Application of listening team learning model in improving middle school students’ mathematical reasoning ability

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Abstract. This study uses classroom action research conducted in Al-Mashum Middle School in Cianjur, West Java. It aims to determine the effectiveness of the Listening Team method toward students’ mathematical reasoning ability. The data is obtained by using a test instrument which gained in two cycles implementation, students interview and teachers observation. The result showed that; (a) The students and teachers activity in cycle 1 has increased, the average of students mathematical reasoning ability is 56.9, (b) In cycle 2 has increased with the value of 73.1. It shows that there is an improvement in students’ mathematical reasoning ability from cycle 1 to cycle to by the value of 16.2

1. Introduction
The Government of the Republic Indonesia has applied a standard on how students’ should be able to achieve certain abilities or skills in mathematics. This regulation was issued by the Indonesian Ministry of Education no. 22 in 2016 in order to help students have adequate mathematical ability. According to Ministry of Education, students are expected to be able to; (1) Understand mathematical concepts by being able to explain the connection between mathematical concepts and apply the algorithm in a flexible, accurate, efficient and precise way in problem solving, (2) able to use mathematical reasoning in a pattern and trait, manipulate mathematical concepts in a more general way, draw up evidence and explain their vision in mathematics, (3) problem solving skills that includes drafting mathematical concept and interpret the solution, (4) communicate their vision in symbols, table, diagram or any other media to unveil a problem, (5) appreciate mathematical concept in real life by having continuous curiosity, take a great interest in mathematics as well determination and confidence in problem solving [1]. Thus, students’ reasoning ability in mathematics is one of the important factors that every student should have. The reasoning skills will help students to overcome difficulties in learning or exploring the mathematics world, it is because they will not only memorize formulas, but also use their reasoning ability to solve mathematical problems.

Mention in Ministry of Education 2006 that mathematics material and mathematics reasoning are two things that cannot be separated, thus mathematics can only be understood by reasoning and reasoning can be learned by learning mathematics [2]. Then, it can be stated that mathematical reasoning ability is an ability to understand the complex relationship concept between two objects based on rules, theory or references that has been validated before [3]. Based on its meaning, mathematical reasoning is not an easy skill to be learned, it requires a great amount of determination from students.
In Indonesia, the lack of mathematical reasoning skills still can be found in many schools, one of them is Al-Ma’shum Middle School in Cianjur, West Java. Based on the observation result carried out in the school concealed that the students in grade VII C have low mathematics reasoning skills. It added that overall grade VII students in the school from VII A-C, the grade VII C students have the lowest mathematical reasoning skills. This is based on the grade VII C previous test result on the subject of Equations and linear inequalities of one variable and comparison. The result shows that grade VII C has the average score under the minimum allowed score criteria. The low score was caused by the students’ lack of problem solving skills, such as: mathematics manipulation and ability to draw good conclusions on mathematical problems that they are facing.

In order to enhance students’ ability to perform well in mathematical reasoning, it needs a good learning model such as group learning. Group learning is a learning model that actively involves all students into the learning process by using a cooperative learning model known as Listening Team. Definition of a team is a small group of people with complementary skills committed to a common purpose, and approach for which they hold themselves mutually accountable [4]. For teams to value creative contributions and promote effective problem solving, diversity needs careful management [5]. As team members participated in setting and prioritizing goals, they better understood the task requirements and were more motivated to achieve them [6]. Most commonly, teams are viewed as a three-stage system where they utilize resources (input), maintain internal processes (throughput) and produce specific products (output) [7]. Then, the importance of listening is the major component in language learning and teaching because in the classroom learners do more listening than speaking [8]. As mentioned by Helgesen that listening is an active, purposeful process of making sense of what we hear [9], it means that we should interpret the meaning from what we hear, therefore listening is an active skill. The listening team focuses on students’ active behavior and their potentials which shows students involvement toward given materials [10]. Learning process by using the Listening Team is started by informing the students about the subject generally, then teachers will divide them into groups to finish the task. Here, each group will have their own role [11]. The Listening Team learning process will be done through these steps; (1) divide the students into groups of four and give them roles as a group such as; one group to only ask questions, group to only act as agreeing group, disagreeing groups and sample setting groups. (2) Explain the materials only in face to face meetings. Once done, give them time to make comments on their tasks. (3) Ask each student to ask, agree, disagree or give examples based on the given discussions [12]. Based on the given background, in this article will discuss “The Application of Listening Team Learning Model in Improving Middle School Students’ Mathematical Reasoning Ability”.

2. Methods
This study uses the Research Action Class model to examine the learning process critically and collaboratively reflect on improving students’ learning process in class. This classroom action research works by deliberately placing together all the materials in all classes on a purpose to examine the learning activities in a real action.

