

## THE DIFFERENCE OF ACHIEVEMENT BETWEEN THE STUDENTS TAUGHT BY CONTEXTUAL TEACHING AND LEARNING AND DIRECT INSTRUCTION IN MATHEMATICS GRADE VIII OF SMPN 1 TANJUNG MORAWA

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### ABSTRACT

The type of this study is a quasy-experiment study. The objective of this research is to know: "The students' *mathematics achievement* by using *contextual teaching and learning (CTL)* is higher than by using *direct instruction*". The population of this research is all of students in SMPN 1 Tanjung Morawa with total of 972 students. The sampling technique applied was cluster random sampling. The control class that is chosen VIII-5 consisted of 36 students, meanwhile the experiment class that is chosen VIII-2 consisted of 36 students. The instruments are used to measure the students *mathematics achievement* was a multiple-choice test and the students learning style was questionnaire. The normality test used of Lillie for's test and the homogeneity test by using Fisher test. The data analysis technique was *t-test* at the level of significance  $\alpha = 5\%$ . The study result showed that: "The students *mathematic achievement* taught by *contextual teaching and learning (CTL)* is higher than the students *mathematics achievement* taught by *direct instruction*, where  $t_{count} (1.2349) < t_{table} (1.9944)$  and Sig. *Contextual* (0.015) < 0.05 and Sig. *Direct Instruction* (0.039) < 0.05". The level of learning mastery for student or KKM, If student gets a minimum score is greater than or equal 2.66 (KKM  $\geq 2.66$ ), so student obtain completeness of learning. The students score is 67.01% (moderate), cumulative learning is 93.06% (very good items questioner). Based on the data analysis result of multiple comparisons by *t-test*, it can be conclude that the student's mathematics achievements not have different which is taught by contextual teaching and learning (CTL) with students by direct instruction.

**Keywords:** Contextual, Direct Instruction, Mathematics Achievement

### Introduction

#### Background

In an ever-changing social situation, ideally oriented education is not only the past and present, but it should be a gradual process and try to anticipate the future and thinking about what the students will face in the future. Eggen and Kauchack (1993:1), that a good education is education that not only prepares students for a profession

or occupation, but to solve problems encountered in everyday life.

Education is a system that is universal, occurring in the lives of people around the world that aims to enhance the dignity of both the man himself or his people. This is in line with the national education goals stated in the Law of the Republic of Indonesia Number 20 Year 2003 (2003:5) namely:

“Pendidikan Nasional berfungsi mengembangkan kemampuan dan membentuk watak serta peradaban bangsa yang bermartabat dalam rangka mencerdaskan kehidupan bangsa bertujuan untuk berkembangnya potensi peserta didik agar menjadi manusia yang beriman dan bertakwa kepada Tuhan Yang Maha Esa, berakhlak mulia, sehat, berilmu, cakap, kreatif, mandiri, dan menjadi warga negara yang demokratis serta bertanggung jawab”.

Mathematics as a knowledge base which is closely related to everyday life and has an important role in improving the quality of education is good. Despite many efforts of government and educational institutions to improve the quality of education but the results are far from expected.

According to Cornelius in (Abdurrahman, 2003:253) argues that:

“Lima alasan untuk belajar matematika karena matematika adalah (1) sarana yang jelas dan logika, (2) sebuah cara untuk memecahkan masalah dalam kehidupan sehari-hari, (3) sebuah cara untuk mengetahui pola suatu hubungan dan pengalaman, (4) sebuah cara untuk mengembangkan kretavitas, (5) sebuah cara untuk meningkatkan kesadaran dari perkembangan budaya.”

Mathematics is universal knowledge that underlies the development of modern technology, has an important role in various disciplines in developing human brainpower. The rapid development in the field of information and communication technology today is based on the development of mathematics in the field of number theory, algebra, analysis, theory of chance, geometry, and discrete mathematics. To capture and create the future of technology required a strong command of mathematics since childhood.

According Ornstein and Levine (1989:24) the results of student learning in math is the result of the activity of

learning mathematics in the form of knowledge as a result of the treatment or the learning of the student. Or in other words, student achievement in mathematics is what students gained from learning math.

Furthermore, berdasarkan hasil analisis dari rendahnya hasil belajar siswa, hal itu disebabkan oleh domonasi proses pembelajaran yang konvensional (Trianto, 2007:1). In this learning atmosphere tends to teacher-centered classroom so that students become passive. Methods that teachers had applied in the classroom received criticism from President Susilo Bambang Yudhoyono quoted in (Harahap, 2009:10) who said:

“coba lihat, sejak TK, SD, SMP, dan SMA, metodenya jangan hanya guru yang aktif, sementara siswanya pasif, dan sekedar mengejar nilai rapor. Kalau tujuannya cuma nilai rapor, anak-anak kita tidak akan kreatif. Seharusnya pendidikan kita bukan menghasilkan *job seeker* (pencari kerja), tetapi menghasilkan *job creator* (pencipta lapangan kerja)”.

