EFFORTS TO IMPROVE UNDERSTANDING OF THE CONCEPT OF THE PHYTAGORAS THEOREM USING THE JIGSAW TYPE COOPERATIVE LEARNING MODEL IN CLASS VIII

Annisa Gustiani[1], Romelan Hamzah[2]
Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul Yogyakarta
[1]annisa1600006092@webmail.uad.ac.id, [2]romelan.uad@gmail.com

ABSTRACT

Lack of understanding of students' mathematical concepts in restating a concept, classifying objects according to specific properties according to the concept, giving examples and not examples of a concept, presenting concepts in various forms of mathematical representation, developing the necessary and sufficient conditions of a concept, and applying the concept or logarithm of problem-solving is a problem that is often encountered in students. This study aims to improve the understanding of the concept of the Pythagorean theorem of class VIII D even semester in SMP Negeri 1 Pleret, Bantul Regency. This type of research is Classroom Action Research (CAR). The research setting was class VIII D in the even semester of SMP Negeri 1 Pleret, Bantul Regency in the academic year 2019/2020, with 31 students. Data collection methods: observation, tests, interviews, and field notes. Research instruments: observation sheets, Pythagorean concept understanding test questions, interview guidelines, and field notes. The test instrument used was the content validity test. Data analysis using descriptive qualitative. The results showed that learning mathematics using the Jigsaw cooperative learning model could improve students' understanding of concepts. The average percentage of understanding concepts can show this: (1) the average percentage of understanding of concepts based on observations in the first cycle was 87.50% with moderate criteria, then increased cycle II to 93.75% high category. (2) the average percentage of concept understanding based on concept understanding tests in the first cycle was 59.34%, and then it increased in cycle II to 74.13%. The results of interviews with students showed that students enjoyed learning using the Jigsaw cooperative learning model.

Keywords: improvement, understanding of concepts, Jigsaw

INTRODUCTION

Education is an effort to develop an individual, such as developing knowledge, skills, insights, and talents. Students need this ability so they can learn mathematics well. However, the quality of education is questioned if the educational outcomes have not reached the level expected. The main problem with the quality of education lies in the problem of educational processing. Furthermore, the smooth processing of education is supported by an education component consisting of students, education staff, curriculum, learning facilities, and even the surrounding community. How much support is given is very dependent on the quality and cooperation, and mobility that leads to the achievement of goals (Umar and Sulo, 2015: 232).

Mathematics is a field of study that has an important role in the world of education. Technology and information in this world are also inseparable from mathematics. However, until now, mathematics is still considered a very difficult, boring field of study, to the point that mathematics is not so important in students' assumptions. This assumption may not be excessive for those who know it; this is because mathematics has an abstract nature that also requires a good understanding of concepts to understand new concepts to understand previous concepts.

Menko Eco (2018: 24), Learning concepts that have recently developed have focused on active, cognitive, and constructive processes in meaningful learning. Students are considered to construct their meaning in learning activities based on their previous knowledge, cognitive activity, and metacognitive students. In this case, the teacher needs to instill adequate concepts in students.

According to Permendiknas No. 22/2006 (Depdiknas, 2006: 346), one of the goals of mathematics in secondary education is to understand mathematical concepts, explain inter-concept interrelations and apply concepts algorithms flexibly, accurately, efficiently, and precisely in solving the problem. According to Sierpinska, Hiebert, & Lefevre (in Vita, 2017: 84), understanding mathematical concepts can also be seen as a process of building meaning towards a mathematical object and building relationships between existing knowledge new knowledge relating to a mathematical object.

Based on the results of the interview on Wednesday, September 11, 2019, with Mrs. Kisyanti, S.Pd as a mathematics subject teacher at SMP Negeri 1 Pleret in class VIII D students, it was found that the teacher said that the students' ability in understanding concepts was lacking, this can be seen lack of level of understanding of students' concepts in terms of 1) Restate the concept of 53.23%, 2) Classify objects according to specific properties (according to the concept) of 29.03%, 3) Give an example and not an example of a concept of 51, 61%, 4) Presenting concepts from various forms of mathematical representation of 30.65%, 5) Developing the requirements or sufficient requirements of a concept of 45.16%, 6) Applying the concept or logarithm of problem-solving by 12.90%. These data show that the level of understanding of students' concepts in learning mathematics is still low.

