Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.7, No.25, 2016

The Enhancement of Mathematical Reasoning Ability of Junior High School Students by Applying Mind Mapping Strategy

Carolina. S. Ayal Yaya S. Kusuma Jozua Sabandar Jarnawi Afgan Dahlan

Abstract
Mathematical reasoning ability, are component that must be governable by the student. Mathematical reasoning plays an important role, both in solving problems and in conveying ideas when learning mathematics. In fact there ability are not still developed well, even in middle school. The importance of mathematical reasoning ability (KPM are parallel in improving student skill to mastery those three abilities. Therefore it is necessary to apply learning strategy that is expected to improve the KPM, in mathematics teaching. This research applied mind mapping strategy (SMM) as an alternative to improve all three. This aims to find out contribution level in SMM application to ward the enhancement of mathematical reasoning ability, at school rank (low , high and medium), KAM (high, medium and low). The research is a quasi-experimental research by using Pretest and Posttest Control Group Design. The sample in this research is 130 students in eight of two School in Ambon. Each school represents high school rank and medium school rank. The hypothesis was tested at 5% significance level. The data were analysed by applying the Kolmogorov-Smirnov (KS), Levene test, t-test, t'-test , Mann-Whitney U test, and ANOVA two lines. The result shows that:(1) there is a difference achievement, the enhancement of KPM, in experiment class and control class; (2) there is an interaction between learning and school rank in enhancing the ability of mathematical reasoning; (3) there is no interaction between learning and KAM in increasing reasoning ability.
Keywords: mathematical reasoning ability, mind mapping strategy.

A. Background

Mathematics as a subject, should be given to all students to begin from elementary school to supply students with the ability to think logically, analytical, systematic, critical, and creative, as well as the ability to cooperate. For students in addition to support and develop other sciences, mathematics is also required for the provision plunge and socializing in public life. On a given subject, mathematics can be regarded as a network concept because it consists of several concepts related to one another.

Learning conditions and junior high school students' understanding of the subject matter including mathematics is not satisfactory, as proposed by the Directorate of PLP that learning in junior high school text books inclined to be oriented and less related to the daily lives of students. Learning inclined to abstract, and the lecture method used by teachers in teaching make difficult concepts understood by the students. Learning is still fixated on the pattern of the source material presented books. Most teachers in teaching students pay less attention to the ability of reasoning, or in other words the methods used less varied, consequently student motivation becomes difficult, and the learning patterns of students simply memorize and mechanistic (Widdiarto, 2004). This makes students tend to think in mechanistic and less hone reasoning way, so that when students are faced with problems or new problems, students find it difficult to solve, especially with demand reaching minimum completeness criteria (KKM) schools was set at 65. These conditions require learning undertaken by teachers with varying methods that can condition the student to be able to face problems or unusual problems as encountered in the classroom.

In fact the learning of mathematics in schools is still dominated by the activity of the exercises for the achievement of the basic mathematical skills (basic mathematical skills) alone. "Transfer of knowledge" from teachers to students, is a custom that is used by teachers to teach orientation using conventional methods. This resulted in a lack of achievement, learning and mathematical learning outcomes of students. According Pranoto (in Latif, 2011), approximately 76, 6% of junior high school students turned out to be judged "blind" mathematics. Facing such conditions, the learning of mathematics must change the image of mechanistic become humanistic learning fun. This means, in the learning of mathematics teachers should provide learning well and focused, so that materialized rich interaction and quality between teachers and students, students and teachers, and students with student, thereby not only learning the monotony and centered to teachers alone.

Teaching mathematics and mathematical reasoning are the two things are interrelated and can not be separated because the material is understood through reasoning and mathematical reasoning to understand and drilled through learning mathematics (Depdiknas, 2002). This means that mathematical reasoning is an important part in mathematics, because the mathematical reasoning students can complete math problems. Therefore, in the study of mathematics must have regard to the reasoning, since mathematical reasoning abilities will illustrate math skills. In reality, the math teacher rarely junior high school (SMP) students' attention to mathematical reasoning abilities. Lack of mathematical reasoning skills students junior high school (SMP) is a major problem in mathematics education. One of the goals of mathematics teaching junior high school (Curriculum 2006: 246)

is to develop creative activity, as well as having an attitude of curiosity, attention, and interest in studying mathematics, as well as a tenacious attitude in solving problems. With the above purpose means a math lesson should be given to all students from elementary schools (SD) to high school so that students have the ability to reason, logical thinking, analytical, systematic, critical, creative, problem solving and generalization.

