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The Use of Core Model in Enhancing The Mathematical Reasoning Ability of Junior High School

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Abstract. This study aims to determine a) whether there is a difference between the increase in mathematical reasoning skills students who acquire CORE learning model and students received conventional math learning. b) whether there is an interaction between the learning approaches and classification of early mathematical ability (superior and inferior) to increase mathematical reasoning abilities. This research was conducted in the form of experiment. The instrument used in this study is a test instrument reasoning abilities. The research was conducted on one of the class VII SMP in medium qualification in Bandung to the subject of geometry. Based on this research, it is known that: (a) there are significant differences enhancement on reasoning ability mathematics students who obtain teaching model of CORE and students who obtain the learning of mathematics conventionally, well-reviewed as a whole and is based on prior knowledge of students (superior and inferior) (b) there is no interaction between prior knowledge of students and learning model, or it can be said there is no influence students' initial ability to both classroom learning model as
overall reasoning abilities can be concluded CORE model learning in enhancing mathematical reasoning abilities.

Keywords: *Model CORE, Mathematical reasoning, Prerequisites mathematical ability*

A. Introduction

Mathematics plays an important role in forming the character of students because mathematics is related to the daily activities of students and students' abilities can be developed through mathematics. Plus the hours of math is a lot more, about 4 hours of lessons a week.

Sumarmo (2010: 2) One of the characteristics of mathematics is its emphasis on deductive process that requires logical reasoning and axiomatic, that begins with the inductive process which includes the preparation of a conjecture, a mathematical model, analogy or generalization, through the observation of a number of data.

In the development of mathematics, there are many mathematical concepts built by man and is needed to help solve problems in everyday life faced. In mathematics, there are some basic capabilities that must be considered. Sumarmo (2005) classifies the basic math skills in five (5) standard capabilities as follows:

1) Understanding the mathematical
2) Mathematical problem-solving
3) Mathematical reasoning
4) Mathematical connection
5) Mathematical communication

Reasoning is one of the most important topics as stated in the above three indicators. Reasoning is also an important tool for math and everyday life, reasoning can be applied effectively or are not effective and can also be applied to useful purposes.

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Mathematical concepts are arranged hierarchically it means that the new concept is formed due to lack of understanding of the concept before. Therefore, to understand a mathematical concept that is new in higher education is indispensable mastery of mathematical concepts and reasoning power is good at the previous level of education.

Reasoning skills of mathematics is a mental process that must be built continuously through the various contexts Baroody (Tamalene, 2010: 2) If students really have to understand the students' knowledge of the material will stay longer in their minds, and can be applied in a variety of situations, so that their ability not only perform as instructed by the teacher and following algorithms.

Baroody (Rohana, 2015) revealed that there are four reasons why reasoning is important for mathematics and daily life, namely:

a. The need of reasoning to do mathematics. It means that reasoning has important role in mathematics development and application.
b. The need of reasoning in school mathematics. This is seen clearly that to master mathematics knowledge appropriately, it need reasoning in mathematics learning.
c. Reasoning involved in another content area. It means that reasoning skills can be applied to another knowledge. It can be said that reasoning supports the development of another knowledge.
d. The need of reasoning for everyday life. It means that reasoning is useful to daily life. It means that reasoning is useful to overcome the problem in daily life

In the process of teaching and learning mathematics ability to think and reason are closely related to one another, because mathematics is an arena for students to solve a problem and gaining the trust that to produce a settlement that is the true not only of the words of his teacher, but because of the logic of thinking and their reasoning clear, because it is a model CORE (Connecting, Organizing, Reflecting and Extending) applied in learning to connect, organize, describe and convey knowledge that exists in the minds of students and broaden their knowledge by conducting discussions during the learning process takes place.

Connecting with, students are encouraged to be able to connect new knowledge to be learned with previous knowledge. Organizing brings students to be able to organize knowledge. Then with Reflecting, students are trained to be able to explain back the information they have acquired and Extending, students can expand their knowledge at the time the discussion took place.

The cognitive growth of students is the best maintenance in a social environment in which students participate actively in which they are helped to reflect on what they learned. For teachers, the development of reflective classes in which students construct new knowledge and learn to manage their own learning, of course, they are still require teachers to extend class discussions.

