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Comparison of Student's Learning Outcomes in Mathematics Subjects Using STAD Type Cooperatives with Peer Tutors in Grade X of SMA PGRI Betung Kabupaten Banyuasin

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Abstract: The learning model used is still teacher-cantered, this makes students tend to be passive in following the learning process in class, so that student learning outcomes are relatively low. To overcome this, there are many learning models that can improve student learning outcomes and require students to be active. in participating in learning activities. One of the researchers tried to use the STAD Type Cooperative learning model and Peer Tutor. The aim of this research was to find out which was better. The learning outcomes of students using the STAD Type Cooperative compared to those using Peer Tutors in class X SMA PGRI Betung, Banyuasin Regency. The population of this study were all class X students of SMA PGRI Betung, Banyuasin Regency. The samples were taken from two classes, namely classes X1 and X3, using simple random sampling techniques. The method used in this research is the experimental method. The data collection technique that the researcher carried out was a test technique and to analyse the data, statistical analysis was carried out using the t test. The results of the data analysis, which are strengthened by the results of the evaluation test data analysis, prove that the learning outcomes achieved by students in mathematics subjects using STAD Type Cooperative are better than the learning outcomes achieved by students in mathematics subjects using Peer Tutors.

Keywords: Learning Outcomes, Peer Tutor, STAD Type Cooperative

A. Introduction

According to Kurniawati (2021), the aim of learning mathematics is the formation of reasoning abilities in students which is reflected through critical, logical, systematic thinking, and having an objective, honest, disciplined nature in solving problems both in the field of mathematics, other fields, and in everyday life. In the new educational paradigm, the goal of learning is not only to change student behavior, but to form professional character and mental attitudes that are oriented towards a global mindset. The focus of learning is on learning how to learn and not just on learning the substance of the subject (Guna et al., 2018). Constructivist learning allows problem-based learning to occur. With this problem-based learning scenario,

students will try to empower all their academic potential and strategies to solve problems individually or in groups (Noviati, 2020).

According to Yeni et al., (2022), an interesting innovation that accompanies this paradigm change is the discovery and implementation of innovative and constructive learning models, or more precisely, developing and exploring student's knowledge in a concrete and independent manner. Peer tutor model According to Wali et al., (2020) a peer tutor is one or several students who are appointed and assigned to help students who experience learning difficulties.

Peer Tutors can also make students feel less afraid to express opinions and not feel reluctant to ask questions about things they don't know. Because peer tutoring is carried out by a tutor, there are several benefits from tutoring activities (Munthe & Naibaho, 2019). There are times when the results are better for some children who have feelings of fear or reluctance towards their teachers. For tutors, tutoring work will have the effect of strengthening the concepts being discussed. By telling another child, it will be as if he is studying it and memorizing it again. For tutors, it is an opportunity to train yourself to hold responsibility in carrying out a task and practice patience. Strengthen relationships between fellow students thereby strengthening social feelings. Apart from the peer tutor learning model, there is also a cooperative learning model which is a group teaching strategy that involves students working collaboratively to achieve common goals. Cooperative learning consists of various types, including the STAD type cooperative (Puspitaningrum, 2020). According to Wulandari, (2022); Rizal et al., (2021), this cooperative type of STAD places greater emphasis on activities and interactions between students to motivate each other and help each other master the subject matter in order to achieve maximum achievement. The advantage of the STAD type is that there is cooperation within the group and determining the success of the group depends on individual success so that each group member cannot depend on other members.

One of the main problems in learning in formal education (schools) today is the low absorption capacity of students. This seems to be an even distribution of student learning outcomes which is still very worrying (Reichenbanh et al., 2019). This achievement is of course the result of learning conditions that are still conventional and do not touch the dimensions of the students themselves, namely how learning actually is learning to learn (Hartati et al., 2022). This can be seen from the learning outcomes obtained by students at PGRI Betung High School where researchers received information from one of the mathematics subject teachers at PGRI Betung High School Banyuasin Regency, saying that student learning outcomes still had not reached the minimum completeness criteria target (Prasetyo, 2013). Even though there is quite an encouraging improvement in the quality of education, the learning and understanding of high school students (in several subject materials including mathematics) shows less than satisfactory results. Learning in high school tends to be text book oriented and less related to student's daily lives. Learning tends to be

abstract and using the lecture method so that academic concepts are less understandable or difficult to understand. Meanwhile, most teachers in teaching still pay little attention to student's thinking abilities, or in other words do not carry out teaching that can increase creativity, the methods used are less varied, and as a result it is difficult to develop student's learning motivation and teaching patterns tend to be rote and mechanistic. Therefore, researchers are interested in conducting research with the title "Comparation of Student Learning Outcomes in Mathematics Subjects Using STAD Type Cooperative with Peer Tutors in Class X SMA PGRI Betung, Banyuasin District"

B. Methods

Variables are research objects or what makes a research point of interest. In this research, the variables are:
X1: Student learning outcomes using STAD Type Cooperative
X2: Student learning outcomes using Peer Tutors.