Based on the results of interviews and observations on Wednesday, September 18, 2019, in class VIII D, mathematics learning shows that learning is still centered on the teacher, students are bored and pay less attention to learning, students assume that mathematics is complicated because the material taught is difficult, but there are also which says that mathematics is not so tricky, in solving problems given by the teacher students still seem to memorize formulas or answers so that students do not know how to solve problems given by the teacher, students are still busy playing alone with activities that he likes such as telling stories / chatting with friends, students are not brave enough to express opinions, questions about material that are not yet understood, and in refuting the opinions of friends.

Sri (in Ratih, 2015: 3) argues that the meaning of understanding mathematical concepts is to explain the interrelationships of concepts and apply concepts or algorithms flexibly, accurately, efficiently, and precisely in problem-solving. The reason that makes students' understanding of mathematical concepts is not acceptable is the lack of students' willingness to develop and build their concepts. Also, learning in a class that is only centered on the teacher can affect students' understanding of mathematical concepts. Students should play an active role in discovering the concepts being studied. Students only receive unidirectional information from the teacher. Often students are not able to solve problems that are different from the examples given by the teacher.

Therefore, to foster the ability to understand concepts in learning, teachers should seek learning models that can provide opportunities and encourage students to practice the ability to understand students' mathematical concepts. Furthermore, according to Suherman (2001: 217), cooperative learning in mathematics will improve students' positive attitudes toward mathematics. So. for this purpose, it can be done with a cooperative learning model. According to Roger et al. (in Miftahul, 2017: 29): states that cooperative learning is an organized group learning activity by one principle that learning must be based on socially changing information among groups of learners in which each learner is responsible for his learning and encouraged to improve the learning of other members.

In this cooperative learning, there are various types, a learning model that can be used in mathematics learning. By the problems above is a Jigsaw cooperative learning model. According to Slavin (2005: 237), the Jigsaw cooperative learning model is a learning model where students work in heterogeneous teams. In the Jigsaw type cooperative learning model, there are origin groups and expert groups. Researchers are interested in applying the Jigsaw type cooperative learning model because the Jigsaw type cooperative learning model is a cooperative learning model where students are placed into 4-6 people called home groups. Then the original group is further divided into expert groups. Expert groups from each origin group discuss their expertise, and then the expert group returns to the original group to exchange information (Suyatno, in Fransisca Siti Sudaryati, 2012: 2).

According to Silberman (2001: 160), divide the jigsaw procedure/stage as follows: (1) Select learning material divided into parts. A section can be abbreviated like a sentence or several pages; (2)

Counting the number of study sections and the number of students in an appropriate way, dividing different tasks into different groups, then asked to read, discuss, and study the material assigned to them; (3) After completion, a jigsaw group is formed. Each group has a representative from each group in the class so that they will group students with the same problem; (4) The expert group members then teach the material learned in the Jigsaw group to other friends in the group, and (5) Students are reassembled into large classes to make comments and leave questions to ensure proper understanding for students.

Based on the background of the problem that the researchers have described above, the researcher formulates the problem is Does the use of Jigsaw type cooperative learning models with the subject of the Pythagorean theorem can improve understanding of mathematics learning concepts in eighth-grade students of SMP Negeri 1 Pleret 2019/2020 Academic Year? The objectives to be achieved in this study are to find out that using the Jigsaw cooperative learning model can improve the understanding of mathematics learning concepts with the subject of the Pythagorean Theorem on VIII grade students of SMP Negeri 1 Pleret 2019/2020 Academic Year.