Reasoning ability of students is a key aspect in developing the creative abilities. Children who have a good mathematical reasoning would tend to be more responsive to the problems surrounding and children are invited to put forward ideas honestly, explaining her idea to friends.

Piaget 1973 (Anwar 2012: 7) states that students learn by doing, talking and reflecting based on their actions. They construct mathematical knowledge using concrete objects and situations experienced.

From the above description, the writer interested to examine " The Use Of Core Model In Enhancing The Mathematical Reasoning Ability Of Junior High School Students."

Based on the description in the above background, it is a problem in this research are:

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1) Are there differences enhancement reasoning abilities mathematics among students who received teaching model CORE and students who received conventional learning, reviewed in (a) total (b) the ability beginning students (superior & inferior)?
2) Is there an interaction between the learning model and the classification of early mathematical ability (superior and inferior) in enhancing mathematical reasoning abilities.

Based on the above problems, the purpose of this study was to analyze: 1) To review and describe the differences increase the ability of reasoning mathematics among students who received teaching model CORE and students who received conventional learning are reviewed in (a) total (b) the ability of the beginning students (superior and inferior). 2) To review and describe the interaction between the learning model with the classification of early mathematical ability (superior and inferior) in enhancing mathematical reasoning abilities.

B. Theoretical Framework

The process of learning mathematics is basically not just transfer ideas from teachers to students, but it is a process in which teachers give students the chance to see and think about the idea that given. Based on this view, the real math learning activities are activities of teacher-student interaction, students, and learner and teacher to clarify the mind and the understanding of a given mathematical ideas through logical thought and action, creative, and systematic. In other words, adaptive reasoning and strategic competence are an essential and fundamental skills in mathematics learning should be built with study in students. Referring to the opinion Shimizu and Yamada, Herman (2007).

The research conducted by Shimizu and Yamada, Herman (2007) revealed that teachers have a very central role in the learning process through disclosure, encouragement, and the development of students' thinking process.

1. Reasoning

Reasoning is a thought process that is done in a way to draw conclusions. General conclusions can be drawn from the cases of the individual, but it can also be the opposite of the individual to be special and general (Suherman and Winataputra, 1993).

The term translated from the reasoning that contains the meaning of the term conclusions. Broadly speaking, in terms of how the withdrawal of its conclusions, mathematical reasoning are classified into two types, namely inductive reasoning and deductive reasoning. Inductive reasoning is drawing conclusions based on the observed data. Mathematical activities that are categorized as inductive reasoning among them are: provide an explanation of the adequacy of the elements to resolve the issue and give a reason to the truth of a statement, estimating answers, solutions or trends; Interesting analogy. Activities under the deductive reasoning of which is to carry out a calculation based on certain rules, compile evidence, give reasons to the truth of the solution, and logical reasoning. (Sumarmo, 2006).

Reasoning analogy is an inference based on similar properties. In line with this Mundiri in Tamalene (2010: 16) says that the analogy is comparing two different things based on the likeness, and then draw conclusions based on a likeness. While Generalization is the exposure of the relationship some of the concepts applied in more general situations. Reasoning includes observation of specific examples and determine the underlying pattern or rules. For example, the product of two odd numbers is an odd number. The principle on which the generalization is "what happened several times under

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certain conditions, can be expected to always occur when the same conditions are met" (Soekadijo, 1999: 134).

2. CORE (Connecting, Organizing, Reflecting and Extending)

CORE models need to be taught to students in mathematics because its content includes four things: (1) you do and you are experienced, (2) you reflect on your experience; for example, 'what did you learn?', 'what do you think?', (3) you have conceptualized a new outlook and use it to describe a conception which is more than the material questions and (4) your trial theory revision and looking for new feedback. Its main objective is to teach and train students for self-reflection as an essential component of a strategy of actions in the context of education, employment, and so on (Jacob, 2005).

CORE is one model of learning that is based on the theory of constructivism that students should be able to construct their own knowledge through interaction with its surroundings. Connecting means connect, it needs to be applied to the students because, with the good, the students will be given the information and the use of metacognitive knowledge to connect and develop their ideas. Organizing, required by students to organize the information obtained. With the discussion will help students organize their knowledge. In this case, Katz & Nirula (2001) states about how someone organize their ideas and whether the organization helps to understand the concept. Therefore, organizing is indispensable in the learning process.

