EFFECTIVENESS APPROACH CONTEXTUAL TEACHING AND LEARNING (CTL) ON THE MATHEMATICS LEARNING OUTCOMES IN EVEN SEMESTER OF VII GRADE

Mita Maretta Ningtias[a], Widayati[b]
Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul, Yogyakarta
[a]mitamaretta@gmail.com, [b]ummunabilah67@gmail.com

ABSTRACT

The teachers still dominate learning mathematics, and some students still assume that mathematics is a hard subject. The lack of student activeness in learning mathematics in the class resulted in low student learning outcomes. Fortunately, there is one way to improve the students' learning outcomes by using the Contextual Teaching and Learning (CTL) approach. This study aims to determine the effectiveness of the learning approach Contextual Teaching and Learning (CTL) approach with conventional learning. The study is done in MTs Sultan Hadlirin Mantingan District Jepara. This study population was the seventh-grade students of Islamic Junior High School Sultan Hadlirin mantingan (MTs Sultan Hadlirin Mantingan) School Year 2016/2017, which comprises of 3 classes with a total of 68 students. The experiment class was VIIA, and class VII B as the control class that was selected by random sampling of classes. The methods of data collection using documentation and test. The research instrument is in the form of questions. The test instrument is used for validity, reliability, and distinguishing features. Prerequisite test data analysis is used for Normality Test, Homogeneity Test, and Hypothesis Testing. Hypothesis test results with a significance level of 5% and 46 degrees of freedom showed that: (1) there are differences in learning outcomes of mathematics that using approach Contextual Teaching and Learning (CTL) approach with conventional learning. It can be seen in t_{count} = 8,0383 and t_{table} = 2,0130, so $t_{count} > t_{table}$ and (2) Learning mathematics using approach Contextual Teaching and Learning (CTL) approach is more effective than conventional learning. This is indicated by the value t_{count}= 8,0383 and t_{table} = 1,6787, so $t_{count} > t_{table}$.

KeyWords: Effectivity, Contextual Teaching, and Learning (CTL), Mathematics Learning Outcomes

INTRODUCTION

Mathematics is one of the important sciences of human life. Mathematics is a lesson arranged in an orderly, logical, leveled from the easiest to the most complicated. Studying mathematics is not only related to numbers and operations but mathematics about ideas, structures, and relationships arranged in a logical order. Mathematics, as one of the basic sciences, today has developed both the material and its use in everyday life very rapidly. According to the Ministry of National Education (2008:13), Mathematics is a universal science that underlies the development of modern science and technology, has an important role in various disciplines, and advancing human thought power. Today's rapid development in information and communication technology is based on the development of mathematics in number theory, algebra, analysis, probability theory, and discrete mathematics. To master and create technology in the future requires a strong mastery of mathematics from an early age.

However, why is mathematics a scourge for most students? The biggest problem lies in the process of learning mathematics itself. Basic knowledge of mathematics should be taught with joy and enthusiasm and full of history, apparently just passed by without a positive impression from students. This results in students' necessary mathematical abilities becoming weak and unable to support the learning process at the next level. Understanding mathematics learning, according to Uno, Hamzah B. (2007: 130), The essence of learning mathematics is mental activity to understand the meaning and relationships and symbols, then applied to real situations. MTs Sultan Hadlirin Mantingan also experiences problems in the mathematics learning process, affecting students' mathematics learning outcomes. To discover mathematics learning outcomes at MTs Sultan Hadlirin Mantingan, researchers

conducted interviews with students on October 3, 2016. Based on the results of interviews with students, students still assume that mathematics is a complicated and boring subject, some say that mathematics is a scary subject. Understanding the results of learning mathematics, according to Uno, Hamzah B. (2007: 139), namely: Student learning outcomes in mathematics are the results of activities in learning mathematics in the form of knowledge as a result of treatment or learning by students. Alternatively, in other words, student learning outcomes in mathematics are what students get from the process of learning mathematics.

The above can be shown by the results of the Middle Semester Exam mathematics grade VII students who are still low. Observation results also indicate that the students' mathematical grades have not yet reached the specified MCC. Mathematics MCC in this school is 75. The percentage of mastery learning in grade VII of MTs Sultan Hadlirin Mantingan students is only 0% for class VIIA, 0% for class VIIB, and 15% for class VIIC. Most students still do not meet the MCC criteria. The complete data are presented in table 1.

