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INCREASING THE CAPACITY OF UNDERSTANDING CONCEPTS STATISTICS DATA ASSISTED BY STUDENT TEAM HEROIC LEADERSHIP STRATEGY

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ABSTRACT

The pattern of learning that is dominated by the teacher causes weak interaction between students so it can be a factor in limited understanding. This research is classroom action research that aims to describe the increase in students' conceptual understanding after the implementation of the student's team heroic learning (STHL) strategy. The subjects in this study were students of class VII A MTS Islamiyah, Wongsorejo. This research is Classroom action research carried out in two cycles. Data collection techniques used are interviews, Observation, Tests, and documentation. The collected data is analyzed using quantitative analysis techniques and qualitative analysis, presenting information, and drawing conclusions. The results showed that there was an increase in the percentage of student's conceptual understanding by 20.66% after the implementation of the learning strategy STHL. Which was the pre-cycle of classical completeness was 59.17% increased by 68, 17% in the first cycle and became increasing to 79.83% in the second cycle, this strategy, apart from able improving understanding abilities, can also foster a sense of leadership and responsibility if it is applied continuously.

Keywords: Understanding Concepts, Statistics Data, Student Team Heroic Leadership

1. Introduction

The human Resource Development of a country requires quality human beings (Zulkarnain & Budiman, 2019). One of the efforts in creating quality human beings is education. Education is a process that has been planned or deliberate to create a learning atmosphere and learning process that can facilitate students to develop all their potential.

Law on the National Education System No.20 of 2003, explains that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual strength, self-control, personality, intelligence, noble character, and skill needed by himself, society, nation, and state.

Indonesian education is divided into three main lines, namely formal, non-formal and informal. Formal education is a structured and tiered pathway consisting of basic education, secondary education, and higher education. One of the compulsory subjects at every level of formal education is mathematics (Mawaddah & Maryanti, 2016).

Mathematics as one of the compulsory subjects taught in formal educational institutions is an important part of efforts to improve the quality of education. Mathematics is one of the subjects that must be studied and applied at every level of educational institutions. According to (Gusmania & Wulandari, 2018) Mathematics is an abstract science that needs to be studied by every individual because mathematics plays an important role in the development of science and technology.

The purpose of mathematics in secondary education as stated in Permendiknas No. 22 of 2006 (BSNP, 2006) is that students can understand mathematical concepts, and interrelationships between concepts and apply concepts or algorithms flexibly, accurately, efficiently, and precisely to problem-solving. Based on these objectives, students must be able to understand the material well. Understanding the material is very important because it becomes the basis for learning mathematics. If students can understand the material well, then students can develop and apply the material they have learned.

Understanding concepts in learning mathematics is a very important ability and must be possessed by students. Concept understanding is an individual's ability to understand a certain concept. Students are said to understand the concept if they have been able to capture the meaning or meaning of a concept (Nahdi et al., 2018). From this opinion, a student is said to understand the concept if he can re-explain the material he has learned based on his own understanding so that learning will be more meaningful.

To achieve meaningful learning and be able to activate students to master the concepts of learning materials that can be applied in everyday life, the role of a teacher is needed in the learning process. Therefore, a teacher must be able to present learning that involves students directly.

However, in the situation that occurs in the field, almost all teachers when the learning process takes place are still applying conventional learning in which learning is teacher-centered and runs in one direction so that it does not involve students.

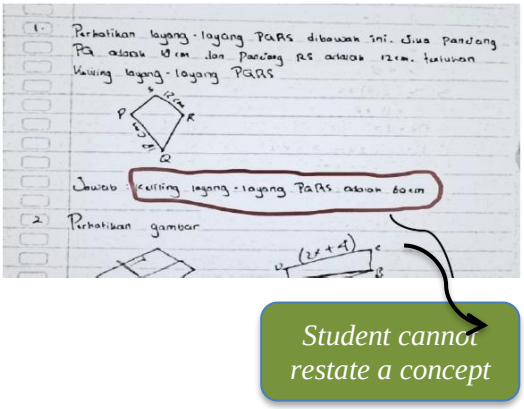

Figure 1. Student Work

Based on Figure 1, it can be seen that the student's understanding ability is still low and the information from the mathematics teacher class VII A MTS Islamiyah. It is known that when a teacher cannot involve students in the learning process, students are more likely to take notes than ask questions orally or have opinions about the material that has been conveyed. So that students seem more passive and their ability to understand concepts is still low or they have not been able to understand the material well, because after participating in learning students have not been able to re-explain the material.