This is supported by United State Agency International (USAID, 2009:1) who says learning in school should not be directed to just know, remember or understand knowledge and science. Correspondingly, according to Ornstein and Levine (1989:11) there is a tendency of most teachers only use the lecture method, so that the students become passive, not creative, and quickly saturated. Likewise in (Ekosiswoyo, 2006:1) disana adalah pengaruh proses penyampaian materi secara instruksi dari guru ke siswa secara satu arah siswa hanya sebagai objek pembelajaran. In the process of mathematics learning, teaching aids and other learning resources are very supportive teaching and learning process in class. This affects the achievement of students after the students get the material given by the teacher. Teachers act as informatory,

organizer, motivator, director, initiator, transmitters, facilitators, mediators, and evaluators. Learning does not just get from the teacher, but learning can also be found from the self and the environment. It should not be centered focus on teacher learning (teacher-centered), where students just accept anything the teacher without going through activity and meaningful student participation, but the focus of learning centered on student activities facilitated and assisted by the teacher. So that students get a good achievement as

expected. To obtain good learning results, students are expected to complete your assignments and understand mathematical concepts to learn math. But the fact that the low performance of students in the resolution of the mathematical tasks and the students have difficulty in understanding the concepts. It is seen from the recapitulation of the study is the average percentage value of final exams before held remedial mathematics courses at SMP N 1 Tanjung Morawa below:

**Table 1. Recapitulation Student Achievement Subject Mathematics Class VIII SMP Negeri 1 Tanjung Morawa in Odd Semester 2011/2012 & Even Semester 2012/2013**

KKM	Odd Semester 2011/2012		Even Semester 2012/2013	
	Total	% Completed	Total	% Completed
$\geq 7.00$	31	40.78%	29	38.15%
$< 7.00$	45	59.22%	47	61.85%
Total	76	100%	76	100%

From Tabel.1 odd semester 2011/2012 academic year that the 76 students (2 classes) there are only 31 students who achieve consistency study 40.78% and the percentage of students who do not achieve the consistency study of 45 students with a percentage of 59.22%. Whereas in semester academic year came true 2012/2013 of 76 students there are 29 students who achieve consistency study 38.15% and the percentage of students who do not achieve the consistency study of 47 people with a percentage of 61.85%.

Under such circumstances the teacher should find the right way to improvements in the learning process. One of the steps that can be reached by teachers in an effort to better understand the students on what they have learned

thus enhancing students' learning results among others by providing a variety of learning strategies and providing motivation for students to learn better.

To overcome the problem of low mathematics achievement, teachers need to know the achievement and the learning progress of students who have previously obtained, for example from another class, before entering the classroom now. The things you need to know it, is such as mastery learning, study skills, and work. The introduction in such matters is important for teachers, by teachers because in this introduction can (1) help/diagnose student learning difficulties, (2) can predict outcomes and further learning progress (in subsequent classes), (3) despite these results can be different and vary with

respect to the state of motivation, maturity, and social adjustment.

By existence is expected by structural practice approach is improving student learning outcomes better, one of the subject at the straight-line equation. Student less attention to the materials that explained by the teacher and have not been able to understand the concepts of matter described by the teacher. It is also found in students on SMP Negeri 1 Tanjung Morawa. Then, the less students understand how to solve it. This statement by researcher also support direct result of interview with mathematics teacher in SMP Negeri 1 Tanjung Morawa (Mom Duena) 9 September 2014 in SMP Negeri 1 Tanjung Morawa stated that:

"siswa mendapatkan nilai yang rendah dalam menyelesaikan tugas-tugas matematika, hal ini disebabkan oleh siswa mengalami kesulitan dalam memahami konsep-konsep. Selain itu guru belum memahami penguasaan dalam manajemen pembelajaran karena focus pembelajaran terpusat pada guru saja (teacher-centered), dan kurangnya saran dan media pembelajaran yang dibutuhkan siswa."

Teacher stated that the students have problems in learning the topic on a straight-line equation of which are already entered on a higher level items, namely its application in daily life. The material is a continuation of the material at the material they have learned about coordinate system and function. However, as Mentioned Earlier, caused the understanding of concepts coordinate system and function is still lack, so the student will into this topic is trouble. Mom Duena also teach mathematics in SMP Negeri 1 Tanjung Morawa express that about learning outcomes of students is less, it is the caused only the students with high-level thinking and active study using the achievement better .

