**International Journal of Research in Mathematics Education**
Vol. 1 No. 1, June 2023, 23-34
Universitas Islam Negeri Prof. K.H. Saifuddin Zuhri Purwokerto
e-ISSN: 3025-7638, p-ISSN: 3025-1842, https://doi.org/10.24090/ijrme.v1i1.8540

# The Influence of the Student Team Achievement Divisions Model Assisted by GeoGebra Media on the Ability to Comprehend Mathematical Concepts

**Desya Adella Nur Afinda**[1]✉

[1]*Tadris Matematika, Universitas Islam Negeri Prof. K.H. Saifuddin Zuhri Purwokerto, Purwokerto, Indonesia*

✉ *email: 1917407051@mhs.uinsaizu.ac.id*

*Received June 7, 2023* *Accepted June 28, 2023* *Published July 5, 2023*

**Abstract:** This research was conducted based on the low ability to understand mathematical concepts of students in class VIII SMP Muhammadiyah 1 Purwokerto. One of the contributing factors is the use of inappropriate learning models. The solution that is considered capable of increasing the ability to understand mathematical concepts is to apply the STAD learning model assisted by Geogebra media in the learning process. This study aims to find out how the implementation of the application of the STAD model assisted by GeoGebra media and to find out whether there is an influence of the STAD model assisted by GeoGebra media on the ability to understand mathematical concepts in class VIII students of SMP Muhammadiyah 1 Purwokerto. The type of research used is quantitative with experimental research methods. The population in this study were all students of class VIII SMP Muhammadiyah 1 Purwokerto, totaling 118 students, with a sample of 38 students, 24 students from class VIII B and 14 students from class VIII D. The research variable was the STAD model assisted by GeoGebra media as an independent variable and the ability to understand mathematical concepts as the dependent variable. Methods of data collection are done by observation and tests. Data analysis used the T-test, with prerequisite tests for normality and homogeneity tests. The results showed that there was an influence between the STAD model assisted by GeoGebra media on students' ability to understand mathematical concepts.
**Keywords:** The ability to understand mathematical concepts; STAD models; GeoGebra media.

## A. Introduction

Education is a right for every citizen in Indonesia. Education plays an important role for human life and future. This is regulated in the 1945 Constitution article 31 which states that every citizen has the right to obtain basic education and the government seeks and organizes a national education system (UUD, 1945). According to Law No. 20 of 2003, national education has the goal of creating a learning atmosphere and learning process so that students actively develop their potential through spiritual strength, religion, self-control, personality, intelligence, noble character, and the skills needed by them. society, nation and state (Depdiknas, 2003)). To achieve these national education goals, it is necessary to have learning in various fields of study in every school in Indonesia, one of the fields of study that needs to be studied is mathematics.

Mathematics is one of the scientific disciplines that plays a major role and is useful for the development of science and solving problems in everyday life. Although not all of these problems are mathematical problems, mathematics plays an important role in solving

problems. In addition, mathematics is also one of the main subjects at every level of education (Kamarullah, 2017). Thus, mastery of mathematics is needed at every level of education, one of which is secondary education. Considering that learning mathematics is very important for education and survival, every student from an early to middle age should be able to master mathematics.

According to Permendiknas No. 22 of 2006, learning mathematics aims to enable students to have the ability to understand mathematical concepts, explain the interrelationships between concepts and apply concepts or algorithms in a flexible, accurate, efficient and precise way in solving problems (BSNP, 2006). In addition, the objectives of learning mathematics were also stated in the Ministry of National Education in 2003, which aims to make students have the ability to understand mathematical concepts, reasoning, problem solving, mathematical communication with tables, symbols, diagrams and others, and have an attitude of respect for the application of mathematics in everyday life (Depdiknas, 2003). From this explanation to achieve the goals of learning mathematics, students must master several abilities, one of which is the ability to understand mathematical concepts.