Reflecting is the stage where the students to think deeply about the concepts learned. Sagala (2005) suggested that the reflection is a way of thinking into the back of what has been done in the case studied in the past. Students precipitate what has newly learned a new knowledge structure, which is an enrichment or revision of previous knowledge. Students express what he has learned in the form of inference. This process can be seen with the ability of students to explain the information that they have acquired and it would seem that not every student has the same ability. Extending a stage where students can expand their knowledge of what has been acquired during the learning process takes place. The expansion of knowledge in question must, of course, be adapted to the conditions and abilities of students. Guthrie (Jacob, 2005) says that declarative and procedural knowledge of students expanded so quickly that they are researching answers to questions they have; metacognitive knowledge increases so they do discuss strategies to obtain information among friends and teachers and tried to explain his findings to his friends in class.

Syntax learning model CORE are as follows: (C) information the old-new and between concepts, (O) organization of ideas for understanding the material, (R) rethink, explore, and digging, (E) to develop, expand, use, and find.

C. Methodology

The method used in this research is the experimental method. The variable research is a condition observed by the researchers, and in this study using several variables, namely:

1. The independent variable, namely the CORE model learning and conventional learning
2. The dependent variable is mathematical reasoning ability learners.
3. The control variables namely Prerequisites Ability Test (PAT), the participants were divided into groups of top and bottom groups based on the score of the PAT in one class.

Instruments used in the study was the instrument of mathematical reasoning abilities.

Data were analyzed namely quantitative data of test results of mathematical reasoning abilities of students. Before analyzing the data, all of the students who become

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research subjects are grouped into two categories. This grouping aims to determine the position of the student in the group of upper (superior) and bottom (inferior). This grouping is done according to test results prerequisite capabilities.

To determine the number of students in each group of students, using the guidelines KKM Mathematics at the school. Based on the calculation it turns out not represent a percentage based KKM for inferior-superior grouping, KKM is derived based on the average grade (the control experiments). Students who obtain the same value and above average superior students categorized and students that earned below-average grades of students categorized inferior.

Table 1. Distribution of Student Groups Classes and Class Experiment Control

No	Group	Experimental Class	Experimental Control
1	Upper (Superior)	17	16
2	Down (Inferior)	19	20
	Total	36	36

Analysis of test result data is needed to determine the magnitude of increase in students' mathematical reasoning abilities. so that primary data test results of students before and after treatment application of learning by using model CORE is analyzed by comparing pretest and posttest scores.
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D. Results And Discussion

Data collected during the study consisted of Mathematical reasoning ability test scores of students (pretest, posttest, gain).

Mathematical reasoning skills test results consisted of pretest and posttest scores. To determine the increase of Mathematical reasoning skills students gain seen from the score. The distribution of test score data of Mathematical reasoning skills students are presented in Table 2 below

Table 2. Data recapitulation of Mathematical Reasoning Ability

Prerequisites Ability Test	**Experiment Class (CORE Model)**						**Control Class (Conventional model)**					
	Pretes		**Post-test**		**Gain**		**Pretes**		**Post-test**		**Gain**	
	$\bar{X}$	**S**	$\bar{X}$	**S**	$\bar{X}$	**S**	$\bar{X}$	**S**	$\bar{X}$	**S**	$\bar{X}$	**S**
Superior	65.29	6.56	81.47	7.53	0.47	0.18	52.13	8.65	69.69	6.95	0.36	0.13
Inferior	45.29	11.87	60.29	7.05	0.26	0.11	37.75	8.00	52.70	5.38	0.23	0.10
Total	55.50	14.87	70.17	13.00	0.34	0.17	44.14	11.05	60.25	10.69	0.23	0.14

Description: Ideal Maximum Score (SMI) 100

In Table 2. it appears that the average gain of Mathematical reasoning skills in students who obtained CORE m`odel study was higher than students who received conventional learning in each group prior knowledge of students. If the CORE model learning is applied to all groups of students prior knowledge, it can improve students' mathematical

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reasoning abilities. Furthermore, the average gain is the highest of Mathematical reasoning skills obtained by the students in the group ahead and the average gain is the smallest mathematical reasoning skills obtained by the students in the group inferior. Seeing the results of data summary, it can be said that the trend of learning using CORE models more appropriately used on a group of students on