Students have not been able to restate a concept like an example in Figure 1 which is the result of student work. after learning takes place and students have not been able to conclude the material they have learned in their language. And things like this cause the average value of assignments or test scores that he has is still below the KKM, which is 65. Based on the data obtained, students who reach the KKM out of 30 students are 9 students and those who have not reached the KKM are 21 students.

To be able to overcome such problems, the classroom teacher has taken several actions to improve the learning process by using several ways such as discussions, assignments, and repeating material that students find difficult. However, the application of some of these methods is not optimal so student learning outcomes are still low. Therefore, a renewal in learning is needed so that it can be more effective and learning objectives can be achieved. One of the learning models that can improve students' understanding of concepts is the Student Team Heroic Leadership (STHL) learning model.

According to (Harahap, R, 2018) in the student team students are placed in study groups consisting of 4 to 6 people who are a mixture according to the level of gender, intelligence, and ethnicity. Meanwhile, according to (Nasrulloh et al., 2021) Student Team Heroic Leadership is a learning strategy that provides opportunities for students to think, answer, help each other, and can foster a heroic leadership spirit.

The results of research by (Zulkarnain & Budiman, 2019) stated that the application of the Student Team Heroic Leadership (STHL) learning model can affect student learning outcomes. This result is reinforced by the results of (Fauziah, et. al., 2018) on junior high school students who stated that STHL can improve students' communication skills and self-regulated learning. Based on the background of the problem, the researcher is interested in discussing "*Increasing the Capacity of Understanding Concepts Statistics Data Assisted by Student Team Heroic Leadership Strategy*".

2. Research Methods

The research used in this research is classroom action research which consists of four stages, namely planning, action, observation, and reflection. The research design was carried out referring to the scheme proposed by Kemmis and Taggart. Schematically, the class action research model is as follows:

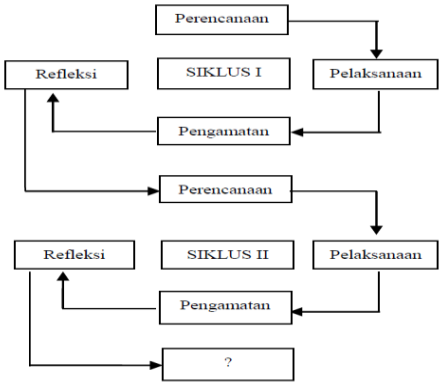

Figure 2. Kemmis and Taggart's research design (Nahdi et al., 2018)

The subjects in this study were 30 students of class VII A MTS Islamiyah Wongsorejo. Data collection techniques used are interviews, Observation, Tests, and documentation. The instrument made by the researcher was then validated by the expert, who then if the expert stated it was feasible with or without revision to be implemented, the researcher just started implementing it. Researchers used two experts. The data collected were analyzed using quantitative analysis techniques and qualitative analysis, presenting information, and drawing conclusions

3. Results and Discussion

This research was conducted in two cycles, each cycle consisting of three meetings with a time allocation of 2 x 45 minutes plus a pre-cycle. This study focuses on the learning process and aims to improve students' conceptual understanding skills in class VII A MTS Islamiyah Wongsorejo.

Before the research was carried out, the researcher first made an instrument and submitted it to the validator to test its feasibility. Validation results obtained 4 and declared valid and feasible to use. The next step in the activation process will be described below.

Pre-Cycle

In this pre-cycle, initial observations were made to determine the learning process both in class and outside the classroom. In this study, researchers collected data in the form of classroom observations and student work that already existed with the teacher before the Student Team Heroic Leadership (STHL) learning model was applied to students. The percentage of each indicator of pre-cycle student concept understanding can be seen in table 1.

Table 1. Percentage of Each Indicator of Understanding Pre-Cycle Concepts

No	Concept Understanding Indicator	Percentage
1	Restate the concepts that have been learned	44,17%
2	Clarifying objects based on whether or not the requirements are met to form the concept	62,5%
3	Applying concepts algorithmically	73,33%
4	Presenting concepts in various forms of mathematical representation	52,5%
5	Linking various forms of concepts	63,33%

Based on table 1 which shows that students' understanding is still low, it is necessary to take action to improve students' understanding of concepts, namely by applying the Student Team Heroic Leadership (STHL) learning model.

Cycle I

Analysis of the results of observation of student activities in the first cycle obtained a score of 52 from a maximum score of 60 resulting in a percentage of 86.6% with ***a fairly good category***. At the end of the learning cycle, a test is carried out. The average of each indicator of understanding in the first cycle test can be seen in table 2 below.