Conceptual understanding is a basic ability that is very important for students to have. The importance of understanding concepts is stated by Santrock in Hendriana's book (2021) which says that understanding concepts is an important factor in the learning process. In understanding concepts students not only memorize the concepts they have learned, but are also able to re-express them in their own language or other easy-to-understand forms, provide interpretation of data and are able to apply concepts in various problem solving (Sanjaya, 2009). The importance of students' ability to re-express concepts in their own language, provide interpretation of data, and apply concepts in problem solving is so that students can build a deeper and more meaningful understanding. This is in line with Winarno's opinion stated in Hendriana's book (2021), which says that the ability to understand concepts is an ability that must be considered in the learning process, especially to acquire meaningful mathematical knowledge.

Mathematical concepts according to Dahar (2011) are likened to developmental stones in thinking, meaning that students will experience difficulties in undergoing the learning process to a higher level if they do not understand the concept. Mathematical concepts have relationships with other mathematical concepts, so that if students do not understand the basic concepts, students will have difficulty understanding and solving more complex mathematical problems. By understanding the concepts in depth, students can understand the relationship between these concepts and relate them to the knowledge they already have. This will help students understand more complex material. Apart from that, understanding concepts also helps students to develop other mathematical abilities (Hendriana et al., 2021). Therefore in learning mathematics, conceptual understanding needs to be emphasized, students must understand the basic concepts well before proceeding to more complex concepts. With a good understanding of the concept will help students in solving mathematical problems and problems in everyday life.

According to NCTM (2000), students' understanding of mathematical concepts can be seen from students' ability to: (1) define concepts verbally and in writing; (2) make examples and non-examples; (3) representing concepts with symbols; (4) change the form of representation to other forms; (5) get to know the various meanings and interpretations of

concepts; (6) identify the nature of the concept and the terms that define the concept; (7) distinguish and compare concepts.

But in reality, the current understanding of mathematical concepts is still weak, in fact many students are still wrong when understanding mathematical concepts. This can be proven by the results of the 2018 Program for International Student Assessment (PISA) survey which stated that Indonesia ranks 72 out of 78 countries participating in the survey. The average score obtained by Indonesian students is 379, below the average score of students in other countries, namely 489 (Tohir, 2019). This shows that the ability to understand concepts in Indonesia is still relatively low.

Low understanding of mathematical concepts also occurs at SMP Muhammadiyah 1 Purwokerto. Based on the results of interviews and observations conducted by researchers during the implementation of Field Experience Practice in March 2023, it can be seen that there are still many students who only memorize the formulas that have been given by the teacher, so that when students are given questions that are different from examples, they will have difficulty solving them. this matter. Likewise, when students were given story questions, most of them had difficulty writing them back into mathematical language. Then when the teacher appoints students to re-explain the material they have learned, students cannot explain without looking from the notebook they have written. In addition, when the teacher gave students the opportunity to ask questions, none of the students asked, even though many of them did not understand the material.

There are several factors that cause the low ability of understanding students' mathematical concepts. Based on research conducted by Widyastuti (2015) one of the factors causing the low ability to understand students' mathematical concepts is the learning process which is still teacher-centered. In fact, in the learning process, teachers still use conventional models or lectures, which make the teacher the center of information, so that students tend to be passive in the learning process. To improve the ability to understand mathematical concepts, teachers must apply innovative learning models, so that students are more active during the learning process. One learning model that can facilitate students to be active is the Student Team Achievement Divisions (STAD) learning model.

The Student Team Achievement Divisions (STAD) model is a type of cooperative learning model developed by Robert Slavin and his friends at Hopkin University (Nurdyansyah & Fahyuni, 2016). In the Student Team Achievement Divisions (STAD) model, students will be divided into several heterogeneous groups based on their academic ability to discuss and work together to solve a problem. When studying with groups, students are encouraged to help explain to their friends, so that all members in each group can understand the concept being studied. Then after studying with groups, each student will be tested through quizzes or tests, at which time they are not allowed to work together.