For that, we need a learning strategy that is deemed appropriate and specific so that it can improve students' mathematical reasoning abilities. One strategy that is expected and able to make the learning environment to attract, motivate students and fun when students learn the material through a strategy of learning mathematics is Mind Mapping (mind maps). Mind mapping was developed by Buzan in 1970 based on research on how the brain processes information. The brain takes information from a variety of signs, both images, sounds, scents, thoughts and feelings.

Sugiarto (2004: 75) argues that Mind Mapping is a good learning strategies used by teachers to improve memorized, understanding the concept of a strong student, and student creativity through the freedom of imagination. Mind mapping (mind maps) is also a technique summarizes the material to be studied and projected problems encountered in the form of a map or chart techniques, making them easier to understand. In addition Buzan (2012) argues that the study of mathematics by using mind mapping strategies (mind map) will improve students' motivation to memorize and strong, as well as students become more creative. In addition to teaching and learning activities will be more interesting, students would be more motivated by the learning of mathematics. From the above definition can be argued that the strategy mind mapping application (mind maps) in mathematics, is expected to increase motivation to learn mathematics and students memorized power. From the above description, authors are encouraged to research on "Improvement of Mathematical Reasoning Ability Junior high school students using Mind Mapping Strategies.

B. Formulation of the Problem

Issues that were examined in this study was formulated as follows:

1. Are the achievement and improvement of mathematical reasoning abilities of students who acquire learning with mind mapping strategy (SMM) is better than mathematical reasoning abilities of students who received conventional learning (PK)?
2. Is there an interaction between learning (SMM and PK) and ranked schools (high and medium) to the improvement of students' mathematical reasoning abilities?

C. Research Purposes

In accordance with the formulation of research problems, the goal of this research is:

1. To examine comprehensively the achievement and improvement of mathematical reasoning skills students acquire learning with mind mapping strategy (SMM) and conventional learning (PK).
2. To examine in depth how much interaction between learning (SMM and PK) and ranked schools (high and medium) to the improvement of students' mathematical reasoning abilities.

D. Profit Research

The result is expected to be useful for:

1. Teacher: for teachers of this study can provide a correct understanding of a material on a particular topic, so that students can understand the material to develop mathematical reasoning abilities of students through the mathematical mind mapping strategy (SMM).
2. Student: for students of this study provide a new experience and a lot for students to actively participate in the learning of mathematics in the classroom, so that in addition to developing students' mathematical reasoning abilities so that there is an increase in student achievement, it also makes the learning of mathematics more meaningful and useful.
3. Researchers: for researchers empirically can improve the ability of researching, developing learning models with mind mapping strategy as a theory which was introduced in mathematics education and valuable experience that can be considered to develop mathematical reasoning skills students at various levels of education.

E. Review of Literature

1. Mathematical Reasoning Ability Students

Reasoning skills needed by students to understand the concept to the next can solve mathematical problems. With the students' reasoning skills can be cultivated and conditioned to ask. By asking the students can develop reasoning. One of the capabilities inherent in mathematics in addition to other capabilities such as mathematical communication, problem solving, or the ability to connect between the mathematical concepts is reasoning. Thus, the reasoning is the process of thinking in conclusion. General conclusions can be drawn from the cases of the

individual, or otherwise, of things that are common to be the case that individual. Sadiq (2009), Herdian (2010), defines reasoning as an activity, process or activity thought to draw conclusions or make a new statement, which was based on some statements whose truth has been proven or assumed previously. In addition Sumarmo (2010: 260) says that reasoning is the ability and activity in the brain that must be developed continuously through a context. From some of the definitions set forth above it can be concluded that the reasoning is an activity or the activity of thinking in order to prepare a new statement, which was based on some statements whose truth is known in a advance..