Table 2. Percentage of Each Indicator of Understanding the Concept of Cycle I

No	Concept Understanding Indicator	Percentage
1	Restate the concepts that have been learned	71,67%
2	Clarifying objects based on whether or not the requirements are met to form the concept	46,67%
3	Applying concepts algorithmically	81,67%
4	Presenting concepts in various forms of	59,17%

	mathematical representation	
5	Linking various forms of concepts	65,83%

Table 2 shows that the average percentage of students's understanding of the lowest concept is in the second indicator, namely Clarifying objects based on whether or not the requirements are met to form the concept. The average percentage of achievement in the second indicator is 46.67%. This happens because students are still carried away by the methods commonly used by classroom teachers, and students still cannot understand the concept because the worksheets they use are too difficult to understand.

Furthermore, for the improvement and improvement of students' conceptual understanding skills, by using the STHL model the research was continued to cycle II.

Cycle II

Based on the results of observations in cycle II, student activity increased more than in cycle I. In cycle II, the score obtained was 96.6%, so student activity towards learning activities with the STHL learning model was included in the ***very good category***. At the last meeting in cycle II students were given a test to determine the students' conceptual understanding ability. Based on the results of the test analysis in cycle II, the average percentage of each indicator of conceptual understanding can be seen in table 3 below.

Table 3. Percentage of Each Indicator of Understanding the Concept of Cycle 2

No	Concept Understanding Indicator	Percentage
1	Restate the concepts that have been learned	87,5%
2	Clarifying objects based on whether or not the requirements are met to form the concept	81,67%
3	Applying concepts algorithmically	85,83%
4	Presenting concepts in various forms of mathematical representation	78,33%
5	Linking various forms of concepts	81,67%

The percentage comparison of each indicator of student concept understanding from pre-cycle, cycle I, and cycle II can be seen in table 4 below

Table 4. Comparison of the percentage of each indicator of students' concept understanding

Indicator	Increased understanding of the concept	
	Pre cycle → cycle I	***Cycle I → Cycle II***
1	27,5%	15,83%
2	-15,83%	35%
3	8,34%	4,16%
4	6,67%	19,16%
5	2,5%	15,84%

Table 4 shows the increase in the average percentage of each indicator of students' conceptual understanding abilities, globally the average results of students' conceptual understanding can also be seen in the following diagram.

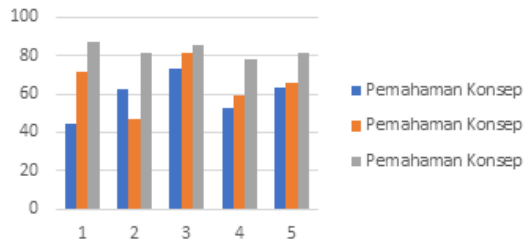

Figure 3. Graph of Student Concept Understanding Scores in Pre-Cycle, Cycle I, and Cycle II

Based on Figure 2 above, there are differences in ability between pre-cycle, cycle I and cycle II. The students's understanding ability of each indicator has increased and is described as follows.

1). *Restate the concepts that have been learned*

With the implementation of the Student Team Heroic Leadership (STHL) learning model, students' conceptual understanding abilities increased from pre-cycle, first-cycle, and second-cycle. Students can define and express a concept according to their sentences. This is supported by the opinion of (Maharani et al., 2013) who states that the indicator of restating a concept is the ability of students to re-express concepts in the material they have learned.

2. *Classify objects based on whether or not the requirements are met to form a concept*

This indicator is in following the opinion of (Augustine et al., 2020) which says the ability to classify objects according to certain properties according to the concept is the ability of students to group objects according to their types based on the properties contained in the material. This indicator decreased by 5.83% from pre-cycle to cycle I, but in cycle II it increased by 35%.

3. *Apply the concept algorithmically*

Handayani & Wardani (2015) stated that mastery of concepts in an algorithmic manner in mathematics is a form of application of the concept. Students' ability to apply concepts algorithmically has increased from pre-cycle, first cycle, and second cycle.

4. *Presenting concepts in various forms of mathematical representation*

In this fourth indicator, students experienced an increase from pre-cycle, cycle I, and cycle II. Novira, et.al. (2019) stated that the ability to understand mathematical concepts on indicators presenting concepts in various forms of mathematical representation is the ability of students to draw or make graphs, make mathematical expressions, and compose stories or written texts, while according to (Derfia et al., 2020) explaining presenting concepts in the form of mathematical representations is the ability to explain concepts sequentially in a systematic manner. For example, if students are given a problem, students can present the given problem in the form of tables, graphs, diagrams, sketches, mathematical models, or other methods.

5. *Linking various forms of concepts (internal and external mathematics)*

In research (Nuraeni, 2017) said that one of the concept learning that can be done is to present examples/facts related to the concept to be studied and allow students to find the concept themselves. This indicator has increased 2.5% from pre-cycle to cycle I and 15.84% from cycle I to cycle II with gains in pre-cycle 63.33% and cycle I by 65.83% to 81.67% in cycle II .