METHODS

The type of research used is Classroom Action Research or Classroom Action Research (CAR), aiming to improve learning quality. "Classroom action research is an examination of learning activities in the form of an action, which is deliberately raised and occurs in a class simultaneously." (Suharsimi Arikunto, 2014: 3). This action research is carried out in the form of cycles twice or until the fulfillment of the objectives to be achieved is achieved. According to Suharsimi (2014: 17-19), the steps as in the chart above are as follows: 1) Stage 1: planning, 2) Stage 2: Implementing actions, 3) Stage 3: Observation, 4) Stage 4: Reflection or reflection. The research procedure was carried out in two cycles, namely:

a. Cycle I
    1. Planning. Planning is done so that the research goes as expected. The steps to be taken at this stage are determining the subject matter. Namely, the Pythagorean theorem material, making lesson plans (RPP), developing learning scenarios by the prepared lesson plans, preparing and preparing worksheets, preparing teaching materials to be worked on in groups, prepare evaluation tools, prepare equipment needed when teaching, compile and prepare observation sheets, interview guides, and field notes, and prepare tools to document research such as mobile phones.
    2. Implementation of actions. Researchers carry out learning by first explaining the learning model that will be applied during the learning process with the suitability of lesson plans that have been made.
    3. Observations. The observation phase is carried out simultaneously as the learning process occurs, directed at the points in the observation sheet and interview guidelines. The remittance made is students' observation in solving a problem, used to determine the Pythagorean Theorem concept during the learning process by applying the Jigsaw type cooperative learning model.
    4. Reflection. Reflection is the final stage in each cycle that aims to evaluate the research results in cycle I. The researcher, together with the mathematics subject teacher, makes reflections or actions in cycle I.

b. Cycle II

    The stages in cycle II follow the stages of work in cycle I. In this case, the action plan in cycle II is prepared based on reflection or evaluation in cycle I. The researcher analyzes the data on implementing the learning process and learning outcomes in cycle I in student quiz values about understanding concepts Phytagoras theorem material by applying Jigsaw type cooperative learning models. If the research objectives have not been achieved, action will be formulated so that the learning process in cycle II will be even better. If there is an increase in understanding the Pythagoras theorem concept in students, the learning activities stop in the second cycle. However, if there is no increase in understanding of the concept of the Pythagorean theorem in students from the results of

the average cycle I and cycle II as well as from the evaluation of cycle I and cycle II, it will be followed up to determine whether or not research in cycle III.

Data collection techniques used were observation, concept understanding tests, interviews, and field notes. The instruments used were observation sheets, Pythagorean concept comprehension test questions, interview guidelines, and field notes. The instrument test used was a content validity test. Analysis of the data used is descriptive qualitative.

Data analysis was performed by data sources obtained, such as observations, interviews, documentation, field notes, and tests. In short, the process of data analysis refers to the model of Miles and Huberman. These include (1) data reduction, (2) data, (3) inference. The analysis of the data is as follows:

The results of student observations in learning mathematics using the Jigsaw type cooperative learning model were analyzed descriptively to provide an overview of learning activities by applying the Jigsaw type cooperative learning model. The answer "yes" is given a score of 1, and the answer "no" is given a score of 0. How to calculate the percentage score as follows:

$$\bar{x} = \frac{a}{b}\, x\, 100\%$$

Information:
$\bar{x}$: percentage of observation scores per meeting
a: total score obtained at each meeting
b: the maximum number of scores per meeting
Next is calculated the average percentage of observation scores per cycle and then categorized according to the qualifications of the percentage of observations as follows:

Table 1. Qualification Result Percentage Observation Score

Range of scores	Criteria
$66{,}68 \leq \bar{x} \leq 100$	High
$33{,}34 \leq \bar{x} \leq 66{,}67$	Is
$0 \leq \bar{x} \leq 33{,}34$	Low

(Suharsimi Arikunto & Cepi Safruddin A.J, dalam Isti H.K, 2011: 36)

The first cycle and second cycle test results reflect the extent of students' understanding of the concept. The data collected will be analyzed with descriptive statistics to solve the problem of understanding the level of concepts using the following formula:

$$P = \frac{JS}{JM}\, x\, 100\%$$

Information:
P: Percentage score of students' correct answers
JS: The number of correct answer scores for each student's conceptual understanding ability
JM: The maximum number of scores for concept comprehension.