Table 3. Anova Test Results Two Line Score Gain normalized by Factors Ability Students and Model Early Learning

Tests of Between-Subjects Effects

Dependent Variable:Gain

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.652[a]	3	.217	11.742	.000	.341
Intercept	7.772	1	7.772	420.118	.000	.861
Class	.078	1	.078	4.228	.044	.059
Group	.537	1	.537	29.032	.000	.299
Class * Group	.031	1	.031	1.696	.197	.024
Error	1.258	68	.019			
Total	9.431	72				
Corrected Total	1.910	71				

a. R Squared = .341 (Adjusted R Squared = .312)

Here is an explanation based on the table above; for groups of the initial ability of students, has a sig value 0,000; because sig <0.05, then Ho is rejected. This means that there are significant differences concerning mathematical reasoning skills students between student groups and inferior-superior.

The class has a sig value 0,044; because sig <0.05, then Ho is rejected. This means that there are significant differences concerning mathematical reasoning skills students between the experimental and control classes.

Groups * Classes have sig value 0,197; because sig> 0.05, then Ho is accepted. This means there is no interaction between prior knowledge of students and learning model, or it can be said there is no influence students 'initial ability to both classroom learning model in terms of students' reasoning abilities. ANOVA test results of the calculation of the increase in the mathematical ability of students according to prior knowledge and learning model described in Figure 1.

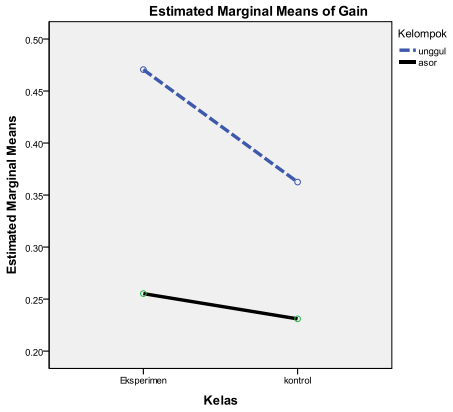

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Figure 1. Anova Test Results Two Line Score Gain normalized by Factors Ability Students and Model Early Learning

Based on the analysis of data that have been presented previously, the following will describe the description and interpretation of research data.

Improved Ability of Mathematical Reasoning

Based on an analysis of the average pretest score in the group of students who received conventional learning model of CORE and respectively 55, 50 and 44.14 can be concluded that the two groups there are significant differences. This indicates that the readiness or ability early mathematical reasoning students who received the CORE model learning and conventional learning different relative. Based on data analysis based on mathematical reasoning capabilities initial ability students superior and inferior, there are significant differences. After learning as much as eight meetings in both groups with a different approach, then given post-test to determine the mathematical reasoning abilities of students. then analysis of the data and gain post-test both classes. The average score post-test classes get CORE model learning and conventional classes are 70.17 and 60.25. and after the test the average difference at a significance level of 0.05 can be concluded that there is a significant difference from the value post-test both groups.

Based on data analysis based on mathematical reasoning capabilities initial ability students superior and inferior, there are significant differences between the average value post-test mathematical reasoning ability between the superior and inferior getting CORE learning models with a superior group and inferior getting conventional learning.

Similarly to score gain mathematical reasoning abilities in the classes get CORE learning models and conventional models gained an average score of 0.343 with a moderate enhancement category and 0.289 with an increase in the low category. Having tested there is a significant difference the average value of normalized gain mathematical reasoning skills classes get CORE model learning and classroom learning using the conventional model. Based on data analysis based on mathematical reasoning capabilities initial ability students superior and inferior, there are significant differences and inferior-superior group who get the CORE model learning with th superior group and inferior getting conventional learning. Judging from the results of the calculation of the normalized gain the whole class to get the learning model of CORE and conventional class differences significant enhancement. Similarly, the gain calculation results normalized based on the initial ability students superior and also there is an increased inferior mathematical reasoning skill with a significant difference.

The result of the calculation whether there is interaction between the learning approaches and the classification ability of early mathematics (superior and inferior) to increase the ability of reasoning mathematically is to accept the null hypothesis that there is indeed no interaction between the learning approaches and the classification ability of early mathematics (superior and inferior) to increase the ability of reasoning mathematically.

