AN ANALYSIS OF STUDENTS' MATHEMATICAL REASONING ABILITY IN VIII GRADE OF SABILINA TEMBUNG JUNIOR HIGH SCHOOL

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ABSTRACT

This research is done to know the students' reasoning ability in learning mathematic. The method of this research is Qualitative Method. This research was done in VIII-3 Sablina Tembung Junior High School YearAcademic 2016/2017 consist of 40 students. Based on research result done, there is 42,5% achieved indicator to recommend the supposition, there were 27,5% achieved indicator arranging the proof, there were 52,5% achieved the indicator checking the validity an argument, and 25 % achieved indicator concluding a statement.

Keyword : *Mathematic Reasoning Ability*

1. PRELIMINARY

Mathematic education at school aims so that the students have good reasoning especially when finishing the problem in mathematic subject. One of the goal of mathematic learning at school is to train the mind set and reasoning in conlude a conclusion, developing the ability to solve the problem, and developing ability to deliver an information or communicate ideas through spoken, written, picture, graphic, map, diagram, atc (Depdiknas, 2006: 6).

Reasoning is an action or thinking process to conclude a conclusion or make a new statement based on the statement before and the truth had proved. Turmudi (2008) stated that mathematic reasoning ability is a brain habitation as other habitation that must be developed consistently using many contexts, knowing and proving are the fundamental aspects in mathematic. With mathematical reasoning , the students can give the suppostion and than arrange the proof and chech the truth of an argument to the mathematic problem and take a conclusion well. Boesen (2010) stated that *Reasoning in this paper is the line of thought, the way of thinking, adopted to produce assertions and reach conclusions.*

The importance of mathematical reasoning in mathematic, according to Shivakumar and Suvarna (2014:1) stated that *Reasoning skills develop gradually though a person's lifetime and at different rates for different individuals Reasoning skills are recognized as the key abilities for human being to create, learn, and exploit knowledge. These skills are also an important factor in the process of human civilization. Therefore, the importance of reasoning skills has been of great concern in educational settings and the world of work.*

While according to Depdiknas (Shadik, 2004) "mathematic material and mathematic reasoning are two things that can't be separated, namely mathematic material can be understood through reasoning and ris practiced rasoning by studying mathematic material". Beside of that according to Wahyudin (Rohana, 2015), *"reasoning abilityis very*

important to understand mathematics and mathematically reasoning is thinking habit. This result of reasoning then poured into systematical concepts in mathematics. Those concepts continually developed to become concepts which more complex and advance even can be used to solve various problems in life.

Thereby, mathematical reasoning ability is needed by students to filed an allegationand than arrange the proof and check the validity of an argument to a mathematic problem and take a conclusion correctly.

According to Wahyudin (in Mikrayanti, 2016) found that one of trend that causes the students are failed to master the main discussion in mathematic namely the students are less-reasoning and use a good reasoning in finishing the question given. Rosnawati (in Sherly Mayfana Panglipur Yekti, 2016) said that the average of the lowest percentage that can be reach by the students in Indonesia is in cognitive domain in 17% reasoning level.

1.1 Mathemathical Reasoning Ability

Reasoning belief is one of thought form,, Hardjosatoto said that reasoning be one of event from thinhking process. The limitation about thinking is a set of mental activity variety like remembering a thing again, imaging, memorizing, relating some meaning, creating a concept or guessing some possibilities (Ahmad 2015).

According to Nurdalilah (2012), reasoning is one of thinking way that relate two cases or more based on the character and certain rule that have convessed the truth by using proving steps until reaching a conclusion. According to Lithner (2008, reasoning bis an adopted thinking to get a statement and have a conclusion in problem solving that is not always based on formal logic so it's unlimited in a proof. Based on the argument above, can be conclude that an is an activity, reasoning process, thinking ability toget a conclusion or make a correct new statement.

Basically, reasoning application had used by the students during the mathematic learning process in the class. It can be seen from the statement of Depdiknas (Shadiq, 2004) " mathematic material and mathematic reasoning is two things that can't be separated, namely mathematic material can be understand by reasoning and the reasoning is understood through learning mathematic material". Thereby, every mathematic problem finishing need an reasoning ability and to practice it can be given some questions with special design so the students are habitated to finish the questions.

Mathemtic reasoning a fondation to get or construct mathematic science. Using the reasoning in pattern and character, doing mathematic manipulation in making generalization, arranging the proof, or explaining idea and mathematic statement is an important thing to increase students' reasoning ability about a mathematic material (Bani 2011:13)according to mathematic reasoning , students are expected to see that mathematic is a logic study.