Discussion or group learning, according to the syntax, is carried out to support the Student Team Achievement Divisions (STAD) model. In addition, to improve students' understanding of mathematical concepts, it is necessary to apply learning media in the learning process. According to Azhar (2011), learning media is media that can facilitate the delivery of material to students so that it can be well received and attract students' interest in learning. The use of interactive and interesting learning media will make students more motivated to learn

and actively participate in the learning process. One of the media that can make it easier for students to understand mathematical concepts is geogebra media.

Geogebra is one of the computer-based learning media that can support mathematics learning. Geogebra was created by Markus Hohenwarter in 2001, geogebra was developed to solve mathematical problems, especially regarding geometry and algebra or algebra (Priatna & Arsani, 2019). According to Syahbana (2016), geogebra is a computer program that is used as a tool for constructing and visualizing or demonstrating mathematical concepts interactively and dynamically. GeoGebra provides tools for constructing points, lines, plane shapes, geometric shapes and other geometries accompanied by geometric calculations. Through geogebra abstract mathematical concepts can be visualized so students can more easily understand mathematical concepts.

Based on the description above, this research is important to do, this is in line with the importance of the ability to understand mathematical concepts in learning mathematics. In order to facilitate and improve students' abilities to understand mathematical concepts, teachers must apply innovative learning models and media, so that students are more active during the learning process. One of the learning models and media that is considered suitable for facilitating and increasing the ability to understand concepts is the Student Team Achievement Divisions (STAD) learning model assisted by GeoGebra media. From this, the researcher wants to conduct a study related to the effect of the STAD learning model assisted by GeoGebra media on the ability to understand students' mathematical concepts which the researcher wrote in the title, "The Influence of the Student Team Achviement Divisions Model Assisted by Geogebra Media on the Ability to Comprehend Mathematical Concepts".

## B. Methods

The type of research used in this research is quantitative research. The research design used in this study is an experimental research design. Experimental research is research conducted to test hypotheses about a causal relationship between two or more variables. In experimental research, researchers carry out treatments by creating certain conditions by controlling or manipulating one or more independent variables to see their impact on the dependent variable (Kountur, 2009). In this study, the independent variable is "Student Team Achievement Divisions (STAD) Learning Model assisted by Geogebra Media" and the dependent variable is "Students' Ability to Understand Mathematical Concepts".

This research was conducted at SMP Muhammadiyah 1 Purwokerto which is located on Jl. Independence Pioneer No. 6, Penisian, Purwokerto Kulon, Kec. Purwokerto Sel., Banyumas Regency, Central Java. This research was carried out in the 2022/2023 academic year in semester II or even semester, to be exact in May 2023 until completion. The population in this study were all grade VIII students of SMP Muhammadiyah 1 Purwokerto for the 2022/2023 academic year, which consisted of 5 classes, namely classes VIII A, VIII B, VIII C, VIII D, and VIII E with a total of 118 students. The sample is part of the population to be studied. Sampling in this study used a convenience sampling technique, namely researchers chose samples because they were willing and available to be studied (Creswell, 2012). From five classes with a total of 118 students, the researchers took 38 students to serve as research

samples, 24 students came from class VIII B and 14 students came from class VIII D. Class VIII B became the experimental class and class VIII D became the control class.

In this study data collection was carried out by observing and testing. Observations were made to observe the implementation of the STAD learning model assisted by geogebra media, the instrument used to observe the implementation was an observation sheet carried out by two observers. A description test is a test whose questions require a description answer, where the answer is an opinion from the knowledge possessed by an individual (Asrul et al., 2014). In this study, the researcher collected data by means of a description test, namely the pretest and posttest. The pretest was given before the research was conducted while the posttest was given after the research was carried out.