Table 1. The Midterm Mathematics Grade Grade VII Mts Sultan Hadlirin Mantingan Even Semester 2016/2017 Academic Year

Class	≥ MCC 75		< MCC 75		Total students
	Amount	Percentage	Amount	Percentage	
VIIA	0	0 %	25	100 %	25
VIIB	0	0 %	23	100 %	23
VIIC	3	15%	17	85%	20

(Source: MTs Sultan Hadlirin)

Also, based on interviews with MTs Sultan Hadlirin Mantingan teacher on October 3, 2016, information was obtained that in the learning process in class, teachers use conventional learning models, namely the learning process that is still teacher-centered in the delivery of material. This causes students to be less interested in participating in learning. Often students do not pay attention to what the teacher explains, often do noise in learning, lack of student activity in learning mathematics in class, if the teacher invites the submission of questions, nobody asks while if given a question by the teacher, students often cannot solve it. This situation results in low student mathematics learning outcomes. One effort to create optimal conditions and the material given to students must be apparent. The selection and use of the right learning approach are important in learning mathematics so that it is expected to affect student learning outcomes in mathematics. The teacher should present lessons in an exciting and student way so that students are interested in and interest in the mathematics learning process. One form of the learning process used is to use the Contextual Teaching and Learning (CTL) approach. Suprijono, Agus. (2014: 79) states that Contextual learning or CTL is a concept that helps teachers link material taught with real-world situations and encourages students to make connections between the knowledge they have and their application in their lives as family and community members.

In the Contextual Teaching and Learning (CTL) approach, students are invited to be more active in thinking and communicating ideas in solving mathematical problems for students. Through the Contextual Teaching and Learning (CTL) approach, it is hoped that the learning process will be better, more innovative, effective, and optimal learning outcomes, thus supporting attitudes/behaviors and better mastery of the material by students. Also, with the emergence of the Contextual Teaching and Learning (CTL) approach, it is hoped that student problems related to learning in schools can be solved. The research takes the issue of the effectiveness of the Contextual Teaching and Learning (CTL) approach to the learning outcomes of seventh-grade students of MTs Sultan Hadlirin Mantingan in Jepara district in the 2016/2017 school year with the subject matter of set material.

Based on the description above, the formulation of the problem in this study are: 1) Are there differences in student learning outcomes in mathematics using the Contextual Teaching and Learning (CTL) approach by using a conventional approach to class VII students in the even semester of Sultan Hadlirin Mantingan in Jepara Regency 2016/2017 school year? 2) Is learning that uses the Contextual Teaching and Learning (CTL) approach more effective than using a conventional approach to VII grade students even semester of Sultan Hadlirin Mantingan Jepara Regency 2016/2017 school year?

While based on the formulation of the problem, the objectives in this study are 1) To find out whether or not there is a significant difference between mathematics learning outcomes using the Contextual Teaching and Learning (CTL) approach by using a conventional approach to class VII students even semester of Sultan Hadlirin Mantingan, Jepara Regency 2016/2017 school year. 2) To determine the effectiveness of the Contextual Teaching and Learning (CTL) approach by using a conventional approach to class VII students even semester of Sultan Hadlirin Mantingan, Jepara Regency 2016/2017 school year.

METHODS

In this study involving two classes, namely the experimental class and the control class. Both classes have the same ability and the same material, but different treatment in the process of delivering material. The process of delivering experimental class material uses the Contextual Teaching and Learning (CTL) approach. While the process of delivering material to the control class using conventional learning. In this study, using a posttest-only control design. According to Sugiyono, (2011:112). In this design, there are two groups, each randomly chosen (R). The first group was given treatment (X) and the second group was not. The treated group is called the experimental group, and the untreated group is called the control group. The effect of the treatment is (O_1: O_2). In actual research, the effect of treatment is analyzed by different tests, using statistical t-tests, for example. If there is a significant difference between the experimental and control groups, the treatment given has a significant effect. Research Design Using Posttest-Only Control Design can be seen in table 2.

Table 2. Research Design Using Posttest-Only Control Design

Experimental Group	R	X_1	O_1
Control group	R	X_2	O_2

Info:

R: Random

X_1: Experimental classes treated using the Contextual Teaching and Learning (CTL) approach

X_2: Control class is a class that uses conventional learning

O_1: Results of the experimental class posttest

O_2: Pretest control class results

This research belongs to the type of experimental research. This research was conducted in MTs Sultan Hadlirin Mantingan even semester 2016/2017 academic year with class VII A as an experimental class, class VII B as a control class, and class VII C as a Trial class. The variables in this study were the use of the Contextual Teaching and Learning (CTL) approach given to the experimental class, conventional learning in the control class. Mathematics learning outcomes for Grade VII students on the even semester material set of MTs Sultan Hadlirin Mantingan in the 2016/2017 school year and conducted from 12 to January 19, 2017. The research was conducted in the experimental and control classes with the same set of materials, teachers, and the number of meetings. After reaching the last sub-chapter, the two classes are given a test of learning outcomes, which later the learning outcomes of the two classes will be seen the difference in the results, so it is known which strategy is more effective.