The percentage of scores obtained are then qualified to determine how high students understand mathematical concepts. The following table qualifies the results of the percentage analysis score:

Table 2. Qualification Results Percentage of Students Understanding Concepts

No	Percentage	Understanding Level
1	$81\% \leq P \leq 100\%$	Very good
2	$61\% \leq P \leq 81\%$	Good
3	$41\% \leq P \leq 61\%$	Enough
4	$21\% \leq P \leq 41\%$	Less
5	$< 21\%$	Very Less

RESULTS AND DISCUSSION

a. Cycle I

1. Planning. At the planning stage, the researcher prepares several things, namely compiling a learning tool consisting of a Learning Implementation Plan (RPP) and the Student Worksheet (LKPD), as well as the Written Test Cycle I questions, compiling and preparing a research instrument consisting of an observation sheet, questions Phytagoras concept understanding test questions, and interview guidelines, group divisions are based on student grades at the time of previous observation and prepare documentation tools.
2. Actions
    a. The first meeting. In the initial activity of learning, the teacher starts learning by saying greetings and praying. Next, the teacher introduces himself and conveys the learning objectives. After that, the teacher asked students about a square and the area of a triangle. In the apperception, only a few students responded. In contrast, other students responded with a joke. Then the teacher explains that the material is related to the Pythagorean theorem material. In the core activity, the teacher explains the material proves the Pythagorean theorem, determines the length of the sides of the elbow triangle if the lengths of both sides are known, and determines whether a triangle is a right triangle or not (a type of triangle) and associates the material with other knowledge. Next, the teacher presents the steps of learning. Then in the first step, the formation of the original group or large group of students is asked to gather with the original group divided based on students' work at the time of previous observation. The origin group consists of 5 groups, where there is 1 group with seven members and four other groups with six people. After that, students are given LKPD to be discussed with their respective groups with the time given. Next, the homegroup divides the assignments to each group member to work on the questions. In the next activity, students are directed to gather with a group of experts to work on their chosen questions. After that, students return to the homegroup to explain the work results that have been discussed with the expert group. During the discussion, the teacher goes around and facilitates the learning process. After the group discussion is over, the teacher reinforces the material proving the Pythagorean theorem, determining the length of the sides of a right triangle if the lengths of both sides are known and determining whether a triangle is a right triangle or not (triangle type) and together concludes the material. LKPD was collected from teachers. Also, the teacher reflects and then conveys the material to be studied next.
    b. Second meeting. In the initial activity of learning, the teacher starts learning by saying greetings and praying. Next, the teacher conveys the learning objectives. After that, the teacher asked the students questions about the previous material. In the apperception, students were enthusiastic in answering it. Then the teacher outlines the material that determines the triple Pythagoras and determines the comparison of the sides of the isosceles right triangle. In the core activity, the teacher explains the material determines the triple Pythagoras, determines the comparison of the sides of the isosceles triangle isosceles. Next, the teacher presents the steps of learning as in the previous meeting. Then students are asked to gather with the original group as in the previous meeting as well. After that, students are given LKPD to be discussed with their respective groups with the time that has been given and share tasks with each member of the group to work on the questions. In the next activity, students are directed to gather with a group of experts to work on their chosen questions. After that, students return to the homegroup to explain the work results that have been discussed with the expert group. During the discussion, the teacher goes around and facilitates the learning process. After the group discussion is over, the teacher gives reinforcement about the material determining the triple Pythagoras, determining the comparison of the sides of the isosceles right triangle, and asking students to collect the LKPD. Then the teacher gives Quiz questions to students to work on individually to see students' ability to understand the concepts of the Pythagorean theorem

material. Next, the teacher asks students to collect Quizzes. Then jointly conclude the material determines the triple Pythagoras and determines the comparison of the sides of the isosceles triangle and the teacher, reflecting on and conveying the material to be studied next.

3. Observation I. Observation results showed that 87.50% of the learning steps were implemented well. The time of observation is when the learning process takes place, the instrument used is the student observation sheet. The results of the students' concept understanding ability test in the first cycle are as follows:

Table. 3. The Test Results of Students' Concept Understanding Ability in Cycle I

No	The observed aspect	Final Test Cycle I	
		%	Category
1	Restate a concept	71,77	Good
2	Classifying objects according to specific properties according to the concept	36,29	Less
3	Give examples and non-examples of concepts	61,29	Good
4	Present concepts from various forms of mathematical representation	67,34	Good
5	Developing necessary and sufficient conditions for a concept	60,48	Enough
6	Applying the concept or logarithm of problem-solving	58,87	Sufficient
Average Percentage of		**59,34**	**Sufficient**