The population in this study were all class.

Table 1. Research Population

No	Class	Man	Woman	Sum
1	X_1	23	19	42
2	X_2	18	23	41
3	X_3	16	24	40
4	X_4	16	25	41
Sum		73	91	164

The sample is a portion taken from the population. The size of the sample to be studied refers to the following opinion "If there are less than 100 subjects, it is best to take all of them so that the research is population research. However, if the number of subjects is large, it can be taken between 10-15% or 20-25% or more." Class X at SMA PGRI Betung has four classes to be used as the research population. Because the population in this study is homogeneous or students have relatively the same abilities because students are not grouped based on ranking, the research sample was taken using simple random sampling, namely by random method (Rahman, 2011). From the results of the sampling, it turns out that classes X1 and X3 was selected as the sample with the provisions that class X1 was taught using STAD Cooperative Type and class X3 was taught using Peer Tutors as seen in the following table:

Table 2. Research Sample

No	Class	Sum
1	X_1	42
2	X_2	40
Sum		82

The data collection technique used in this research is the test technique (Dewi & Daulay, 2020). This test technique is used to obtain value data from the learning outcomes of students who use the STAD Type Cooperative and Peer Tutor. In this case, the test data given is a written test, which consists of 5 questions in the form of structured descriptions which are carried out in one test

In analysing the data, researchers used the statistic t-test, with the following formula:

$$t = \frac{\left(\overline{X_1} - \overline{X_2}\right)}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$\overline{X_1}$ = average count class Cooperative STAD Type

$\overline{X_2}$ = average count of Peer Tutor classes

n_1 = number of students of STAD Type Cooperative class

n_2 = number of students of the Peer Tutor class

s_1^2 = Standard deviation of cooperative class STAD type

s_2^2 = standard deviation of the Peer Tutor class

To calculate the variance of each sample, the formula is used:

$$S^2 = \frac{n\sum f_i x_i - \left(\sum f_i x_i\right)^2}{n(n-1)}$$

Description:
xi = midpoint value
fi = frequency of the value
n = number of samples
s2 = Variance of sample
To find the combined standard deviation with the formula:

$$S^2 = \frac{(n_1 - 1)s_1^2 + (n_1 - 1)s_2^2}{n_1 + n_2 - 2}$$

Description:
S2 = combined default junction
s1 = Varian's Class Cooperative Type CITY
s2 = Peer Tutor class variance
n1 = number of samples of STAD Type Cooperative class
n2 = number of Peer Tutor class samples

C. Results and Discussion

This research was conducted from 30 May to 3 June 2008 for 4 days. It is known that class X at SMA PGRI Betung has four classes, for class X1 there are 42 students, for class X2 there are 41 students, for class The researcher took samples randomly (sample random sampling) by drawing lots, from the results of the sampling it turned out that class X1 and class X3 were selected. With the provisions, class X1 is taught using STAD Type Cooperative and Class X3 is taught using Peer Tutors.

Class X1 uses STAD Cooperative Type in it's implementation, students are formed into heterogeneous groups consisting of 4-5 people. Learning begins with the researcher's explanation of the material, then each group discusses to review the material provided with their own abilities in mastering the material further. During the learning activities, the researcher supervises and provides guidance as necessary.

Meanwhile, class X3 uses peer tutors. The researcher first asked the mathematics teacher about several students who had more learning abilities than their classmates to be used as tutors during the lesson. Then the researcher created a class setting using Peer Tutors. The researcher formed students into small groups consisting of 5-6 people, where one of them had a tutor who had been previously appointed to the group. The researcher explains the material for determining the position of points, lines and planes in three-dimensional space. Students who still don't understand the material will be assisted by tutors according to their assignments. Tutors provide enrichment or guidance by means of dialogue between students and their tutors in their respective groups monitored by researchers (Intania et al., 2021).

At the fourth meeting, an evaluation test was given, which was the same in classes X1 and X3 regarding the topic of determining the position of points, lines and planes in three-dimensional space. A total of five questions (grid and answer key attached).