Furthermore, the data analysis method, to find out the implementation of the STAD learning model assisted by geogebra media from the observation sheet, then the decision-making guidelines are as follows:

**Table 1. Guidelines for Making Implementation Decisions**

| Average Score | Description Implementation |
|---|---|
| $3{,}25 \leq x \leq 4{,}00$ | Very good |
| $2{,}50 \leq x < 3{,}25$ | Good |
| $1{,}75 \leq x < 2{,}50$ | Good Enough |
| $1{,}00 \leq x < 1{,}75$ | Not Good |

Then to find out whether or not there is an influence of the media-assisted STAD learning model on the ability to understand geogebra's mathematical concepts, it is done by testing the average difference in increasing the ability to understand mathematical concepts using the geogebra media-assisted STAD learning model. To test these differences using pretest and posttest data in the control class and experimental class which were then analyzed by the T test with a significance level of 0.05. The T test was carried out with the help of the SPSS application, before carrying out the T test the prerequisite tests that must be fulfilled, namely the normality test and homogeneity test. Test criteria in the T test, if the significance value (2-tailed) <0.05 then $H_0$ is rejected and $H_1$ is accepted. If the significance value (2-tailed) > 0.05 then $H_0$ is accepted and $H_1$ is rejected. The hypothesis is as follows:

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 \neq \mu_2$

## C. Results and Discussion

### 1. Data Analysis On The Implementation Of The STAD Learning Model Assisted By Geogebra Media

Based on the implementation data taken from the observation sheet given to the observers. Decision making for implementation data analysis follows in table 1. Following are the results of implementation observations filled in by the observer:

**Table 2. Implementation Observation Results**

| No. | Observer | Date of Observation | Score Total | Observer Score | Average Observer Score |
|---|---|---|---|---|---|
| 1 | Wiji Satrianingrum, S.Pd. | Tuesday, May 16 2023 | 40 | 3.33 | 3,42 |
| 2 | Sisfi Sulistiani, S.Pd. | Tuesday, May 16 2023 | 42 | 3.50 | |
| 3 | Wiji Satrianingrum, S.Pd. | Monday, 22 May 2023 | 45 | 3.75 | 3,84 |
| 4 | Sisfi Sulistiani, S.Pd. | Monday, 22 May 2023 | 47 | 3.92 | |
| Observation Score Results | | | | | 3,63 |

Based on table 2, it can be seen that the total average score obtained from the results of implementation observations by Wiji Satrianingrum, S.Pd. and Sisfi Sulistiani is 3.63. Based on the decision-making guidelines in table 1, the value of 3.63 is included in the "Very Good" category. Thus, it can be said that the implementation of the Geogebra-assisted Student Team Achievement Divisions (STAD) learning model in the experimental class is very good.

## 2. Data Analysis of the Influence of the Student Team Achievement Divisions (STAD) Learning Model Assisted by Geogebra Media on the Ability to Understand Mathematical Concepts

In the influence data analysis, the results from the pretest and posttest from the experimental class and the control class were used, along with the explanation:

### *a. Experimental Class and Control Class Pretest Data*

Pretest data on the ability to understand mathematical concepts in the experimental class and control class were obtained before the application of the Student Team Achievement Divisions (STAD) learning model assisted by GeoGebra media and conventional learning models. The results of the pretest data in the experimental class and control class are presented in the following table:

**Table 3. Pretest Value Data for Experiment Class and Control Class**

| No. | Experimental Class | *Pretest* | Control Class | *Pretest* |
|---|---|---|---|---|
| 1 | A H P | 64 | A H A | 75 |
| 2 | A W U | 46 | A A P | 71 |
| 3 | A N W | 43 | A A M | 71 |
| 4 | D D K | 71 | B K | 61 |
| 5 | D P | 75 | D A Z | 71 |
| 6 | D R A | 75 | D K S | 61 |
| 7 | E V P | 54 | E D T | 61 |
| 8 | F S M | 54 | E B H | 54 |
| 9 | F S M | 39 | F A R | 68 |
| 10 | J B A | 57 | M F K | 83 |
| 11 | K A D | 86 | M N A | 75 |
| 12 | K S S | 64 | N F | 43 |
| 13 | M M P | 86 | S P R | 50 |
| 14 | M F T | 79 | V D H | 43 |
| 15 | N D A | 75 | | |
| 16 | N A R | 82 | | |
| 17 | N K | 39 | | |
| 18 | P A R | 61 | | |
| 19 | R J P | 54 | | |
| 20 | R T W | 79 | | |

| | | | | |
|---|---|---|---|---|
| 21 | S D | 46 | | |
| 22 | S L | 43 | | |
| 23 | T S K | 79 | | |
| 24 | Z A P | 61 | | |
| | Amount | 1512 | Amount | 887 |
| | Average | 63 | Average | 63.35714 |