(Source: Data Processing Results)

Based on the table above, it can be seen that students' understanding of the Pythagorean concept after learning has obtained the following percentages:

a. Restate a concept of 71.77% with either category. As many as 14 students answered correctly, 13 students answered incorrectly in indicators restating a Pythagorean Theorem concept. Four students had not been able to restate a Pythagorean theorem concept correctly.
b. Classifying objects according to specific properties according to the concept of 36.29% with fewer categories. In this indicator, as many as six students answered correctly, three students answered incorrectly, and 22 students were unable to classify objects according to specific properties according to the concept of the Pythagorean theorem.
c. Give an example and not an example of a concept of 61.29% with a good category. In this indicator, which is determining the example or not the example of the Pythagorean triple, as many as four students answered correctly, 23 students answered incorrectly, and four students could not answer correctly.
d. Presenting the concept of a form of mathematical representation of 67.34% with a good category. This indicator determines the types of triangles, including right triangles, acute and blunt, divided into two parts: 1) 4a as many as 22 students answer correctly, seven students answer incorrectly, and two students cannot answer correctly. 2) 4b as many as six students answered correctly, 19 students answered incorrectly, and six students could not answer correctly.
e. Developing the requirements and sufficient requirements of a concept of 60.48% with enough categories. In this indicator proving the triangle's sides' length, whether included in the triple Pythagoras or not, as many as two students answered correctly, 23 students answered less correctly. Six students could not answer correctly.
f. Applying the concept or logarithm of problem-solving by 58.87% with enough categories. In this indicator that solves problems in daily life, as many as six students answered correctly, 21 students answered incorrectly, and four students could not answer correctly.

4. Reflection. Based on the reflections that have been held by the researcher with the observer, the following things are obtained:
    a. Some students have not been able to pay attention when learning occurs because students chat with friends and feel bored.
    1. Students have not been fully involved during group discussions because they feel afraid if the answer is wrong and do not understand how to solve it.
    2. Most students have not been able to restate a concept because students do not understand the concept.
    3. Students have not been able to classify objects according to specific properties according to the concept because students are still confused.
    4. Students have not given examples and non-examples of concepts because students' solutions written by students are wrong.
    5. Most students have not presented mathematical representation because students are still wrong in describing the type of triangle.
    6. Students have not developed the necessary conditions and sufficient concept requirements because they do not understand the square and triangle area's prerequisites.
    7. Most students have not been able to apply the concept or logarithm of problem-solving because they are still confused and do not understand the Pythagorean theorem formula.

b. Cycle II
    1. Planning. In the planning stage, the researcher prepared several things, namely compiling the Learning Implementation Plan (RPP), compiling the Student Worksheet (LKPD), compiling the students' concept understanding cycle II, compiling, and preparing observation sheets for students regarding the implementation of learning, and interview guidelines. The observation sheet for learning outreach and interview guidelines is the same as planning in cycle I and making improvements based on cycle I reflection.
    2. Actions
        a. The first meeting. In the initial activity of learning, the teacher starts learning by saying greetings and praying. Next, the teacher conveys the learning objectives. After that, the teacher asked the students questions about the previous material. In the apperception, students were enthusiastic in answering it. The teacher then outlines the material and compares the sides of a right triangle for all special angles, applying the Pythagorean theorem to flat shapes and space spaces. At the core activity, the teacher explains the material determines the comparison of the sides of a right triangle for all special angles, applying the Pythagorean theorem to the flat shape and the geometrical shape. Next, the teacher presents the steps of learning as in the previous meeting. Then students are asked to gather with the original group as in the previous meeting as well. After that, students are given LKPD to be discussed with their respective groups with the time that has been given and share tasks with each member of the group to work on the questions. In the next activity, students are directed to gather with a group of experts to work on their chosen questions. After that, students return to the homegroup to explain the work results that have been discussed with the expert group. During the discussion, the teacher goes around and facilitates the learning process. After the group discussion is over, the teacher gives reinforcement about the material determining the comparison of the sides of a right triangle for all special angles, applying the Pythagorean theorem to the flat shape and the building space concluding the material that has been studied. LKPD was collected from teachers. Also, the teacher reflects and then conveys the material to be studied next.
        b. Second meeting. In the initial activity of learning, the teacher starts learning by saying greetings and praying. Next, the teacher conveys the learning objectives. After that, the teacher asked the students questions about the previous material. In the apperception, students were enthusiastic in answering it. Then the teacher continues the material that has