Barodi (Dahlan, 2004) suggests some advantage if students are given tests involve reasoning, namely: (1) students have the opportunity and organized to use reasoning skills, and an educated guess; (2) encourage the students to do the estimate; (3) help students to understand the value of a negative feedback in deciding an answer; and (4) the reasoning ability to train and help the child to learn math. According Herdian (2010) characteristics of reasoning, namely; (1) the existence of a mindset that is called by the logic, this means that reasoning is a logical thought process that is thought according to a certain pattern or according to a certain logic, (2) analytical thought processes. The main characteristic of mathematics as a thought process in the form of drawing conclusions from the general to the particular thing is deductive reasoning. While the reasoning is based on limited samples, and observed observation or experiment called inductive reasoning. According Suriasumantri (Kusumah, 2008) which states that inductive reasoning is the process of thinking in the form of a common conclusion (applicable to all / many) on the basis of knowledge about specific things starting from a set of facts. It means that the conclusion of an inductive reasoning process is highly dependent on the results of observations or experiments are limited. Inductive reasoning can occur when the process of thinking that link the facts or evidence of specific-evidence of the known leads to a conclusion of a general nature.

Material mathematics and mathematical reasoning are two things that can not be separated, namely matter understood through mathematical reasoning, and reasoning is understood and practiced through the learning of mathematics. In understanding the concept of learning is often preceded by inductively through real experience or intuition, using simple examples that highlight the capabilities. Mathematical reasoning brain is a custom job that must be developed consistently using a wide variety of contexts. Turmudi (2008) argues that the mathematical reasoning ability is the ability to express the arguments that are essential for understanding mathematics.

SUMARMO (2005) said that some of the indicators of the ability of belonging to the mathematical reasoning, namely: (1) draw the logical conclusion; (2) provide an explanation of the models, pictures, facts, nature, relationships or patterns exist; (3) estimate the answer and process solutions; (4) using a pattern of relationships to analyze the situation, or make an analogy, generalization, and arrange conjecture; (5) propose opponent example: (6) follow the rules of inference, check the validity of the argument, proving and compose a valid argument; and (7) develop direct evidence, indirect evidence and proof by induction. Based on the above indicators (aspects) the ability of mathematical reasoning used in this study are as follows: (1) the ability of the students draw logical conclusions based on existing data; (2) the ability of the students check the validity of the arguments in the work on the problems; (3) the ability of students to explain the figures and tables they use in solving problems; and (4) the ability of students to prove the relationship between mathematical concepts.

2. Mind Mapping Strategy

The process of mapping the mind to connect the concepts about specific issues of the branches of nerve cells that make up the correlation concept leads to an understanding and the result is poured directly on the paper with the preferred animated and easily understood by the maker of the call with mind mapping. Results of mind mapping is a direct illustration of how the connections in the brain. So mind mapping is the easiest way to put the information into the brain and taking information out of the brain. Mind mapping is a way of noting that creative, effective, and literally will map our minds. With mind mapping, it will create a comprehensive view of the subject matter.

Mind mapping is also a route map for the memories, allows us to compile facts and thoughts in a way that the natural workings of the brain involved from the beginning. Mind mapping is described by using curved lines, symbols, words, and images are simple, basic and natural fit with the way the brain works. According to Martin (Basuki 2000: 22) mind mapping is a guide for teachers, to show the relationship between ideas that are important in the subject matter. Arends (Basuki, 2000: 25) states that mind mapping is a good way for students to understand and remember the amount of new information. With a good mind map presentation, the students can remember a material with a much longer. Moreover, Buzan (2012) argues that, mind mapping is a way of developing thinking activities in all directions, capturing a variety of mind in a variety of angles. Mind mapping develop divergent thinking, creative thinking. Mind mapping is the easiest way to put the information into the brain and retrieve information when needed. From the above opinion can be said that mind mapping is a strategy designed by the teacher so that students can be skilled in thinking, and can help students to link concepts that are important in learning a subject matter as well as enhance the creativity of the students about a concept.

Learning activities using mind mapping strategy, namely: (1) students must learn the concept of a material with the guidance of teachers, in these activities students are doing their own activities that foster a sense of learning and tenacious perseverance in the face of adversity on students; (2) determine the main ideas. This activity enabled students to discover and select keywords or key terms of a subject matter that has been studied so as to develop students' skills in finding and solving a variety of problems; (3) create or compile mind mapping (mind maps), in this case the students found the whole key words or key terms of a subject matter that has been studied, and students preparing these keywords into a mind map structure is most easily understood and understood by students that this activity develops students' independence in completing tasks; (4) the presentation in front of the class. The presentation in question is the activity of students in explaining the mind map in order to communicate ideas in front of a class of students to other students in the end there are enough opportunities for students to maintain and account for his opinion.

