International Journal of Educational Research Excellence (IJERE)
https://ejournal.ipinternasional.com/index.php/ijere
Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

Differences in Learning Outcomes Mathematics Student Using the Jigsaw Method and Contextual Teaching Learning in the Principal Discussion Rectangular Flat Building

Yusniar N Tambunan[1], Christyani Siregar[2], Titin Elfrida Situmorang[3]
[1,2,3] University of Sisingamangaraja XII Tapanuli (UNITA), Indonesia
Email: tambunanyusniar83@gmail.com, christyanisiregar33@gmail.com
Corresponding Author e-mail: tambunanyusniar83@gmail.com
Article history: received January 25, 2024; revised February 12, 2024; accepted February 20, 2024

Abstract. Study This aim for know difference results Study taught students use method Jigsaw and Contextual Teaching Learning methods in the main discussion Get up flat facet four. Data analysis to test hypotheses with formulas t test statistics. The type of research used is experimental research. From the two sample groups, one experimental group $_{1 \text{ was determined}}$, namely class VIII $_{b}$ and one experimental group, namely class VIII $_{c}$, both groups were given the same instruments. Where are the instruments totaling 10 items the most important question formerly tried out For know validity , reliability , level difficulty and distinguishing power . Based on The results of the research data state that the learning outcomes of the two sample groups are different. After carrying out the requirements test, namely the normality test using the Liliefors test using the Jigsaw method, it was obtained that $L_0 = 0.1342$ and $L_{table} = 0.161$, with the CTL method, $L_0 = 0.1232$ and $L_{table} = 0.161$ were obtained from the two samples $L_0 < L_{table}$ and both classes have a normal distribution and the homogeneity test with the variance comparison test obtained $F_{Hit} = 2.26$ and $F_{table} = 2.424$, so $F_{Hit} < F_{table}$ then both classes have homogeneous variance. The hypothesis is tested with the t test and the real level $\alpha = 0, 05$ obtained $t_{hit} = 0.885$ and $t_{tab} = 2.019$ it turns out that $t_{hit} < t_{tab}$, t_{hit} is outside the acceptance of Ho so Ho is rejected, meaning there is a significant difference between the learning outcomes of students taught using the Jigsaw method and the CTL method in building materials rectangular flat.

Keywords: Learning Outcomes, Jigsaw Method, Rectangular Flat Buildings

I. INTRODUCTION

There are many factors that can influence student learning outcomes, including errors in using learning methods. As said by Nana Sudjana (1989 in J. Darmono 2009:2) states : " the teacher's task is to choose various appropriate methods and models to create teaching and learning processes and teaching and learning activities". This shows that the teacher's ability to choose teaching methods and models that suit the situation and conditions is very necessary . Based on description above , researchers feel it is necessary to conduct research regarding " Differences in Student Mathematics Learning Results Using the Jigsaw Method and Contextual Teaching Learning on the Subject of Rectangular Flat Buildings in Class VII I of SMP Negeri 1 One Roof Tampahan Academic Year 20 23 /20 24 ".

Learning methods

Jigsaw Method

Jigsaw type cooperative learning is a type of cooperative learning that consists of several members in one group who are responsible for mastering a part of the learning material and are able to teach that part to other members in their group. The jigsaw type cooperative learning model is a cooperative learning model, with students studying in small groups consisting of 4-6 people heterogeneously and working together with positive interdependence and being responsible for the completeness of the part of the subject matter that must be studied and conveying the material to the group members who other.

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

Contextual teaching learning method

The contextual approach (Contextual Teaching and Learning) is a learning concept that helps teachers relate the material taught to students' real-world situations and encourages students to make connections between the knowledge they have and its application in their lives as members family and society. With draft that's the result Learning is expected to be more meaningful for students. The learning process takes place naturally in the form of students working and experiencing activities, not transferring knowledge from teacher to teacher student .

Research Hypothesis

Based on the problem formulation and theoretical basis, the hypothesis of this research is "there is a significant difference between the learning outcomes of students who use the Jigsaw Method and those taught using the Contextual Teaching Learning Method on Quadrilateral Building material in class VIII SMP Negeri 1 Satu Tampahan Roof .