not been delivered at the previous meeting. At the core activity, the teacher continues the material that has not been delivered at the previous meeting and continues the material applying the Pythagorean theorem in daily life using the Pythagorean theorem. Next, the teacher presents the steps of learning as in the previous meeting. Then students are asked to gather with the original group as in the previous meeting as well. After that, the students are asked to discuss the competency test in the LKS book, page 15, with their respective groups with the time given, and share the tasks for each group member to work on the questions. In the next activity, students are directed to gather with a group of experts to work on their chosen questions. After that, students return to the homegroup to explain the work results that have been discussed with the expert group. During the discussion, the teacher facilitates the learning process After the group discussion is over. The teacher explains the material applying the Pythagorean theorem in daily life using the Pythagorean theorem and asks students to collect the LKPD. Then the teacher gives Quiz questions to students to work on individually to see students' ability to understand the concepts of the material being learned. Next, the teacher asks students to collect Quizzes. Then together, conclude the material that has been learned, and the teacher reflects and conveys the material to be studied next.

c. Observation II. Observation results showed that 93.75% of the learning steps were implemented well. The time of observation is when the learning process takes place, the instrument used is the student observation sheet. The results of the students' concept understanding ability test in the first cycle are as follows:

Table 4. The Test Results of Students' Concept Understanding Ability in Cycle II

No	The observed aspect	Final Test Cycle I	
		%	Category
1	Restate a concept	96,77	Very Good
2	Classifying objects according to specific properties according to the concept	68,55	Good
3	Give examples and non-examples of concepts	68,95	Good
4	Present concepts from various forms of mathematical representation	74,19	Good
5	Developing necessary and sufficient conditions for a concept	63,71	Good
6	Applying the concept or logarithm of problem-solving	72,58	Good
Average Percentage of		**74,13**	**Good**

(Source: Data Processing Results)

Based on the table above, it can be seen that students' understanding of the Pythagorean concept after learning has obtained the following percentages:

a. Restate a concept of 96.77% with a very good category. In the questions that refer to this first indicator, students are asked to explain how the pattern formed from the length of the right sides and the length of the hypotenuse on the sides of the isosceles right triangle. As many as 30 students answered correctly, and one student could not answer correctly.

b. Classifying objects according to certain characteristics according to the concept of 68.55% with a good category. In questions that refer to this indicator, students are asked to solve story questions, which are then solved according to the concept; 10 students answer correctly, 17 students answer incorrectly, and four students cannot answer them correctly.

c. Give an example and not an example of a concept of 68.95% with a good category. In the questions that refer to this indicator, students are asked to draw a triangle from a predetermined comparison. There are two parts to the questions: 1) 2a, as many as 20 students answered

correctly, five students answered incorrectly, and six students have not answered correctly. 2) 2b as many as 11 students answered correctly, 14 students answered incorrectly, and six students could not answer correctly.

d. Present the concept of the form of mathematical representation of 74.19% with either category. In the questions that refer to this indicator, students are asked to sketch questions about daily life. As many as 15 students answer correctly, 11 students answer incorrectly, and five students have not answered the questions correctly.

e. Developing the requirements and sufficient requirements for a concept of 63.71% with a good category. In the questions that refer to this indicator, students are asked to determine a rectangle area by knowing one side and angle. Many as 29 students answered incorrectly and two students have not been able to answer correctly.

f. Apply the concept or logarithm of problem-solving by 72.58% with either category. In this indicator, the problems related to daily life are calculating kite laying height. As many as 13 students answered correctly, 15 students answered incorrectly, and three students could not answer correctly.

3. Reflection. Based on the reflection held between the observer and the researcher, the following matters are obtained:

a. Student attention to ongoing learning is done well. Students have started to pay attention to the teacher and their friends while explaining.