Buzan (2012: 171) argues that mind mapping (mind maps) will help students: (1) easy to remember something; (2) considering the facts, figures, and formulas with ease; (3) increase the motivation and concentration; (4) considering and memorize faster. Buzan also shows that the students will memorize quickly and easily concentrate the mind mapping technique, giving rise to the desire to acquire knowledge and desire to succeed. From the foregoing, it can be seen that learning by using mind mapping (mind maps) were designed by teachers to help students in the learning process, store information such as the subject matter received by students during the learning, and helps students prepare cores are important of the subject matter in the form of maps or graphs so that students more easily understand it.

Learning with mind mapping has the advantage that:

Can express opinions freely.

1. Can work with other friends.
2. Note denser and clear.
3. It is easier to search for records if needed.
4. Note was more focused on the core material.
5. Easy to see the whole picture
6. The brain helps to: organize, remember, compare and make connections.
7. Facilitate the addition of new information.
8. A review could be faster.
9. Each map is unique.

Disadvantages of mind mapping are:

1. Only students who are actively involved.
2. Not entirely student learning.
3. Mind mapping is varied so that students will be overwhelmed teachers check students' mind mapping (Kiranawati, 2007: 1).

Some components of mind mapping that must be considered is the main concept, the main issues, sub-issue (of any major issues), sub-sub-issue (of each issue), and propositions. According to Buzan (2012) basic steps in the preparation of mind mapping are:

a. Start from the middle of an empty paper
b. Use images (symbols) for the main idea
c. Connect the main branches to the central image. Make branches related to the branch and so on
d. Draw a line connecting the curved
e. Use one keyword for each line
f. Use images

2.1 Application Mind Mapping in Learning Mathematics

At the application stage there are four steps involved in the process of learning with mind mapping strategy, namely:

1. Overview is a comprehensive review of a topic during the learning process started. The goal is to provide an overview to the students about the topics to be studied. Especially for the first meeting at the beginning of each semester, Overview can be filled with activities to make the Master Mind Map which is a summary of all the topics taught during a semester that is usually already present in the syllabus.
2. Preview, early reviews are a continuation of the overview so that the general description given more detailed level of the overview and can be a further elaboration of the syllabus. Thus, students have had sufficient prior knowledge about the sub-topic of the material before more detailed discussion begins. Especially for very simple materials, preview step can be skipped so go directly to step Inview.
3. Inview, in-depth review sutau which is the core of the learning process, in which the topic will be discussed in detail, detail and depth. During this Inview, students are expected to record the information, concepts or formulas important along the graph, list or diagram to help students understand and master the material

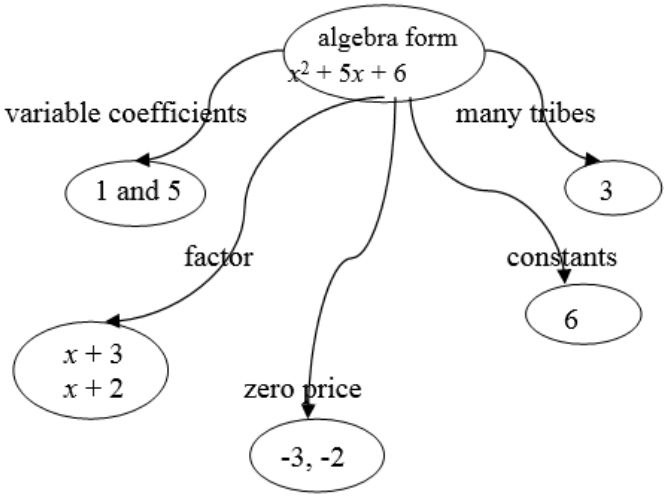
being taught.

4. Review is a review carried out before the end of jampelajaran and in the form of a summary of the material that has been taught and emphasized in the information, concepts or important formula to remember or controlled by the student. This will help students to focus on re-learn all the materials taught in school at the time at home. The reviews can be done when the lesson will begin at the next meeting to help students recall the material that has been taught at the previous meeting.