II. RESEARCH METHODS

Type and Design Study

Types of research

This type of research is experimental research, namely differentiating student learning outcomes using the Jigsaw method with student learning outcomes using the Contextual Teaching Learning method.

Research sites

The location of this research is SMP Negeri 1 One Roof Tamapahan.

Research Population and Sample

Population Study

The population in this study were all students of class VII I of SMP Negeri 1 One Roof Tampahan for the 2023/2024 academic year with a total of 4 classes.

Research Sample

In accordance with this research, two classes are needed and both classes are experimental classes. And the samples for this research were class VIII $_B$ as the Jigasw class and class VIII $_C$ as the CTL class with the same number of 30 people.

Research Instruments and Tools

The research instrument is a data collection tool, and the research instrument used is a description test . The test consists of 10 questions, arranged in accordance with the curriculum and teaching objectives that have been determined. Before the test is used, it is first tested in a class that is not a research class to see the validity, reliability and level of difficulty of the test and the differentiating power of the test.

A. Validity

A test is said to be valid if it can accurately measure what it wants to measure. The formula used is a rough product moment correlation formula (Arikunto 1993: 160).

$$r_{xy} = \frac{N\sum XY - \left(\sum X\right)\left(\sum Y\right)}{\sqrt{\left[N.\sum X^2 - \left(\sum X\right)^2\right]\left[N.\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

Table 1. Coefficient Validity Test

Coefficient	Qualification
0.80 – 1.00	Very high
0.60 – 0.80	Tall
0.40 – 0.60	Currently
0.20 – 0.40	Low
0.00 – 0.20	Very low

B. Reliability of Research Instruments

Determining reliability to find out how far a test can show score stability. Used formula: KR-21 (Arikunto 1993: 103)

$$r_{11} = \left(\frac{n}{n-1}\right)\left[1 - \frac{M(n-M)}{nSt^2}\right]$$

For determined reliability that is use criteria as following :

Table 2. Reliability

Reliability Coefficient (r_{11})	**Criteria**
$0.80 < r_{11} \leq 1.00$	Very high
$0.60 < r_{11} \leq 0.80$	Tall
$0.40 < r_{11} \leq 0.60$	Currently
$0.20 < r_{11} \leq 0.40$	Low
$0.00 < r_{11} \leq 0.20$	Very low

C. Difficulty Level

Analysis of test items to determine the construction of test questions from trial results will be carried out by analyzing test items, namely:

The number that shows the difficulty and ease of a problem is called the difficulty index (Arikunto 1993: 207). The difficulty level of the questions is calculated using the formula:

$$P = \frac{B}{JS}$$

The difficulty index can be classified:
The P 0.00 to 0.30 question is a difficult question
Problem P 0.30 to 0.70 is medium
The P 0.70 to 1.00 question is an easy question.

D. Test Discriminating Power

The differentiating power of a test is the ability of the questions to differentiate students with high abilities from students with low abilities. The number that shows the amount of discriminating power is called the discrimination index (D).

In determining the differentiating power, only the two poles are taken, namely the bottom 27% of scores as the lower group (JB).

To determine the differentiating power, the following formula is used:

$$D = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A - P_B \qquad \text{(Arikunto, 2012: 232)}$$

With clarification of differentiating power:

D = 0.00 – 0.20: bad
D = 0.21 – 0.40: sufficient

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

D = 0.41 – 0.70: good
D = 0.71 – 1.00: very good (Arikunto, 2012: 232)

The criteria for differentiating power used in this research are sufficient, good , and good very
.

Research design

For the experimental method, one of the general research designs is used in this experiment. The design form is:

Table 3. Research Design

Pre-test	Note. Sample (Treatment)	Post-Test
Experiment $_1$	PPMJ	Q_J
Experiment $_2$	PPMCTL	Q_{CTL}

Information :

Q_J = Giving the final test to experimental group $_1$
Q_{CTL} = Giving the final test to experimental group $_2$
PPMJ = providing Jigsaw mathematics learning
PPMCTL = providing CTL mathematics learning

Procedure Study

So that the abilities of the two classes can be measured, research steps are carried out.