Based on table 3, it can be seen that the pretest score of the experimental class has the lowest score of 30 and the highest score of 86, with an average score of 63 out of 24 students working on it. Meanwhile, the control class had the lowest score of 43 and the highest score of 83, with an average score of 63,35 out of 14 students who worked on it. The difference in the mean scores of the experimental class and the control class was not much different, namely 0.35, which means that the initial abilities of the students from the two classes were the same. This can be proven further by testing the hypothesis of the pretest data. In this study, the hypothesis test used was the t-test with the prerequisite test being the normality test and homogeneity test.

Then the normality test, the normality test is carried out to find out whether the sample comes from a normally distributed population or not. In this study the normality test used the Kolmogorov Smirnov test with the SPSS version 25 application. The decision-making criterion in the test was that the Kolmogorov Smirnov test significance number Sig. ≥ 0.05 then the data is normally distributed and if the significance number is the Shapiro Wilk test Sig. <0.05 which means the data is not normally distributed (Sugiyono, 2015). The following are the results of the pretest value data normality test:

**Table 4. Pretest Normality Test Results**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| pretest | .131 | 38 | .097 | .945 | 38 | .063 |

a. Lilliefors Significance Correction

Based on table 4, it can be seen that the significance value in the pretest results is greater than 0.05, i.e. 0.063 > 0.05, meaning that $H_0$ is rejected and $H_1$ is accepted, so that it can be said that the pretest results data from the experimental class and the control class are normally distributed data..

After the data is tested for normality, it is followed by a homogeneity test, a homogeneity test is carried out to find out whether the samples come from populations that have the same variance. Homogeneity test can be done if the data group is normally distributed. The decision making criterion in the test is if the significance score for the test is homogeneous ≥ 0.05 which means the data is homogeneous and if the significance score for the test is homogeneous < 0.05 which means the data is not homogeneous (Nuryadi et al., 2017). In this study the homogeneity test was carried out using the SPSS version 25 application. Following are the results of the homogeneity test from the pretest value data:

**Table 5. Pretest Homogeneity Test Results**

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| hasil pretest | Based on Mean | 1.754 | 1 | 36 | .194 |
| | Based on Median | 1.731 | 1 | 36 | .197 |
| | Based on Median and with adjusted df | 1.731 | 1 | 35.485 | .197 |
| | Based on trimmed mean | 1.754 | 1 | 36 | .194 |

Based on table 5, it can be seen that the data based on the pretest results on the mean has a significance value of 0.194 which is more than 0.05. So that it can be said that the pretest result data is homogeneous data.

The T-test was carried out after it was found that the research data were normally distributed and homogeneous. To test the hypothesis in this study used the T test. In this study the T test was conducted to determine the students' initial ability to understand mathematical concepts. Following are the results of the t test using the SPSS version 25 application:

**Table 6. Pretest Data T Test Results**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference Lower | Upper |
| pretest | Equal variances assumed | 1.754 | .194 | -.074 | 36 | .942 | -.35714 | 4.84340 | -10.18001 | 9.46572 |
| | Equal variances not assumed | | | -.078 | 32.449 | .938 | -.35714 | 4.55689 | -9.63419 | 8.91991 |

Based on table 6, from the t-test that has been done it can be seen that the significance value obtained in the pretest data is 0.942. Significance value 0.942 > 0.05, then $H_0$ is accepted and $H_1$ is rejected, $H_0 : \mu_1 = \mu_2$, which means that the results of the values of the experimental class and the control class are not significantly different. Thus, it can be said that students' initial abilities regarding understanding mathematical concepts, both from the experimental class and the control class, have the same abilities. So that the geogebra-assisted STAD learning model can be applied to a class known as the experimental class, namely class VIII B and the conventional learning model is applied to the control class, namely class VIII D.