Pandley (1994: 45) argues that mind mapping (mind maps) aims to build students' knowledge in a systematic study, which is to enhance the knowledge of students in mastering the concept of a subject matter. As for the stages of learning mathematics with mind mapping according Pandley (1994: 46) as follows:

1. Teachers deliver content and learning objectives of the subject matter to be studied.
2. Students learn the concepts of the lessons learned with the guidance of teachers.
3. Once students understand the material that has been described by teachers, teachers group students into several groups according to the adjacent seat. Then the students are encouraged to create a mind map of the material being studied.
4. To evaluate the students' understanding of the constituent elements of the algebra teacher pointed to some students to present the results of a mind map of the constituent elements of the algebra with record or write on the blackboard.
5. From the presentation written by the students on the blackboard, teachers guide students to make inferences.
6. Teachers provide practice questions about the material they have learned to the students to work individually.
7. At the end of the study conducted tests to determine the students' understanding of concepts and capabilities.

One example of mind mapping (mind maps) regarding the name of the algebra based of his family, variables, coefficients and constants.



F. Research Hypothesis

Of problems are formulated, the hypothesis proposed in this study as follows:

1. Achievement and improvement of mathematical reasoning skills students acquire learning with mind mapping strategy (SMM) is better than mathematical reasoning abilities of students who received conventional learning (PK)
2. There is an interaction between learning (SMM and PK) and ranked schools (high and medium) Ability to increase student's mathematical reasoning.
3. There is an interaction between learning (SMM and PK) and early mathematical ability of students to increase students' mathematical reasoning abilities.

G. Design and Research Instruments

This study is a quasi-experimental research. According Ruseffendi (2010) that, quasi-experimental research subjects are not grouped randomly, but researchers receive state sober subject. Design research is pretest-posttest design or the pretest posttest control group design (Tuckman, 1978; Ruseffendi, 2005). Experimental design that authors use in classifying the subject of research, treatment and retrieval of data for each school rankings.

Experimental Design Comparison group pretest-postest

O	X	O
O		O

Whith :

O: Measurement tests of mathematical reasoning skills students (pretest and posttest)
X: Treatment Learning through mind mapping strategy

Each class is given a pretest and posttest study to measure the students 'mathematical reasoning abilities and see the impact of learning on the students' mathematical reasoning abilities. The research instrument consists of a set of test to measure student abilities mathematical penelaran. Then performed a descriptive analysis of the data obtained by calculating the mean, variance, and strander deviation of each group so dperoleh overview. Further statistical analysis with the previous inverensi test for normality and homogeneity test. Data were analyzed using statistical paramertik and non-program Microsoft Office Excel 2007, Anates, Statistics and SPSS-17.

H. Population and Sample

The population in this study were all students of class VIII SMPN school year 20013/2014 in Ambon which consists of high school rank and rank schools being. Two schools in the sample consists of selected high-ranking school SMPN 4 and ranked as the school was chosen SMPN 2. Two classes are used in research that VIII1 class as a class experiment (learning with mind mapping strategy) has 34 students, and the class has 34 VIII2 grade students as the control (conventional learning) at SMPN 4.

I. Results and Discussion

1. Mathematical Reasoning Ability (KPM)

a. Mathematical Reasoning Ability Data

KPM picture quality of students is done through the calculation of the mean and standard deviation. While the achievement of KPM is determined by post-test scores obtained by students. KPM student attainment and improvement in terms of school (PS), early mathematical ability (KAM), and as a whole can be seen in Table 5.

Table 5
Mean Student Achievement and Improvement KPM

	Data group	N	$\bar{X}$&SD	Mathematical Reasoning Ability						
				SMM				PK		
				Pre	Post	<g>	N	Pre	Post	<g>
School Ranking	High	34	$\bar{X}$	9,47	27,21	0,50	34	7,38	24,35	0,45
			SD	2,45	4,78	0,11		1,63	2,37	0,05
	Medium	31	$\bar{X}$	9,45	26,35	0,48	31	7,90	19,81	0,32
			SD	2,80	3,38	0,01		0,98	2,36	0,07
KAM	High	13	$\bar{X}$	10,00	29,00	0,55	18	7,28	23,61	0,43
			SD	2,00	5,18	0,13		1,45	2,73	0,03
	Medium	40	$\bar{X}$	9,60	26,75	0,48	36	7,67	22,33	0,42
			SD	2,92	3,95	0,11		1,41	3,30	0,02
	Low	12	$\bar{X}$	8,42	24,58	0,44	11	8,09	19,18	0,30
			SD	1,83	2,78	0,06		1,04	2,40	0,06
Total		65	$\bar{X}$	9,46	26,80	0,49	65	7,63	22,18	0,35
			SD	2,60	4,22	0,11		1,38	3,28	0,12