1. Before students study the material, a pre-test is given to both groups to see the equality of initial knowledge.
2. Both groups were given the same subject, namely rectangular flat shapes , but the methods used were different. Experimental class $_1$ uses materials that have been prepared using the jigsaw method . Experimental class $_2$ uses materials that have been prepared using the CTL method
3. The study time used by both groups was the same, namely in the morning.
4. Give a post-test after the material is finished.

Data analysis

1. Determine the average value and standard deviation
   a. Determining the average value uses a formula (Sudjana 1986: 67)

$$\overline{X} = \frac{\sum fiXi}{\sum fi}$$

   b. To calculate the standard deviation (S) the formula is used (Sudjana 1986: 270)

$$\overline{X} = \sqrt{\frac{n\sum Xi^2 - \left(\sum Xi\right)^2}{n(n-1)}}$$

2. To check the data normality test, the lifefors normality test was used (Sudjana 1986: 450). Steps taken:
   a. Observations X_1, X_2, $X_{3,.....}$,

   With the formula: $Z_i = \frac{X_i - \overline{X}}{S}$

   b. For each number using the normal distribution, the probability is calculated $F(Z_i) = P(Z<Z_i)$
   c. Calculate the proportion of Z_1, Z_2, Z_3,...., Z_n that is smaller or equal to Z_i di. If the proportion is expressed by $S(Z_i)$ then:

$$S(Z_i) = \frac{banyaknya\, Z_1, Z_2, Z_3, \ldots, Z_n \le Z_i}{n}$$

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

d. Calculate $F(Z_i) - S(Z_i)$ then determine the absolute value

3. Calculate the Standard Deviation of each sample
   Standard deviation is determined using the formula:

$$S = \sqrt{\frac{N\sum_{i=1}^{k} f_i x_i^{\,2} - \left(\sum_{i=1}^{k} f_i x_i\right)^2}{N(N-1)}}$$

   The formula for calculating variance is:

$$S^2 = \frac{N\sum_{i=1}^{k} f_i x_i^{\,2} - \left(\sum_{i=1}^{k} f_i x_i\right)^2}{N(N-1)}$$ (Simbolon, 2009: 42)

4. Examination of the sample variance homogeneity test using the F test, namely:

$$F = \frac{Varians\ terbesar}{Varians\ terkecil}$$

   To test the research hypothesis, the difference between two means test is used with the formula:

$$t_{hit} = \frac{\left(\overline{x_1} - \overline{x_2}\right)}{S\sqrt{\left(\frac{1}{n_1}\right) + \left(\frac{1}{n_2}\right)}}$$ (Simbolon, 2009: 161)

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

   S^2 = combined variance

   s_1^2, s_2^2 respectively the variance of the first sample and the second sample, with the significance level being α, and the critical area: $t_{hit} < -t_{1-1/2\alpha;\ n1+n2-2}$ or $t_{hit} > t_{1-1/2\alpha;\ n1+n2-2}$

   Test criteria:

   If $F_{hit} = F_{tab}$ then both populations have the same variance

   If $F_{hit} \neq F_{tab}$ then the two variances do not have the same variance

   $F_{tab} = F_{1/2}c(V1, V2)$ with $\alpha = 0.05$.

5. Hypothesis testing

   The hypothesis in this assessment is: there is a significant difference between the mathematics learning outcomes of students who use the jigsaw method and those who use the contextual teaching learning method . To make it easier to process the data, the hypothesis was changed to:

   Ho : There is no significant difference in student mathematics learning outcomes between those who use the Jigsaw method and the Contextual Teaching Learning method in the Quadrilateral Building material in class VII of SMP Negeri 1 One Roof Tampahan

   Ha : There is a significant difference in student mathematics learning outcomes between those who use the Jigsaw method and those who use the Contextual Teaching Learning method in the Quadrilateral Flat Building material in class VII SMP Negeri 1 One Roof Tampahan

To compare student presentations from the two samples, a difference of two means test was used. The formula used is in accordance with the results of the previous homogeneity test, in this case the variance of the population is unknown so the formula will be used if the variance is unknown for samples originating from a homogeneous population or samples originating from a non-homogeneous population.

The research hypothesis for the difference test between two means is:

$H_o : \mu_1 = \mu_2$ (the sample mean for the Jigsaw method group and the Contextual Teaching Learning method is not significantly different).

