that the mathematical problem solving abilities of students who use the mind mapping learning model are better than conventional learning and students have a positive attitude towards learning mathematics using the mind mapping learning model.

D. Conclusion

Based on research that has done can concluded that there is influence method mind mapping type mind map syllabus to ability solving problem mathematics on matter get up room side flat student class VIII SMP Negeri 1 Karangreja Regency Purbalingga. From the results of the N-Gain class experiment get the average value of 0.70 is entered to in category height, and in class control the average value of N-Gain is 0.54 which is entered to in category medium. With thus, increase ability solving math in class experiment more tall than class control. Where with use method mind mapping type mind map syllabus from fourth indicator ability solving problem math, which increased the most is indicator understand problem. It because with mind mapping, students can learn draft with mapping so that make it easy student for understand problem.

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