Ideal KPM Maximum Score = 45

Overall, students who acquire learning with SMM has a pretest mean of 9.46 lebh KPM higher than the average pretest KPM students who received PK of 7.63, and the mean posttest learning gain KPM students with SMM at 26.80, higher than postes mean students who received PK as be as to 22.18. Likewise, average <g> KPM students acquire learning with SMM 0,49 higher than the average of <g> KPM students who received PK 0.35. Based on the criteria of Hake (1999), an increase in the medium category.

b. Achievement of Mathematical Reasoning Ability (KPM) after obtaining Learning (SMM and PK)

Table 6 Differences in Achievement Test Students Second KPM Group Learning

Learning	Uji Mann Whitney U	Z	*Sig.* (*1-tailled*)	Conclusion
SMM : PK	833.000	-5,977	0,000	H_0 ditolak

Table 6 shows that the value of sig. = 0.000 less than $\alpha = 0.05$, so H_0 is rejected. This means the achievement of mathematical reasoning skills students acquire learning with SMM better than the achievement of mathematical reasoning abilities of students who received conventional learning (PK).

c. Improved Mathematical Reasoning Ability (KPM) after obtaining learning (SMM and PK)

Table 7 Differences test KPM Improved Second Student Learning Group

Learning	N	Mean	Z	*Sig.(1-tailed)*	Conclusion
SMM	65	0,49			
PK	65	0,35	-5,478	0,000	H_0 ditolak

Based on Table 7 it can be said that, sig. (1-tailed) = 0.000 less than α = 0.05, which means that H_0 is rejected. It can be concluded that the increase in mathematical reasoning skills students acquire learning with SMM better than the improvement of mathematical reasoning abilities of students who received conventional learning (PK).

d. Interaction between Learning and School rating (PS) against Upgrades Mathematical Reasoning (KPM) Students

Furthermore, this study examines the interaction between learning and school rankings to increase students' mathematical reasoning abilities. Test the interaction between learning and school rankings to increase students' mathematical reasoning abilities using ANOVA two stripe. The result using ANOVA two stripe can be seen in Table 8 below.

Table 8. Interaction between Learning and School Rating Upgrades to Mathematical Reasoning Students

Tests of Between-Subjects Effects

Dependent Variable:N-Gain KPM

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.630[a]	3	.210	25.365	.000
Intercept	24.736	1	24.736	2985.960	.000
Pembelajaran	.335	1	.335	40.460	.000
PS	.231	1	.231	27.826	.000
Pembelajaran * PS	.079	1	.079	9.518	.003
Error	1.044	126	.008		
Total	26.684	130			
Corrected Total	1.674	129			

From the calculation of ANOVA two stripe in Table 8 above, it appears that learning and school rankings provide a significant contribution to the improvement of KPM students. This means that is an interaction between learning and school rankings to the enhancement student KPM. Interaction between learning and school rankings factor to the enhancement students' mathematical reasoning abilities in the graph can be seen in Figure 2 below.