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

$H_a : \mu_1 \neq \mu_2$ (the sample mean between the Jigsaw method group and the Contextual Teaching Learning method is significantly different).

III. RESULTS AND DISCUSSION

Description of Research Results

Instrument Testing

The research instrument trial was carried out at SMP Negeri 1 Satu Tampahan where the instrument was given to 28 students in class VIII $_1$ of SMP Negeri 1 Satu Roof Tampahan . Trials are carried out to determine the quality of the test, namely the validity of test items, test reliability, level of difficulty and power differentiator item test .

a. Validity of Test Items

By using the formula from CHAPTER III with data from instrument testing results (attached in appendix 5), the validity coefficient for each item is obtained as presented in appendix 6 . In accordance with the criteria, the following validity is obtained:

Table 4. Validity Item Test

No	Coef. Validity	Note
1	0.4 7	Currently
2	0.40	Currently
3	0.5 2	Currently
4	0.4 9	Currently
5	0.39	Currently
6	0.40	Currently
7	0.45	Currently
8	0.44	Currently
9	0.55	Currently
10	0.50	Currently

From table seen that the instrument items have a moderate validity coefficient, it can be concluded that every item is valid.

b. Test Reliability

By using the formula in Chapter III, a test reliability coefficient of 0.6 5 9 is obtained (full calculation in Appendix 7). The test reliability coefficient is 0.6 5 9 compared with the r value of the product moment critical $_{table}$ for α= 0.05 and n = 10, namely r_{table} = 0.6 32, it is concluded that the test is reliable.

c. Difficulty Level

Use formula $P = \frac{B}{JS}$ In Chapter III, the level of difficulty of the items is obtained as presented in table 4.2 below (calculations to obtain the degree of difficulty of the items are attached in Appendix 8).

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

Table 5. Degrees Difficulty Question Items

No	B	P	Note
1	20	0.78	Easy
2	24	0.85	Easy
3	23	0.67	Currently
4	24	0.71	Easy
5	22	0.6 2	Currently
6	21	0.78	Easy
7	22	0.57	Currently
8	24	0.6 2	Currently
9	16	0.78	Easy
10	24	0.67	Currently

From the table it can be seen that the difficulty level of the instrument is easy and medium , so all items are considered good .

D. Test Discriminating Power

Based on the data in Appendix 10 and using the formula, the differentiating power of each item is obtained as presented in the table below:

Table 6. Differentiating Power

Item No	Differentiating Power Test	Information
1	0.38	Enough
2	0.37	Enough
3	0.5	Good
4	0.44	Good
5	0.44	Good
6	0.44	Good
7	0.5	Good
8	0.37	Enough
9	0.39	Enough
10	0.56	Good

From the table above, it has sufficient and good differentiating power.

From the results of calculating the validity of the test items, the reliability of the test, the level of difficulty of the test items, and the differentiating power of the test, it can be concluded that the test meets the requirements and is suitable for use in collecting research data.

Research Data Analysis

After conducting research at SMP Negei 1 One Atap Tampahan, it was found that the results of the pre-test for both classes had the same results, presented in appendix 3 , and the results of the post-test for both classes had different results, presented in the appendix.

a. Data Statistics

Based on the results of the values for the two samples in Appendix 11, statistical data is obtained in the following table.

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

Table 6. Statistics of Values for Both Samples

Types of Statistics	Class Score Jigsaw	Class Score CTL
N (number of samples)	30	3 0
The highest score	9	9
Lowest value	3	5
Average	6, 9	6, 67
Variance	3.17	1.40
Standard deviation	1.78	1.18

From the statistical data on the values of the two samples, student learning outcomes using the Jigsaw method are better than student learning outcomes using the CTL method .

b. Data Normality Test

To test the normality of student ability data, the Liliefors test was used. From the calculation results for both classes, namely data on student learning outcomes using the Jigsaw method in class VIII B, the value Lo = 0.1342, while L table = 0.161 for n = 30 and real level = 0.05 , means αLo = 0.1342 . < L_{table} = 0.161 and for data on student learning outcomes using the CTL method in class VIII C , the value Lo = 0.1232 is obtained, while L_{table} = 0.161 for n = 30 and real level α= 0.05. Because Lo = 1.232 < L_{table} = 0.161 , it can be concluded that the two sample groups come from a normally distributed population, calculations in appendix 1 3 . So there is one condition for carrying out a *t test* the data is met .