Additional findings during the learning process that students can broaden their horizons when the meeting; metacognitive knowledge increases so they do discuss strategies to obtain information among friends and teachers and tried to explain his findings to his friends in class. This is evident from the analysis of process variation students' answers. Here are some answers to students superior -inferior of classes that derive CORE model learning and students superior-inferior of conventional teaching classes gain, related to a matter of mathematical reasoning.

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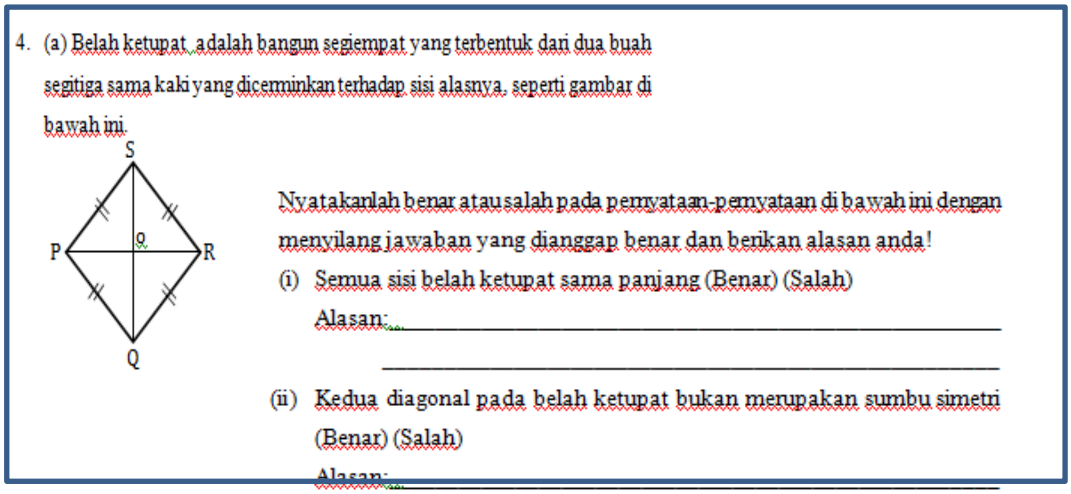
4. (a) Belah ketupat adalah bangun segiempat yang terbentuk dari dua buah segitiga sama kaki yang dicerminkan terhadap sisi alasnya, seperti gambar di bawah ini.

Nyatakanlah benar atau salah pada pernyataan-pernyataan di bawah ini dengan menyilang jawaban yang dianggap benar dan berikan alasan anda!

(i) Semua sisi belah ketupat sama panjang (Benar) (Salah)
Alasan: _____

(ii) Kedua diagonal pada belah ketupat bukan merupakan sumbu simetri (Benar) (Salah)
Alasan: _____