Reasoning or reasoning indicators that must be achieved by the students based on the regulation of Dikdasmen No.506/C/PP/2004 (Shadiq, 2009): (1) the ability to present mathematic statement verbally, written, picture, diagram, (2) the ability to present validity, (3) the ability to do mathematic manipulation, (4) the ability to arrange the proof, giving reason/proof to the truth solution, (5) the ability to make a conclution of statement, (6) checking the error of argument, (7) finding the pattern or character from mathematical shymton to make a generalization. But the mathematical reasoning ability in this research involves students abilityto filed the validity, arrange the proof and give giving proof/reson to a truth solution, checking the validity of an argumen, and take a conclusion of a statement.

2. METHOD OF RESEARCH

Kind of this research is qualitative descriptive. Qualitative research according to Sugiono (2015: 15) is a research method that's used to analyze nature object condition, inductive data analysis and qualitative research result more emphasize the meaning of generalization. Qualitative method is used to get the data that is more contenable.

Descriptive approach itself means this research stives to define od describe problem, event, happen in this time. Written collective data, spoken, and picture. The subject of this research is done in VIII Grade of Sabilina Tembung Junior High School content of 40 students. Mathematical reasoning ability test in questionary form from circle content of 1 question. Every student is given 1 mathematical reasoning ability question that had been validated by 3 validators in a question.

Tha analysis technique that's done to identify the indicator of students' mathematical reasoning ability to finish mathematic question in essay test in circle material is descriptive statistic. Next, mathematical reasoning ability can be measured with the evaluation as the table below:

Tabel -1: Scoring Guidance of Mathematical Reasoning Ability Test

Indicator	Scale	Score
Submitting supposition	There's no answer at all	0
	The students can't submit the supposition	1
	A liitle part of students is only able to give supposition	2
	Almost all students can give the supposition	3
	The students submit the supposition complitely and correctly.	4
Arraning proof	There's no answer at all	0
	The students can't submit the supposition	1
	A liitle part of students is only able to give supposition	2
	Almost all students can give the supposition	3
	The students submit the supposition complitely and correctly.	4
Checking the validity	There's no answer at all	0
	The students can't submit the supposition	1
	A liitle part of students is only able to give supposition	2
	Almost all students can give the supposition	3
	The students submit the supposition complitely and correctly.	4
Taking a conclusion of a statement	There's no answer at all	0
	The students can't submit the supposition	1
	A liitle part of students is only able to give supposition	2
	Almost all students can give the supposition	3
	The students submit the supposition complitely and correctly.	4

3. RESULT OF RESEARCH

Based on the research result with Circle material, mathematical reasoning indicator that's contained in the test is used as measurer of students' mathematical reasoning ability. The indicators rise are: (1) submit the supposition (2) arranging the proof and giving reason/proof to the true solution, (3) checking a validity of an argument, and (4) taking a conclution of a statement.

Tabel -2: Pre Test of Mathematical Reasoning Ability

No	Mathematical Reasoning Indicator			
	Submitting the supposition	Arranging the Proof	Checking the validity of an argument	Taking the Conclusion
	Qustion Number	Question Number	Question Number	Question Number
	1a	1b	1c	1d
1	2	0	2	0
2	0	2	2	2
3	2	0	2	0
4	2	0	0	0
5	0	2	2	2
6	2	0	2	0
7	2	0	2	2
8	0	2	2	2

9	2	0	0	0
10	0	0	2	0
11	2	0	2	0
12	2	2	2	2
13	0	0	2	0
14	2	0	0	0
15	0	2	2	2
16	2	0	2	0
17	0	0	2	0
18	0	2	2	2
19	2	0	0	0
20	0	2	0	0
21	2	0	0	0
22	0	2	0	2
23	0	0	2	0
24	0	0	0	0
25	0	2	0	2
26	0	0	0	0
27	0	0	0	0
28	0	2	0	2
29	0	0	0	0
30	0	2	0	0
31	0	0	0	0
32	0	0	0	0
33	2	0	0	0
34	0	0	0	0
35	0	0	2	0
36	2	0	2	0
37	2	0	2	0
38	0	0	2	0
39	2	0	0	0
40	2	0	2	0
Total	34	22	42	20

The mathematical reasoning ability can be measured as follow:

Criteria	Category
$0 \leq Score \leq 21$	Not undertand
$22 \leq Score \leq 43$	Less-understand
$44 \leq Score \leq 65$	Understand-enaugh

| $66 \leq$ Score ≤ 87 | Understand |
| $88 \leq$ Score ≤ 108 | Really understand |

**Sumber**: Modificated from Sumaryanta Estina Ekawati (2011)

These are the students' answers example of mathematical reasoning ability test:
Problem:
Two gardens A and B are circular. Arround of the garden will be planted of tree in every 2 meters. There are 88 trees and 77 trees of each garden.

    a.   Which garden diameter is shorter?
    b.   Please prove the shorter garden diameter!
    c.   If that garden diameter is shorter so the trees plated are 88 trees. Is that right?
    d.   What can you conclude from the trees amount?