Homogeneity Test Variance

From the calculation results in attachments 1 4 , the value of F_{hit} = 2.26 is obtained . After comparing the $F_{hit\ value\ with\ the\ table}$ F value at the real level α= 0.05 and ν_1 = 29 and ν_2 = 29 , using a two-party test, the critical points are obtained $F_{(0.05)}$ = 2, 424 where the critical area is $F_{hits} < F_{(0.05)}$. It turns out that the F_{hit} is in the critical area. This means that student learning outcomes using the Jigsaw method learning and student learning outcomes using the CTL method learning have homogeneous variances. Calculations to obtain F_{hit} are presented in appendix 1 5 . The statistical formula t used is : $t_h = \frac{\overline{x_e} - \overline{x_k}}{s\sqrt{\frac{1}{n_e} + \frac{1}{n_k}}}$ (Sudjana , 1992: 239)

Testing Hypothesis

After testing the homogeneity of variance and normality testing to determine whether the data is normally distributed on student learning outcomes using the jigsaw method and the CTL method, a hypothesis was carried out with a two-party test using the t statistical test.

Hypothesis to be tested:

Ho : There is no difference in student learning outcomes using the Jigsaw method and the CTL method.

Ha : There are differences in student learning outcomes using the Jigsaw method and the CTL method.

From the calculation results in Appendix 14, it is obtained that t_{hit} = 0.885 . After comparing the $t_{hit\ price}$ with the $t_{table\ price}$ with a real level α= 0.05 and dk = 58, it is obtained $-t_{0.975,\ 58}$ = -2.325 and $t_{0.975;\ 58}$ = 2.019 apparently t_{hit} is not in the critical area because 0.885 < 2.019 so Ho is rejected in other words Ha is accepted. Thus, it can be concluded that there is a significant difference between the learning outcomes of students using the Jigsaw method and the CTL method on the subject of building rectangular planes in class VIII SMP Negei 1 One Roof Tampahan .

Volume 03, Issue 01, January-June 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i1.790

IV. CONCLUSION

By using the Jigsaw method on the subject of flat rectangular shapes in class VIII B One Roof Tampahan 1 Public Middle School, student learning outcomes were obtained with an average of 6.9 , variance 3.17 and a standard deviation of 1.7 8. Meanwhile, by using the CTL method on the subject of flat rectangular construction in class VIII C of SMP Negeri 1 One Atap Tampahan, student learning outcomes were obtained with an average of 6.67 , variance 1.40 and standard deviation 1.18 . With thereby There is significant difference between results Study taught students use Jigsaw method with CTL method on the principal discussion get up flat quadrilateral in class VIII of SMP Negeri 1 One Roof Tampahan Regency North Tapanuli Year Teachings 20 19 /20 20 namely the difference in class averages is 0.23

REFERENCES

Admin. 2015. Development of Mathematics Learning in Indonesia. Mathematics Education Article, (online), (http://pmat.uad.ac.id/development-learning-mathematics-di-indonesia.html, uploaded 10 November 2011).

Arikunto. 2009. *Basics of Educational Evaluation*. Jakarta: Rineka Cipta.

Arikunto. 2010. *Research Procedures*. Jakarta: Rineka Cipta.

Ali.Mohammad.2003. Low NEM in Indonesia.Jakarat: Rays of New Indonesia.

Hasratuddin.2003. Understanding Mathematics. Jakarta.

Slameto. (2010 in Ika Sonya 2016: 1) . *Learning & the factors that influence it.* Jakarta: Rineka Cipta.

Slameto. 2013 (in Ika Sonya 2016:9) . *Learning and the factors that influence it* . Jakarta: Rineka Cipta.

Sudjana, Nana. 2009 (in Ika Sonya 2016:10) . *Assessment of Teaching and Learning Process Results*. Bandung: PT Teen Rosdakarya.

Thobroni. 2015. *studyandLearning.* Yogyakarta: ARRUZZMDIA

Studying Mathematics Education I PGSD Open University undergraduate student