Data collection techniques in the form of documentation and tests. Data collection instruments in the form of an initial ability test and a test of learning outcomes. Data analysis used normality, homogeneity, and t-test. A normality test is used to test whether the data obtained on each variable is normally distributed or not. If the data is normally distributed then, data analysis can be done to prove the research hypothesis. In this case, the normality test uses the Chi-Quadrat $\mathcal{X}^2$

$$\mathcal{X}^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

(Suparman, 2012: 6)

Information:

$\mathcal{X}^2$: Chi-Squared Value
o_i: The frequency of observations in the i-th interval class
E_i: Expected frequency in the ith interval class
k: The number of interval classes
i: 1,2,…k

A homogeneity test is performed to obtain the assumption that the study sample has the same or homogeneous conditions. The homogeneity test is done by investigating whether the two samples have the same variance or not. Populations with equal variance are called populations with homogeneous variance. The formula used in the homogeneity test is the statistical test F:

$$F = \frac{s_1^2}{s_2^2}$$

(Sudjana, 2001:249)
with:

$$s_i^2 = \frac{n\sum x_i^2 - (\sum x_i)^2}{\mathrm{n}(n-1)}$$

(Sudjana, 2001:94)
With:
F: Statistic test
s_i^2: Variation of the i sample
Testing Criteria:
Accept H_0 if $F_{(1-\alpha/2)(n1-1, n2-1)}F < F_{\alpha/2(n1-1,n2-1)}$
T-Test formula, i.e.:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

with :

$$S_p{}^2 = \frac{(n_1 - 1){S_1}^2 + (n_2 - 1){S_2}^2}{(n_{1+}n_2) - 2}$$

(Suparman, 2011: 46)
Information :
T: Test statistics
$\bar{X}_1$: The average grade of students with mathematics learning CD (experimental class)
$\bar{X}_2$: The average value of students learning without using mathematics learning CD (control class)
n_1: Number of students in the experimental class
n_2: Number of control class students
${S_1}^2$: Variation of students in the experimental class
${S_2}^2$: A variant of students in the control class
S_p: Standard deviation combined
For a two-party t-test, If $t_{count} > t_{\frac{\alpha}{2}}(n_1 + n_2 - 2)$, then H_0 is rejected, and H_1 is accepted and for one-party t-test If $t_{count} > t_{\alpha}(n_1 + n_2 - 2)$, then H_0 is rejected and H_1 is accepted.

RESULTS AND DISCUSSION

Before being given the treatment of the experimental class and the control class, the UTS value collection is used for the population's initial ability. This was done to determine that the population of Grade VII students of MTs Sultan Hadlirin Mantingan had the same or homogeneous variance. The homogeneity test results from the initial ability of VII grade students of MTs Sultan Hadlirin Mantingan. A homogeneity test is conducted to determine whether the initial mathematical ability scores of the experimental class and the control class are homogeneous.

Table 3. Results of Initial Ability Homogeneity Tests for Class VII Students

Class	s_i^2	F_0	F_{table}	df	a	Info.
Experiment	146,25	1,4850	2,3315	(24,22)	5%	Homogeneous
Control	98,48					

Based on homogeneity tests that have been carried out in class VIIA and VIIB, it can be seen that $F_0 = 14850$ and $f_{0,025}(24,22) = 2,3315$ because $of\ F_0 < f_{0,025}(24,22)$ which means that both classes have variances that same (homogeneous).

After it is known that the population of class VII students is homogeneous, the instrument testing is then tested in the pilot class. Data analysis from this research instrument shows that out of 20 questions, two were invalid. The number of questions used for the mathematics learning achievement test for grade VII students amounted to 18 questions. While from 18 items, it is known to have a very high level of reliability. The valid questions are reliable and have a good difference in power. They are then given to the experimental class that is the class using the Contextual Teaching and Learning (CTL) approach and the control class that is the class using conventional learning. The results of the mathematics learning achievement test can be seen in the following table 4.

Table 4. Description of Mathematics Learning Outcomes

Class	parameter				
	Score Max	Score Min	$\bar{X}$	S	S^2
Experiment	89	78	83,11	4,38	19, 19
Control	83	56	67,65	8,47	71,72

Table 4. shows the minimum value, the maximum value, and the average value of the experimental and control classes. It can be seen that the average value of the experimental class is higher than the average value of the control class.

Then, the two-party hypothesis test is performed to determine whether there are differences in mathematics learning outcomes between the experimental and control classes. Test criteria for the two-party t-test: If $t_{count} > t_{\frac{\alpha}{2}}(n_1 + n_2 - 2)$, H_0 is rejected, and H_1 is accepted at a significant level of 5%. The results of the two-party hypothesis test can be seen in Table 5 below.