Picture -1. Student's answer sheet
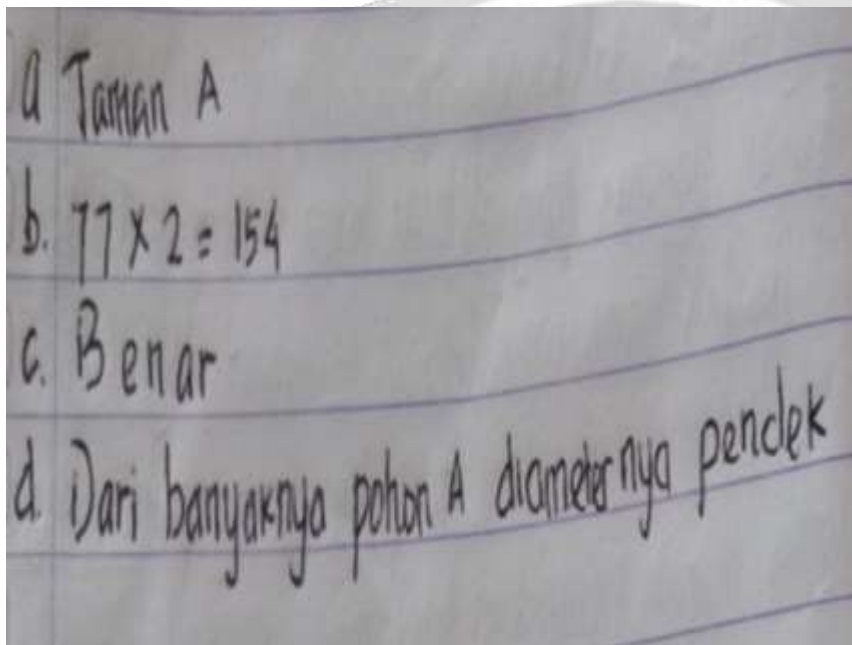
From the picture above, we can conclude that:
    ✓ Student can not suppose
    ✓ The student can not arrange the proof from the question to the mathematic model
    ✓ The student can not see the validity of an argument
    ✓ The student can conclude but the answe is wrong

4. RESEARCH DISCUSSION

Based on the analysis from the result gotten the students' achievement that's filled indicator of reasoning ability of mathematica lreasoning, namely:

    a.   For the first indicator, in table 2 scores indicator are 34 and in less-understand category
    b.   Fer the second indicator, in table 2 scores indicator are 22 and in less-understand category
    c.   In the third indicator, in the table 2 scores indicator are 42 and in less-understand category
    d.   In the foiurth indicator, in table 2 scores indicator are 20 and not understand.

From the result above can be conclude that students' reasoning ability are still low. It means that students' mathematical reasoning ability in solving the problem or classify the question is least that what expected as hope in

PP No 23, 2006. This is also the factor of students' mathematic basic ability that haven't mathematic reasoning, where Erdem, E., & Gürbüz, R (2015) that generally, most of students' mathematic reasoning is in middle level or low level and also related with Rohana'a statement (2015) that the improvement of students' mathematical reasoning ability that get RL and CL are classified in the middle. According to Piaget (Trianto, 2011) that students are in the the 11-15 years are in formal operation development. In these ages, the thing needed to consider is teenagers development aspect. Where the students can experience transition step from the usage of concrete operation into reasoning opertaion.

5. CONCLUSION

Reasoning is an activity or process, or thinking ability to take a conclusion or make a correct new statement. Every mathematic problem needs reasoning ability and to train the students' reasoning ability can be done by giving the question that's designed so the students are habitated to finish the questions.

Mathematical reasoning ability indicators are:
1) Submitting discussion
2) Arranging the proof and give the reason/proof to the truth solution
3) Checking the validity of an argument
4) Taking aconclusion of a statement

Based on the research result above, we can conclude that students' mathematical reasoning ability is still low; the average of first indicator is 34, the average of secon indicator is 22; the average of the third indicator is 42; and the average of the fourth indicator is 20.

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