This research activity is based on the Research-Action-Class model that is defined by the following term; Research - Activity to observe an object by using a methodological approach in order to obtain certain data or information that will be useful to improve certain important qualities for the researcher. Action - A deliberate taken activity to gain certain goals in a research process in the form of an activity cycle. Class - A group of students who are given the same materials from a teacher [13]. In a Research Action Class model, the area coverage classroom goals, methods and the practice itself are considered as a participation and collaborative research [14].

The research is carried out in grade VII C consist of 20 students of Al Ma’shum Madiah middle school, Cugenang district, Cianjur, West Java. The research is based on an initial interview with Al Ma’shum Mardiah mathematics teachers that shows some of their grade VII students have low mathematical reasoning skills.
3. Result and Discussion

3.1 Cycle 1

Based on the analysis of observation towards teachers and students activity, it can be concluded that the student’s activity has increased in each cycle. Overall, the average percentage of teachers and students activity in each action cycle 1 can be seen below.

**Table 1. The Percentage of Teacher and Student Activity in Cycle 1**

|                     | Action 1 | Action 2 | Action 3 |
|---------------------|----------|----------|----------|
| Teachers’ Activity (%) | 66.67    | 75.00    | 89.58    |
| Students’ Activity (%)  | 65.00    | 72.50    | 87.50    |

The result shows that the teacher activity continues to increase where their activity percentage in action 1 is 66.67%, then it is increased in action 2 to 75% as well as to be 89.58% in action 3. Meanwhile, the students’ activity is also increasing from 65% in action 1 to 72.5% in action 2 and the last 87.5% in action 3. This condition can be concluded that teachers and students activity in action 1 are significantly increased from action 1 to action 3. In the table below, you can see the students’ learning completeness that is shown below.

**Table 2. The students’ Learning Completeness in Cycle 1**

| Criteria                  | Number of Students | Classical (%) | Material Of Absorption (%) |
|---------------------------|--------------------|---------------|---------------------------|
| Students Who Score ≥ 70   | 8 People           | 40            | 55.40                     |
| Students Who Score < 70   | 12 People          |               |                           |

The Table 2 shown that there are 12 students who did not complete the first cycle of the test as a result of the difficulties they were having in calculation based questions. Here, they were not careful when finishing the tests and left some questions unanswered. Some of the students were also not present during the test cycle, and there is one student who was absent in the whole meetings in cycle 1. There are also 8 students that were able to finish all the tests in cycle 1, so the classical completion in cycle 1 is 40% and the material absorption is 55.40%. In the table below, the students’ mathematical reasoning in cycle 1 is presented.

**Table 3. The Students’ Mathematical Reasoning Ability in Cycle 1 Test**

| Understanding Ability Category | Number of Students | Criteria     |
|--------------------------------|--------------------|--------------|
| 90 ≤ A ≥ 100                   | 0                  | Very Good    |
| 75 ≤ B < 90                    | 2                  | Good         |
| 55 ≤ C < 75                    | 9                  | Sufficient   |
| 40 ≤ D < 55                    | 5                  | Low          |
| E < 40                         | 4                  | Very Low     |

Based from the above table, there were 4 students in the range of E < 40 with very low interpretation. Five students were in the range of 40 ≤ D < 55 with low interpretation. Nine students were in the range of 55 ≤ C < 75 with sufficient interpretation, whereas there are only two students who have good grades 75 ≤ B < 90 with good criteria. Drawn from the reasoning test in cycle 1, it can be concluded that on average the students’ mathematical reasoning ability in cycle 1 is 56.9 that is considered as a quite good criteria. To understand or to solve problem in mathematics, the primary is reasoning. It is important to note, that reasoning is the foundation of mathematics that if reasoning ability is not developed in the student then mathematics simply becomes a matter of following a set of procedures and mimicking examples without thought as to why they make sense [15].
3.2 Cycle 2
Based on the analysis of observation towards teachers and students activity, it can be concluded that the student’s activity has increased in each cycle. Overall, the average percentage of teachers and students activity in each action cycle 2 can be seen below.

Table 4. The Percentage of Teacher and Student Activity in Cycle 2

| Action | Teachers' Activity (%) | Students' Activity (%) |
|--------|------------------------|------------------------|
| 1      | 93.75                  | 92.50                  |
| 2      | 97.92                  | 95.00                  |
| 3      | 97.92                  | 95.00                  |

The result shows that the teacher activity continues to increase where their activity percentage in action 1 is 93.75%, then it is increased in action 2 to 97.92% as well as to be 97.92% in action 3. Meanwhile, the students' activity is also increasing from 92.5% in action 1 to 95% in action 2 and 95% in action 3. This condition can be concluded that teachers and students activity in action 1 are significantly increased from action 1 to action 3. In the table below, you can see the students’ learning completeness that is shown below.