Table 5. Summary of Hypothesis Testing of Two Parties Learning Outcomes of Mathematics

S_i^2	S_2^2	df	t_{count}	t_{table}	Info.
19, 19	71,72	46	8,0383	2,0130	H_0 rejected

Based on the results of the analysis conducted with a significant level of 5% and degrees of freedom 46, the value of $t_{count} = 8,0383$ and $t_{table} = 2,0130$, so $t_{count} > t_{table}$. Then reject H_0 and H_1 accepted, which means that there are differences in mathematics learning outcomes using the Contextual Teaching and Learning (CTL) approach with conventional learning in seventh-grade students of MTs Sultan Hadlirin Mantingan in Jepara district in the 2016/2017 school year.

From the two-party hypothesis test, it is known that there are differences in mathematics learning outcomes between the experimental class and the control class. Furthermore, a one-party hypothesis test is performed to determine whether learning using the Contextual Teaching and Learning (CTL) approach is more effective than conventional learning. One-party test criteria, If $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted. With degrees of freedom df = $(n_1 + n_2) - 2$ at a significant level of 5%. The results of the one-party hypothesis test can be seen in Table 6 below.

Table 6. One-Party Hypothesis Test Results Mathematics Learning

S_i^2	S_i^2	df	t_{count}	t_{table}	Conclusion
19, 19	71,72	46	8,0383	1,6787	H_0 rejected

Based on the results of the analysis conducted with a significant level of 5% and degrees of freedom 46, the value of $t_{count} = 8,0383$ and $t_{table} = 1,6787$, so the value of $t_{count} > t_{table}$ then H_0 is

rejected and H_1 is accepted which means that mathematics learning uses the Contextual Teaching and Learning approach (CTL) is more effective compared to conventional learning in VII grade students even semester MTs Sultan Hadlirin Mantingan Jepara district 2016/2017 school year.

This happens because in learning mathematics using the Contextual Teaching and Learning (CTL) approach students tend to be more active and pay attention to the learning process because students are required to express/develop a real problem related to mathematics, and also students are trained to cooperate in solving a problem, so students tend to be active, and student mathematics learning outcomes are better. Whereas in class that uses conventional learning, students tend to be passive. In the conventional learning process, only based on student awareness to listen to the teacher's explanation or not without the demand to listen. Students who do not listen will make the learning atmosphere chaotic, which causes other students to be affected. This has caused students to not focus on the learning process so that students' learning outcomes in mathematics are not good. As a result, students learning mathematics using the Contextual Teaching and Learning (CTL) approach is better than students using conventional learning.

CONCLUSION

Based on the results of the research and discussion described above, the following research conclusions can be drawn:

1. There is a difference in mathematics learning outcomes using the Contextual Teaching and Learning (CTL) approach with conventional learning in seventh-grade students of the even semester MTs Sultan Hadlirin Mantingan Jepara district the 2016/2017 school year. This is indicated by the results of the first hypothesis test with a significant level of 5% and degrees of freedom = 46, the obtained value of $t_{count} = 8{,}0383$ and $t_{table} = 1{,}6787$, so the value of $t_{count} > t_{table}$. Then the rejects H_0 and H_1 are accepted.
2. Mathematics learning using the Contextual Teaching and Learning (CTL) approach is more effective compared to the conventional class VII students even semester Sultan Hadlirin Mantingan Jepara district 2016/2017 school year. This is indicated by the results of the second hypothesis test: a significant level of 5% and a degree of freedom 46, the value of $t_{count} = 8{,}0383$ and $t_{table} = 1{,}6787$, so the value of $t_{count} > t_{table}$ then H_0 is rejected, and H_1 is accepted.

REFERENCES

Departemen Pendidikan Nasional. 2008. Panduan Pengembangan Bahan Ajar. Direktorat Pembinaan Sekolah Menengah Atas.

Sudjana, 2001. Metode Statistika edisi 6. Bandung : Tarsito.

Sugiyono, 2011. Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D). Bandung: Alfabeta.

Suparman. 2011. Metodologi Penelitian Pendidikan. Yogyakarta : MIPA Universitas Ahmad Dahlan Press.

_____. 2012. Desain dan Analisis Eksperimen. Yogyakarta : Universitas Ahmad Dahlan.

Suprijono, Agus. 2014. Cooperative Learning. Yogyakarta: Pustaka Pelajar.

Uno, Hamzah B. 2007. Model Pembelajaran Menciptakan Proses Belajar Mengajar Yang Kreatif dan Efektif. Jakarta: Bumi Aksara.