1. Student Learning Outcomes using STAD Type Cooperative

From the data on the learning test results of students taught using the STAD Type Cooperative, the following analysis was carried out:
Before forming a frequency, table is first determined:

1. Range = Biggest data - Hidden data
   = 100 – 50
   = 50
2. Multiple Classes = 1 + 3,3 log n
   = 1 + 3,3 log 40
   = 1 + 5,28
   = 6,28
   Taken 6 classes

3. Class length

$$\frac{\text{Range}}{\text{Lots of classes}} = \frac{50}{6} = 8{,}3$$

The length of the class can be 8 or 9. In this case the length of the interval class = 9

Table 3. Frequency Distribution of Student Learning Test Results Using STAD Type Cooperative

Value	F_i	X_i	X_i^2	$F_i.X_i$	$F_i.X_i^2$
50-58	2	54	2916	108	5832
59-67	2	63	3969	126	7938
68-76	15	72	5184	1080	77760
77-85	10	81	6561	810	65610
86-94	5	90	8100	450	40500
95-103	6	99	9801	594	58806
Sum	**40**	**459**	**36531**	**3168**	**256446**

$$\overline{X} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{3168}{40}$$
$$= 79{,}2$$
$$S_1^2 = \frac{n\sum f_i.x_i^2 - \left(\sum f_i.x_i\right)^2}{n(n-1)}$$
$$= \frac{40(256446) - (3168)^2}{40(39)}$$
$$= \frac{10257840 - 1036224}{1560}$$
$$= \frac{221616}{1560}$$
$$= 142{,}1$$
$$S_1 = \sqrt{142{,}1}$$
$$S_1 = 11{,}92$$

2. Student Learning Outcomes using Peer Tutors

From the data on the learning test results of students taught using Peer Tutors, the following analysis was carried out:

Before forming a frequency, table is first determined:

1. Range = Largest data – Smallest data
   = 85 – 40
   = 45
2. Many class = 1 + 3,3 log n
   = 1 + 3,3 log 42
   = 1 + 5.36
   = 6.36
   Taken 6 classes
3. Class length =

   Range = 45
   Class length 6

   = 7,5 (rounded 8)

The length of the class can be 7 or 8 in which case the length of the interval class = 8

Table 4. Frequency Distribution of Student Learning Test Results Using Peer Tutors

Value	F_i	X_i	X_i^2	$F_i.X_i$	$F_i.X_i^2$
40-47	5	43,5	1892,25	217,5	9461,25
48-55	8	51,5	2652,25	412	21218
56-62	8	87,5	7656,25	700	61250
63-70	7	67,5	4556,25	472,5	31893,75
71-79	6	75,5	5700,25	453	34201,5
80-87	8	83,5	6972,25	668	5578
Sum	**42**	**409**	**29429,5**	**2923**	**213802,5**

From the calculation of the average value with the variance above can be expressed as follows:
Average score and variance of students using STAD type cooperatives

$\overline{X} = 79,2$

$S_1^2 = 142,1$

2. Average scores and variance of students using peer tutors

$\overline{X} = 69,59$

$S_1^2 = 253,1$

After the average value and variance are obtained, we find the combined standard deviation, which is as follows:

After getting the results of the standard deviation we find the calculation as follows:
So, count is: 3,24

For α = 0,05 then:

$$dk = (n_1 + n_2 - 2)$$
$$= (40 + 42 - 2)$$
$$= 80$$

$$t_{1-\alpha} = t_{1-0.05}$$

With dk = 80 because it is not in the distribution list t it will be searched by interpolation: dk = 80 $t_{1-0,05} = t_{0,95}$, dksb = 60, dksd = 120

By the hypothetical criterion: Accept H0 if calculate < t (1-α), where dk = chance (1-α) for other t prices is rejected at a significant level of 5%. From the results of the discussion above, count = 3,24 and t (1-α) 1.665 for a real level of 5%, meaning that count is greater than t (1-α), is outside the H0 reception area. Because H0 is rejected, Ha is accepted

D. Conclusions

Based on the results of the study, the average learning outcomes of students using STAD Type Cooperative were 79,2 and the average learning outcomes of students using Peer Tutors were 69,59. It is clear that student learning outcomes in mathematics subjects using STAD Type Cooperative are better than the learning outcomes achieved by students in mathematics subjects using Peer Tutors, with material on the position of points, lines, and planes in three-dimensional space.

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