1. Student involvement in learning is done well. Students have started to involve friends in discussions, and some fewer students engage in behavior outside of the KBM. However, there are still students in the original group and expert groups who did not participate in the discussion.
2. Students can restate a concept of the Pythagorean theorem. This can be seen when the teacher asks questions with students.
3. Students can classify objects according to certain properties according to the concept. This can be seen when the teacher asks questions with students.
4. Students can give examples and not examples of concepts. It is seen that students can already distinguish triangles on the Pythagorean theorem.
5. Students can present concepts from mathematical representation forms. It is seen that students can already sketch a problem.
6. Students can develop the necessary conditions and sufficient requirements of a concept because they already understand the Pythagorean theorem's prerequisites.
7. Students can apply concepts or logarithms of problem-solving.

From the above reflection results, this research has met the indicators of success. This research is considered sufficient so that the Jigsaw type of cooperative learning stops in cycle II. So, it can be concluded that learning in cycle II has achieved success both in terms of the process and results.

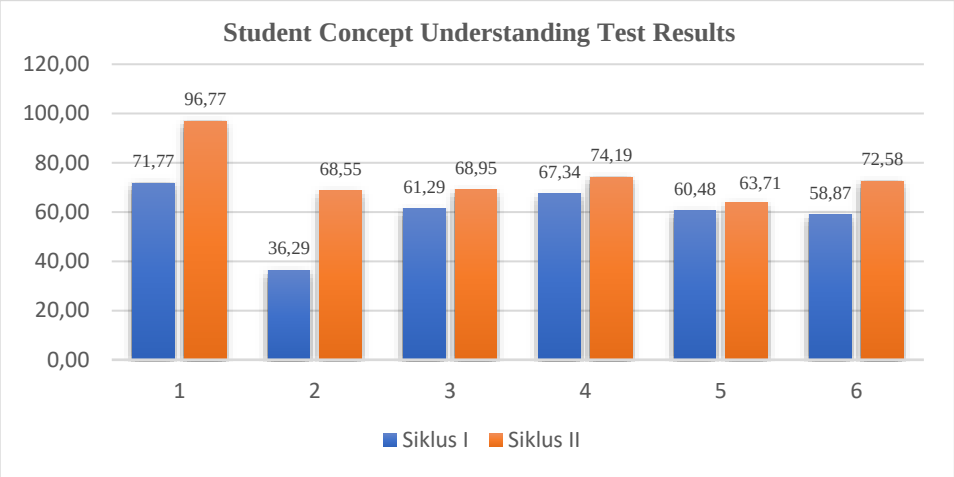
Thus the results of research in the first cycle and second cycle. The results of the study showed that students of class VIII D of SMP Negeri 1 Pleret, Bantul Regency, in the academic year 2019/2020, improved their ability to understand the concept of the Pythagorean theorem after being given an action in the form of mathematics learning using a Jigsaw cooperative learning model. Increased understanding of the Pythagorean theorem concepts from cycle I and cycle II can be seen in Table 9.

Table 5. Improving Students' Concept Understanding Ability

No	The observed aspect	Final Test Cycle I		Final Test Cycle II		Info
		%	Category	%	Category	
1	Restate a concept	71,77	Good	96,77	Very Good	Increase
2	Classifying objects according to certain properties according to the concept	36,29	Less	68,55	Good	Increase

3	Give examples and non-examples of concepts	61,29	Good	68,95	Good	Increase
4	Present concepts from various forms of mathematical representation	67,34	Good	74,19	Good	Increase
5	Developing necessary and sufficient conditions for a concept	60,48	Enough	63,71	Good	Increase
6	Applying the concept or logarithm of problem-solving	58,87	Sufficient	72,58	Good	Increase
Average Percentage of		**59,34**	**Sufficient**	**74,13**	**Good**	**Increase**

(Source: Data Processing Results)



(Source: Data Processing Results)

Figure I. Percentage Diagram of Each Indicator Understanding Student Concepts in Cycle I and Cycle II

Information:
1: Restate a concept
2: Classify objects according to certain properties according to the concept
3: Give examples and not examples of concepts
4: Present concepts from various forms of mathematical representation
5: Develop the necessary conditions and sufficient conditions of a concept
6: Apply the concept or logarithm of problem-solving

Based on Table 9 and Figure I above, there is an increase in students' understanding of concepts in the first cycle with an average of 59.34%, while in the second cycle is increased to 74.13%.