***b. Experimental Class and Control Class Posttest Data***

Posttest data on the ability to understand mathematical concepts in the experimental class and control class were obtained after the application of the Student Team Achievement Divisions (STAD) learning model assisted by GeoGebra media and conventional learning models. The results of the posttest data in the experimental class and control class are presented in the following table:

**Table 7. Posttest value data for experimental class and control class**

| No. | Experimental Class | *Postest* | Control Class | *Posttest* |
|---|---|---|---|---|
| 1 | A H P | 80 | A H A | 77 |
| 2 | A W U | 83 | A A P | 43 |
| 3 | A N W | 80 | A A M | 70 |
| 4 | D D K | 90 | B K | 47 |
| 5 | D P | 93 | D A Z | 67 |
| 6 | D R A | 90 | D K S | 77 |
| 7 | E V P | 77 | E D T | 93 |
| 8 | F S M | 80 | E B H | 80 |
| 9 | F S M | 90 | F A R | 60 |
| 10 | J B A | 60 | M F K | 67 |
| 11 | K A D | 93 | M N A | 67 |
| 12 | K S S | 97 | N F | 90 |
| 13 | M M P | 87 | S P R | 73 |
| 14 | M F T | 87 | V D H | 60 |
| 15 | N D A | 97 | | |
| 16 | N A R | 93 | | |
| 17 | N K | 93 | | |
| 18 | P A R | 50 | | |
| 19 | R J P | 83 | | |
| 20 | R T W | 70 | | |
| 21 | S D | 100 | | |
| 22 | S L | 73 | | |
| 23 | T S K | 70 | | |
| 24 | Z A P | 100 | | |
| | Amount | 2016 | Amount | 971 |
| | Average | 84 | Average | 69.3571 |

Based on table 7, it can be seen that the posttest scores of the two classes are different. The experimental class had the lowest score of 50 and the highest score of 100, with an average score of 84 out of 24 students working on it. Meanwhile, the control class had the lowest score of 43 and the highest score of 93, with an average score of 69.35 out of 14 students who worked on it. The difference in the average scores of the experimental class and the control class has a significant difference, which is 14.65, which means that the ability to understand mathematical concepts of the two classes is different after being given treatment, the experimental class has a higher average value than the control class. This can be proven further by testing the posttest data hypothesis. In this study, the hypothesis test used was the t-test with the prerequisite test being the normality test and homogeneity test.

Then the normality test, the normality test is carried out to find out whether the sample comes from a normally distributed population or not. In this study the normality test used the Kolmogorov Smirnov test with the SPSS version 25 application. The decision-making criterion in the test was that the Kolmogorov Smirnov test significance number Sig. ≥ 0.05 then the data is normally distributed and if the significance number is the Shapiro Wilk test Sig. <0.05 which means the data is not normally distributed (Sugiyono, 2015). The following are the results of the posttest value data normality test:

**Table 8. Posttest Normality Test Results**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| hasil_posttest | .121 | 38 | .177 | .947 | 38 | .070 |

a. Lilliefors Significance Correction

Based on table 8, it can be seen that the significance value in the posttest results is greater than 0.05, namely 0.07 > 0.05, meaning that $H_0$ is rejected and $H_1$ is accepted. So that it can be said that the posttest result data from the experimental class and the control class are normally distributed data.