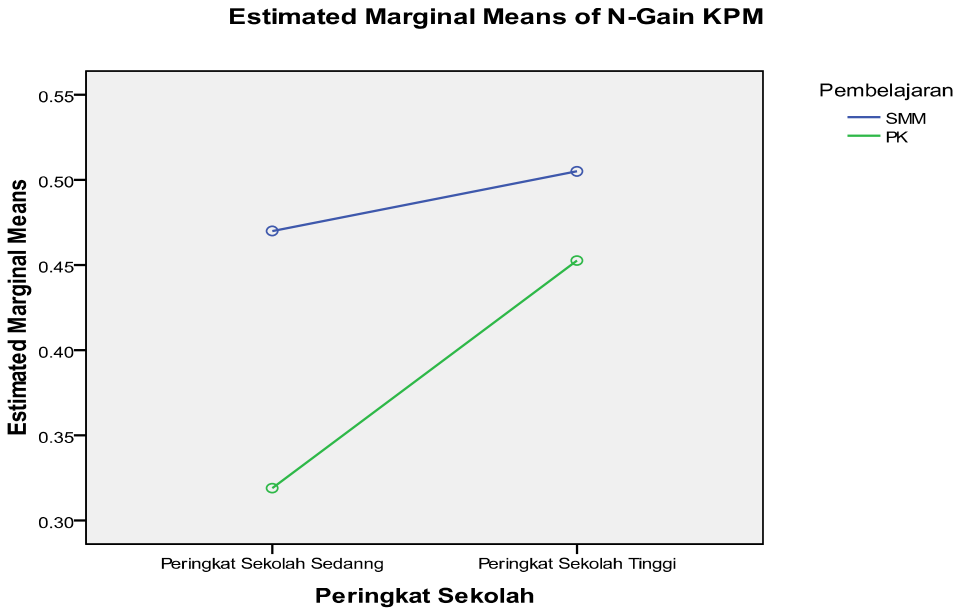


Figure 2. Interaction between Learning and Schools ranking against Mathematical Reasoning Students Upgrades

From Figure 2, it appears that every school rankings, the enhancemen KPM students acquire learning with mind mapping strategy (SMM) inclined to be higher than the students who received conventional learning (PK). The enhancement KPM in students through conventional learning achieved by the lowest and highest rank schools was achieved by high school rankings for the control class. Views from a mean score of N-Gain KPM students acquire learning by SMM bigger than students who received conventional learning. Based on Figure 2, it visible that, students at the high school rankings give the greatest benefit in learning to SMM when compared with students in the school rankings were, so there is interaction between learning at school rankings to increase student KPM. From the above description can be envisaged that the treatment given to the experimental class and control class tend to have a significant influence on the improvement KPM of student.

e. Interaction between Education and Early Mathematical Ability (KAM) against Upgrades Mathematical Reasoning (KPM) Students

Furthermore, this study examines the interaction between early mathematical learning and the ability to increase students' mathematical reasoning abilities. Test the interaction between learning and early mathematical ability to the enhancement students' mathematical reasoning abilities using ANOVA two stripe. The result using ANOVA two stripe can be seen in Table 9

Table 9. Interaction between Learning and Upgrades to Mathematical Reasoning Students

Dependent Variable:N-Gain KPM

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.516[a]	5	.103	11.063	.000
Intercept	18.836	1	18.836	2017.482	.000
Pembelajaran	.331	1	.331	35.429	.000
KAM	.186	2	.093	9.936	.000
Pembelajaran * KAM	.013	2	.006	.691	.503
Error	1.158	124	.009		
Total	26.684	130			
Corrected Total	1.674	129			

Based on Table 9, it can be said that the study provides a significant contribution to the improvement of student car loan. Likewise KAM make a significant contribution to the improvement of student. But together there is no interaction between learning and KAM to the enhancement student KPM. Thus it can be said that learning and human factors do not have a significant influence on the improvement of students' mathematical reasoning abilities.

Interaction between learning and to the enhancement KPM KAM Students are graphs can be seen in Figure 3 below.

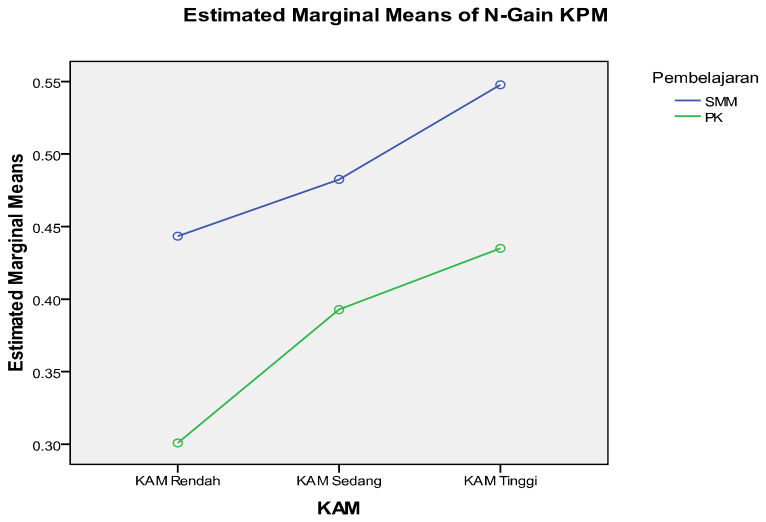


Figure 3. Interaction between Learning and KAM Upgrades to Mathematical Reasoning Students

There is no interaction tendency shown by the picture above plot that shows the two almost parallel lines. The picture shows that the difference in mean improvement of mathematical reasoning ability between students who acquire learning with SMM and PK for the third category is relatively the same KAM. Thus the effect of learning to the enhancement students' mathematical reasoning ability does not depend on the student

KAM.. Plot interaction picture above shows that the enhancement in mathematical reasoning ability KAM three categories of research subjects who acquire learning by SMM bigger than PK.