Table 5. The students’ Learning Completeness in Cycle 2

| Criteria               | Number of Students | Classical (%) | Material Of Absorption (%) |
|------------------------|--------------------|---------------|----------------------------|
| Students Who Score ≥ 70| 14 People          | 65            | 73.5                       |
| Students Who Score < 70| 6 People           |               |                            |

The Table 5 shown that there are 6 students who did not complete the first cycle of the test as a result of the difficulties they were having in calculation based questions. Here, they were not careful when finishing the tests and left some questions unanswered. Some of the students were also not present during the test cycle, and there is one student who was absent in the whole meetings in cycle 1. There are also 14 students that were able to finish all the tests in cycle 1, so the classical completion in cycle 1 is 65% and the material absorption is 73.5%. In the table below, the students’ mathematical reasoning in cycle 1 is presented.

Table 6. The Students’ Mathematical Reasoning Ability in Cycle 2 Test

| Understanding Ability Category | Number of Students | Criteria    |
|--------------------------------|--------------------|-------------|
| 90 ≤ A ≥100                    | 1                  | Very Good   |
| 75 ≤ B < 90                    | 9                  | Good        |
| 55 ≤ C < 75                    | 8                  | Sufficient  |
| 40 ≤ D < 55                    | 2                  | Low         |
| E < 40                         | 0                  | Very Low    |

Based from the above table, there were not student in the range of E <40 with very low interpretation. Two students were in the range of 40 ≤ D <55 with low interpretation. Eight students were in the range of 55 ≤ C <75 with sufficient interpretation, nine students were in the range of 75 ≤ B <90 with good interpretation, where as there are only one student who have good grades 90 ≤ A ≤ 100 with very good criteria. Drawn from the reasoning test in cycle 2, it can be concluded that on average the students’ mathematical reasoning ability in cycle 2 is 73.1 that is considered as a good criteria.

3.3 Improvement of Cycle 1 to Cycle 2
The table below will show the increasing percentage of teachers’ and students’ activities from cycle 1 to cycle 2.
Table 7. The Increased Percentage of Teacher and Student Activities

| Action | Cycles 1 | Cycles 2 |
|--------|----------|----------|
| Teacher Activity (%) | 89.58 | 97.92 |
| Students Activities (%) | 87.50 | 95.00 |

Based on the above table, it can be seen that the increasing activities done by teachers in cycle 1 is 89.58% to 97.92% in cycle 2. Here, the value has increased to 8.34%. Meanwhile, the students’ activities also underwent a good improvement from cycle 1 with 87.50% to 95% in cycle 2. Here, the increasing value is 7.5%. The increasing activity of teachers and students can be further analyzed in the figure.

Figure 1. The Increased Average Value of Teacher and Student Activities

Based on the above figure, there is an increasing activity from teachers and students during the learning process from cycle 1 to cycle 2. This condition indicates that the mathematics learning process that uses the Listening Team Method is able to increase the teachers and students’ activity during the learning process. The research action based itself is an effort that should be done by teachers in order to improve the role and responsibility quality of their students during the learning process [16]. On average, the test result in each cycle is presented in the table below.

Table 8. The Mathematical Reasoning Ability of Students

| Evaluation Tests | The Average Ability of Mathematics Understanding | Criteria |
|------------------|--------------------------------------------------|----------|
| Cycle I          | 56.9                                             | Fairly Good |
| Cycle II         | 73.1                                             | Fairly Good |

Based on the above table, it can be concluded that the mathematical reasoning ability of students has increased in each cycle, it can be seen from the mathematical reasoning ability of students in cycle 1 of 56.9 and in cycle 2 of 73.1 with an improvement of 16.2. Thus, the Listening Team Method can be seen as a way to improve students' mathematical reasoning abilities based on the test results in cycle 1 and cycle 2. Here, the students' improvement on mathematical reasoning skills surely is a very important matter as mathematics learning provides opportunities for the development of reasoning ability, awareness of the usefulness of mathematics, fostering self-confidence, objective attitude and openness to face the ever-changing future [17]. The overall average percentage results for each cycle can be seen in the figure below.
Figure 2. The Students’ Increased Mathematical Reasoning Ability

The above figure indicates that the mathematics learning process that uses the Listening Team Method can improve students’ mathematical reasoning abilities. Here, the advantage of the Listening Team Method is that it does not require complicated communicative skills in order to be carried out. In many cases, students are able to involve themselves in the process with simple direction. This method also raises a positive response for students who have slow cognitive abilities, lack of ability, and lack of motivation, in which the Listening Team Method will train them to be able to think critically. They can also develop the ability to express ideas or develop the ability of students to test their own ideas as well as the understandings of receiving any given feedback [18]. So, in the end, this method is proven to be able to improve students’ mathematical reasoning skills.

4. Conclusion
The result of the study shows that the Listening Team Method can increase the teachers and students activity in each action in cycle 1 and cycle 2. This method also improves the student’s mathematical reasoning skills from cycle 1 to cycle 2. So, it can be concluded that the Listening Team can enhance student’s grade VII mathematical reasoning skills in Al-Ma’sum middle school, Cianjur, West Java.

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