After the data is tested for normality, it is followed by a homogeneity test, a homogeneity test is carried out to find out whether the samples come from populations that have the same variance. Homogeneity test can be done if the data group is normally distributed. The decision making criterion in the test is if the significance score for the test is homogeneous ≥ 0.05 which means the data is homogeneous and if the significance score for the test is homogeneous < 0.05 which means the data is not homogeneous. In this study the homogeneity test was carried out using the SPSS version 25 application. Following are the results of the homogeneity test from the posttest value data:

**Table 9. Posttest Homogeneity Test Results**

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| hasil posttest | Based on Mean | .089 | 1 | 36 | .768 |
| | Based on Median | .133 | 1 | 36 | .718 |
| | Based on Median and with adjusted df | .133 | 1 | 35.906 | .718 |
| | Based on trimmed mean | .104 | 1 | 36 | .749 |

Based on table 9, it can be seen that the posttest data based on the mean has a significance value of 0.768 which is more than 0.05. So that it can be said that the posttest result data is homogeneous data.

The t test was carried out after it was known that the existing research data were normally distributed and homogeneous. To test the hypothesis in this study used the T test. In this study the T test was conducted to determine whether the Student Team Achievement Divisions (STAD) learning model assisted by GeoGebra media has a significant effect on students' ability to understand mathematical concepts. Following are the results of the t test using the SPSS application:

**Table 10. Posttest Data T Test Results**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| posttest | Equal variances assumed | .089 | .768 | 3.302 | 36 | .002 | 14.64286 | 4.43436 | 5.64956 | 23.63615 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Equal variances not assumed | | | 3.198 | 24.737 | .004 | 14.64286 | 4.57938 | 5.20636 | 24.07935 |

Furthermore, based on table 10, from the t test that has been carried out, it can be seen that the significance value obtained in the posttest data is 0.002. A significance value of 0.002 <0.05 means $H_0$ is rejected and $H_1$ is accepted, $H_1 : \mu_1 \neq \mu_2$, which means that there are differences in the results of the experimental class using the STAD model assisted by Geogbra media and the control class using the conventional model. Then, if seen from table 4.7, it can be seen that the average value in the experimental class was 84 and the control class was 69.35. This means that the average value in the experimental class is higher than the control class.

From the same initial abilities in the experimental class and control class, after being given treatment, namely the experimental class which was treated using the geogebra-assisted STAD learning model and the control class which was treated using conventional learning models. It can be seen from the results of the posttest or the final results in both classes, namely the experimental class obtained better scores than the control class. Thus it can be said that there is an influence of the Student Team Achievement Divisions (STAD) model assisted by geogebra media on the ability to understand students' mathematical concepts in class VIII circle material at SMP Muhammadiyah 1 Purwokerto.

From the results of this study, it can be said that the Student Team Achievement Divisions (STAD) learning model assisted by Geogebra media can be a way to improve students' understanding of mathematical concepts. This is in line with the results of research conducted by Pitri Oktaviani, Nurhanurawati, and Coesamin (2013) which stated that the STAD type cooperative learning model had an effect on students' understanding of mathematical concepts and also the results of research conducted by Ramantia (2016) which stated that there was an effect of using geogebra on the ability to understand mathematical concepts.

## D. Conclusion

Based on the results of the research that has been done, on the results of observations made by Wiji Satrianingrum, S.Pd. and Sisfi Sulistiani achieved an average score of 3.63. Based on the decision-making guidelines, the value of 3.63 is included in the "Very Good" category, so it can be concluded that the implementation of the Student Team Achievement Divisions (STAD) learning model assisted by GeoGebra media in the experimental class is very good.

The application of the Student Team Achievement Divisions (STAD) model with assisted by geogebra media has an effect on the ability to understand mathematical concepts of class VIII students at SMP Muhammadiyah 1 Purwokerto. This can be proven from the results of hypothesis testing using the t-test, namely a significance value of 0.002 <0.05 is obtained, so $H_0$ is rejected and $H_1$ is accepted, which means that there are differences in the ability to understand students' mathematical concepts between the experimental class and the control class. This difference is then seen from the average value obtained by the experimental class that applies the STAD model assisted by geogebra media which is higher than the control class which applies the conventional model.

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