4. Conclusions

Student activities have increased during the learning process with the implementation of the Student Team Heroic Leadership strategy. The increase in the percentage of students' understanding of concepts by 20.66% after the implementation of the STHL learning strategy. Where the classical pre-cycle completeness was 59.17%, increased by 68.17% in the first cycle, and became 79.83% in the second cycle. In this strategy, in addition to increasing the ability to understand concepts, it can also foster a sense of leadership, responsibility, and develop potential by adding personal skills and awareness to encourage oneself and others if applied continuously.

5. References

Augustine, S. H., Hartono, Y., & Indaryanti, I. (2020). Pemahaman Konsep Siswa Kelas Vii Smp dalam Materi Garis dan Sudut Melalui Pendekatan Reciprocal Teaching. Lentera Sriwijaya : Jurnal Ilmiah Pendidikan Matematika, 2(2), 1–13. Https://Doi.Org/10.36706/Jls.V2i2.12167

Derfia, J., Gusmania, Y., & Hanggara, Y. (2020). Analisis Kemampuan Pemahaman Konsep Matematis Siswa Kelas X Ips 2 SMA N 17 Batam. Cahaya Pendidikan, 6(2), 128-138.

Fauziah, I., Maarif, S., & Pradipta, T. R. (N.D.). Peningkatan Kemampuan Komunikasi Matematis dan Self Regulated Learning Siswa Melalui Model Problem Based Learning (PBL). Jurnal Analisa, 4(2), 90-98.

Gusmania, Y., & Wulandari, T. (2018). Efektivitas Penggunaan Media Pembelajaran Berbasis Video Terhadap Pemahaman Konsep Matematis Siswa. Pythagoras: Jurnal Program Studi Pendidikan Matematika 7(1), 61-67.

Handayani, M. D., & Wardani, W. W. (2015). Upaya Meningkatkan Pemahaman Konsep Matematika Melalui Model Pembelajaran Problem Solving Pada Siswa Kelas VIII SMP N I Kasihan. Jurnal Derivat, 2(1), 68-75.

Harahap, R. (2018). Perbandingan Strategi Pembelajaran Tipe STAD (Student Teams Achievement) dan Strategi Pembelajaran Tipe TGT (Team-Games-Tournament) Terhadap Hasil Belajar PKN Materi Pokok Demokrasi Pancasila di Kelas X Sma Negeri 1 Batangonang. Jurnal Education and Development, 5(2), 1-6.

Maharani, L., Hartono, Y., & Hiltrimartin, C. (2013). Kemampuan Pemahaman Konsep Siswa Pada Pembelajaran Matematika Menggunakan Model Generative Learning di Kelas VIII SMP Negeri 6 Palembang. Jurnal Pendidikan Matematika, 7(2), 1-17.

Mawaddah, S., & Maryanti, R. (2016). Kemampuan Pemahaman Konsep Matematis Siswa SMP dalam Pembelajaran

Menggunakan Model Penemuan Terbimbing (Discovery Learning). EDU-MAT: Jurnal Pendidikan Matematika, 4(1). Https://Doi.Org/10.20527/Edumat.V4i1.2292

Nahdi, D. S., Yonanda, D. A., & Agustin, N. F. (2018). Upaya Meningkatkan Pemahaman Konsep Siswa Melalui Penerapan Metode Demonstrasi Pada Mata Pelajaran IPA. Jurnal Cakrawala Pendas, 4(2), 1-16.

Nasrulloh, M. F., Khotimah, K., Hidayatulloh, F., & Sukrianingsih, A. (2021). Strategi Student Team Heroic Leadership dengan Pendekatan Open Ended Ditinjau dari Motivasi dan Prestasi Belajar. Pythagoras: Jurnal Program Studi Pendidikan Matematika, 10(1), 57–65. Https://Doi.Org/10.33373/Pythagoras.V10i1.2984

Nuraeni, R. (2017). Perbandingan Kemampuan Pemahaman Matematis Siswa Antara yang Menggunakan Pembelajaran Inside-Outside-Circle dengan Konvensional. Jurnal Mosharafa, 6(3), 441-449.

Novira, R., Mulyono, Isnartoc. (2019). Kemampuan Representasi Matematis dalam Model Pembelajaran Somatic, Auditory, Visualization, Intellectually (SAVI). PRISMA, Vol 2, 287-292.

Zulkarnain, I., & Budiman, H. (2019). Pengaruh Pemahaman Konsep Terhadap Kemampuan Pemecahan Masalah Matematika. Research and Development Journal of Education, 6(1), 18-27.