Figure 2. Results Answer Student Superior Classroom Acquire Learning Model CORE

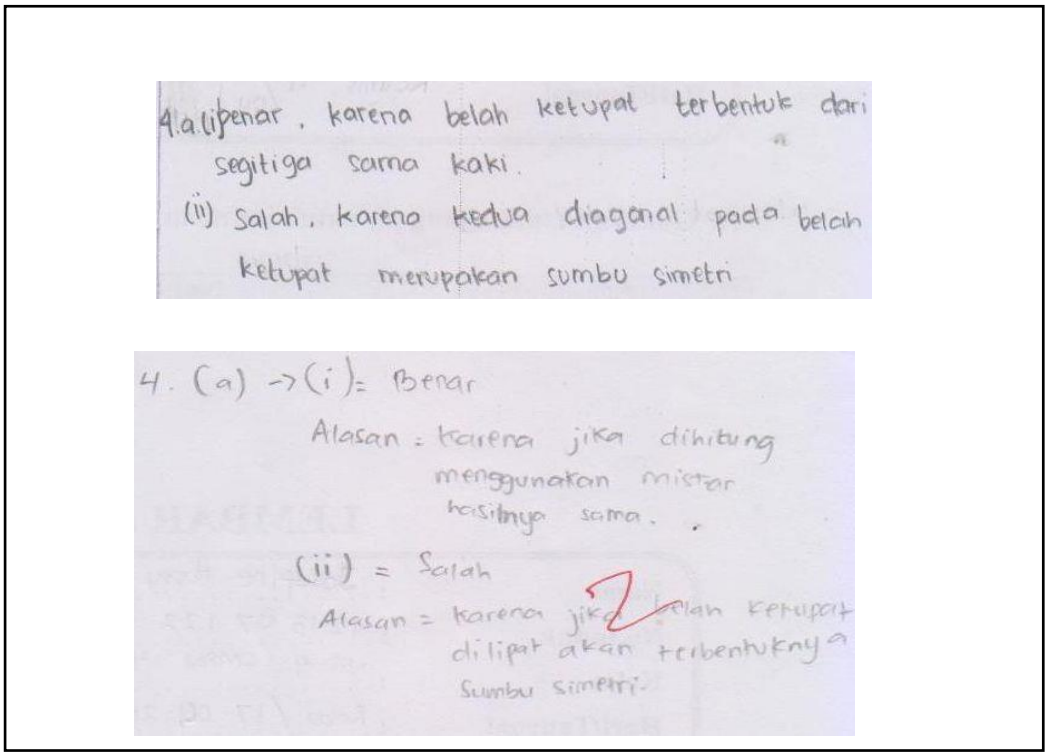

Figure 3. Results Answer Student Superior Classroom Acquire Learning Model CORE

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The problem above deals with analyzing the properties of a rhombus. The results of the answers in Figure 2 and Figure 3 above, it appears that the students gave the correct answer, for different reasons. But one of the students gave the wrong reason for the answers he made.

Here are the results of the students' answers superior-class inferior from getting conventional learning:

Figure 4. Students Result answer in Superior Classroom Acquire Learning Conventional

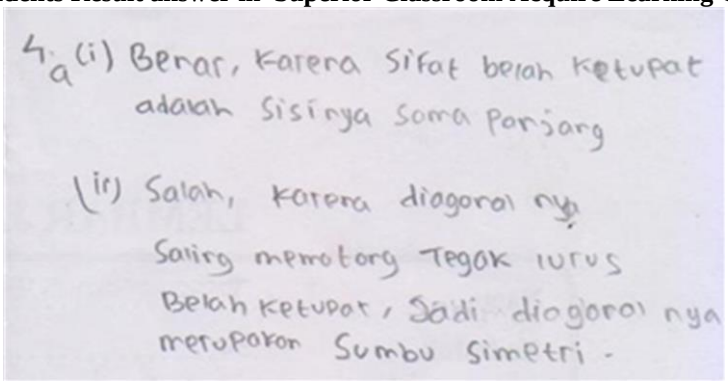
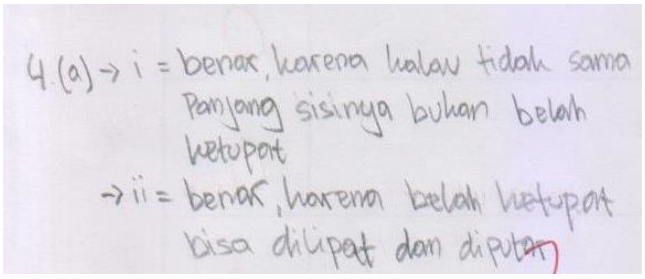


Figure 5. Students Result Answer in Inferior Classroom Acquire Learning Conventional



The results of the answers in figure 4 and figure 5 above, it appears that inferior students in the classroom getting conventional learning the correct answers, with sober reason. But one of the students gives a wrong answer and grounds of the answers made.

E. CONCLUSIONS AND RECOMMENDATIONS

Based on this research, it is known that: (a) there are significant differences enhancement reasoning ability mathematics students who obtain teaching model of CORE and students who obtain the learning of mathematics conventionally well-reviewed as a whole and is based on prior knowledge of students (superior and inferior) (b) does not there is no interaction between prior knowledge of students and learning model or it can be said there is no influence students 'initial ability to both classroom learning model in terms of students' reasoning abilities Based on the conclusions and implications of the above study, proposed some suggestions as follows.

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1. CORE model of learning in mathematics learning should be an alternative for school teachers, especially in enhancing mathematical reasoning abilities.
2. To implement the CORE model of learning by teaching teachers should create a scenario and planning more carefully and critically layout group study space, so learning by using learning model can be applied in class well in the implementation of learning
3. It needs to be done, to see the effectiveness of the implementation of the CORE model learning in mathematics so that CORE model learning really can be applied in various schools with different ratings

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