J. Conclusion

Based on the research that has been presented obtained the following conclusions.

1. Learning with SMM should be an alternative learning that can be used teachers at the school, especially for high school students and is ranked or KAM students with high, medium and low in learning certain topics, especially new topics related to Topics Previous topic that has been studied the students, so that learning becomes more meaningful mathematics.
2. The findings of this research, the school rank (high and medium) and KAM (high, medium, and low) learning more SMM requires persistence, patience, because it is in a group discussion should be practiced in mathematics. Through group discussion activity, relatively high mathematical ability students can further solidify his understanding, while the low mathematical ability students can gain a better understanding of the explanations friends who may be more easily understood.
3. The results showed that when viewed from category KAM, was learning just give considerable influence on high KAM category alone, whereas medium and low KAM showed no effect is quite good. Therefore, for further study of these factors should be considered, so that learning with SMM provide a pretty good effect for a third category of KAM
4. Other researchers can assess more comprehensively how SMM influence on cognitive and affective aspects of the others, particularly to encourage students to mathematics explored in more depth.

K. Bibliography

Basuki. (2000). Accompanied Mathematics Learning formulation of concept. Thesis UPI Bandung. Not published.

Buzan, T. (2012). Book Smart Mind Map. Jakarta: Pustaka Utama.

Department of Education. (2002). Curriculum and Learning Outcomes: Basic Competencies Subjects Mathematics High School and Madrasah Aliyah. Jakarta: Ministry of Education.

----------. (2006). Complete Guide KTSP 2006. Jakarta: Ministry of Education.

Hendriana, H. (2009). Learning with Methaporical Thinking Approach to Improve Understanding of Mathematical Ability, Communication Confidence Mathematics and Junior High School Students. Doctoral dissertation at UPI Bandung. Unpublished.

Herdian.(2010).KemampuanPenalaranMatematika.Tersedia:http://herdy07.wordpress.com/2010/05/27/kemampuan-penalaran-matematis/

Kusumah. (2004). Math Glosary. http:// www.surfnetparents. com/ math_glossary- 676.html. [23 September 2010].

Latif, M. (2011). 76.6 Percent of Students Junior Blind of Mathematics. Compass. Available: http://edukasi.kompas.com/read/2011/01/31/19444535/76.6.Persen.Siswa.SMP.Buta.Matematika.

[Online].Tersedia:http://www.ignatius-edu.com/revolusiner-cara-belajar-denganmetod -mind-maping.html),[22 Desember 2012].

[Online]. Tersedia. http://www.pdf-archive.com/2011/12/05/42-hedi-budiman/, [8 Desember 2012].

[Online].Tersedia:http://mahmuddin.wordpress.com/2009/12/01/pembelajaranberbasis-peta-pikiran-mind-mapping.[22 Desember 2012]

Rosyidah. (2007). Efforts to Improve Student Results Class VII F SMP Negeri 1 Bojong Tegal Through Learning Model Cooperative Learning Type Jigsaw li In Highlights One Variable Linear Equation. Thesis UNNES. Unpublished.

Ruseffendi, E.T. (2010). Basics Education Research & Field Other Non-exact sciences. Bandung: Bandung Tarsito.

Sadiq. F. (2009). Problem solving, reasoning and communication. Yogyakarta: Depdiknas

Sugiarto, I. (2004). Power Optimizing Brain Work With Holistic Thinking and Creative. Jakarta: Gramedia Pustaka General.

Sumarmo U. (2005). Mathematics Learning to Support the Implementation of School Curriculum 2012. Papers on Mathematics Education Seminar at the State University of Gorontalo. Gorontalo.

Turmudi. (2008). The cornerstone of Philosophy and Mathematics Learning Theory (paradigm Explorative and Investigation). Jakarta: Leuser Cita Library.

Widdiarto, R. (2004). Models of Learning Mathematics SMP. [On Line]. Available: http: //p4matematika.org/downloads [February 25, 2013].