Based on the analysis of students ' understanding of concepts and the results of observations of the implementation of learning in the cycle, I can be told that teaching and learning activities in cycle II are by the expected goals and students' understanding of concepts in mathematics learning using Jigsaw type cooperative learning models have met the indicators of success that is more of or equal to 61% in the excellent category or $P \geq 60\%$.

In this study, in addition to using observational data and students' understanding of concept tests, researchers used data in interviews conducted with students. This can be seen from the results of interviews with student representatives. Based on the results of the interview, the following results are obtained:

1. Positive responses from students to learning using the Jigsaw cooperative learning model.
2. Jigsaw type cooperative learning models can improve students' understanding of concepts in the learning process, supported by Erlambang (2017) research results.

Overall, it can be concluded that learning mathematics using a Jigsaw cooperative model can improve the understanding of the concept of the Pythagorean theorem of class VIII D of SMP Negeri 1 Pleret, Bantul Regency in the academic year 2019/2020. Thus the action hypothesis can be accepted.

CONCLUSION

Based on the results of the discussion, it can be concluded that the application of the Jigsaw cooperative learning model can improve the understanding of the concept of the Pythagorean theorem in class VIII D students of SMP Negeri 1 Pleret Bantul. This can be seen from the average percentage of conceptual understanding of each cycle, which is as follows:

1. The percentage of concept understanding based on observations in the first cycle was 87.50% with a high category, then increased to 93.70% with a high category in the second cycle.
2. The percentage of concept understanding based on concept understanding tests in the first cycle was 59.34% with enough category, then increased to 74.13% with a good category in the second cycle.

Based on the average percentage of students' understanding of the concepts above, students' understanding of mathematics learning concepts by applying the Jigsaw type cooperative learning model has met the success indicator, which is $P \geq 61\%$.

REFERENCES

Arikunto, Suharsimi, Suhardjono, and Supardi. (, 2014). Classroom action research. Jakarta: Earth Literacy.

Arikunto, Suharsimi. (, 2014). Classroom action research. Jakarta: Earth Literacy.

Arikunto, Suharsimi. (, 2014). Research Procedure: a practical approach, Fifteenth Matter. Jakarta: PT RINEKA COPYRIGHT.

Arikunto, Suharsimi., And Cepi Safrudding, A.J. (2014). Educational Program Evaluation: Practical, theoretical guidelines for students and practitioners of education. Second Edition. Fifth Matter. Jakarta: Earth Literacy.

Isrok'atun and Amelia Rosmala. (, 2018). Mathematical Learning Models. Jakarta: Earth Literacy.

Ministry of National Education. (, 2006). Permendiknas No. 22/2006 concerning Content Standards. Jakarta: Ministry of National Education.

Priansa, D.J. (2017). Development of Learning Strategies & Models, 1st Printing. Bandung: CV LITERATURE SETIA

Rusman. (, 2014). Learning Models: Developing Teacher Professionalism. Second Edition, Fifth Printing. Jakarta: Rajawali Press.

Silberman, M.L, 1996. Active Learning: 101 Active Learning Strategies, translation by Sarjuli, Ammar, A., Sutrisno, Arifin, Z.A. & Muqowin, 2002. Yogyakarta: Yappendis.

Slavin, Robert E. (2005). Cooperative Learning. Bandung: Nusa Media.

Sugiyono. (2017). Qualitative Research Methodology. Bandung: ALFABETA

_____. (2009), Statistics for Research, Fourteenth Printing, Bandung: ALFABETA.

Suherman, Erman, et al. (2003). Common Textbook (Revised Edition) Contemporary Mathematical Learning Strategies. Bandung: JICA.

Suyono., And Hariyanto., (2011), Learning and Learning: Basic Theory and Concepts, Second Printing, Bandung: PT Remaja Rosdakarya.

Warsono., And Hariyanto. (, 2014). Active Learning: Theory and Assessment. Third Matter. Bandung: PT Youth Rosdakarya.

Widoyoko, S. Eko Putro. (, 2018). Assessment of Learning Outcomes in Schools, third edition (revised edition). Yogyakarta: Student Library.