From the interview above, the low student achievement in math, among others, caused by: (1) the poor performance of students in resolving academic tasks, (2) students have difficulty in understanding the concepts, (3) lack of control of the teacher in learning management, (4) focus centered on teacher learning (teacher-centered), where students just accept what is given teacher without going through activity and meaningful student participation, and (5) lack of advice and learning media.

To overcome these problems the teacher as a lecturer should be able to choose an effective learning approach to teaching and learning success. Teaching and approach contextual or Contextual Teaching and learning (CTL) is a concept which helps teachers to link the content of mathematics to real world situations and motivates students to make connections between knowledge and applicability in their lives as family members, citizens, and labor (Parnell, 2001:101). The contextual teaching and learning approach which learning in the school is related real situation. Then, the result of student's achievement is accepted and benefit if the students leave it the school. By Contextual teaching and learning is related in real situation as learning sources or material application. Contextual teaching and learning approach helps students gain a better achievement, also helps teachers improve student achievement.

### **Operational Definitions**

To avoid differences of meaning clarity about important terms contained in this research, it will be noted of operational definition namely:

1. Achievement is the results that have been achieved by students in the learning process and satisfy

maximally expressed with numbers or words.

2. Mathematics achievement is the level of student mastery of the material is achieved in following appropriate teaching and learning goals.
3. Contextual Teaching and Learning approach is a kind of instructional that helps students to understand the significance of the subject matter learned by relating the material to the context of their daily lives and help teachers relates instructional activities to subjects matter.
4. Direct Instruction is learning model that focuses on mastering concepts and also change the behavior of a deductive approach. Here the teacher plays an important role as a transmitter of information, so that a teacher should take advantage of existing facilities such as tape recorders, films, demonstrations, drawings and so on. The information presented can be knowledge of the nature of procedural and declarative knowledge to the shape of lectures, demonstrations, training or practice, and teamwork.

### Research Method

#### Place and Time of Research

The research doing at November 3<sup>rd</sup>, 2014 until November 22<sup>nd</sup>, 2014 in SMP Negeri 1 Tanjung Morawa Academic Year 2013/2014 on first semester.

#### Kind of Research

Type of research is a class experiments conducted collaboratively with classroom teachers. The approach used is cotextual approach to teaching and learning (CTL) which is useful to know the difference in learning achievement of eighth grade students

with students who are taught using direct instruction.

### Research Procedure

In conducting this research, the following phase is:

1. Preparation Phase
 

Activities undertaken in this stage include the preparations in connection with the execution of the research.

    - a. Consultation with the principal's and teacher grade VIII in SMP Negeri 1 Tanjung Morawa, to request permission to conduct research and arranging a research schedule suitable into school schedule
    - b. Arranging a lesson plan of Contextual Teaching and Learning (CTL) and Direct Instruction. The lesson plan that have made three meetings, where one meeting is 2 x 40 minutes
    - c. Preparing data collecting tools as post-test
    - d. Validating the instrument tools of research
  2. Prepare test instrument to obtain data on student achievement
- Implementation Phase
- a. Determine the sample class of the population.
  - b. Prepare material planned, that topic is Pythagorean Theorem.
  - c. Prepare material using Contextual Teaching and Learning (CTL) on an experimental class in accordance with the lesson plan.
  - d. Teach the material using Direct Instruction control class according to the lesson plan.
  - e. Provide post-test on the samples after the class finished all the material provided.

### 3. Data Collection Phase

Data in this research collected after the test is given to students, and then do the scoring. Phase of data processing are:

- Making tabulation and describe the result of research data
- Analyze the data by testing its normality and homogeneity. The last was testing the hypothesis by t-test.
- And also make a conclusion for this research
- Arranging the research report

valuator by students class IX SMP Negeri 1 Tanjung Morawa and mathematics lectures

### Observation Sheet

Suherman (1990) said that, observation is non test evaluation of inventory data on attitudes and personality of student or teacher when learning activities begun and carry out by observe their activities and behavior directly. There are two observation sheets for this research, such as

## Result and Discussion

### Data Collection

This instrument for this research is test and observation.

### Research Instrument

The research instrument used to collect data on students achievement test used on Pythagorean theorem topic consists of 20 multiple-choice items, before give the test to students, the instrument that arranged have legalized by expert

### Discussion

#### Statistic Descriptive Analysis

The descriptive statistic of the study result taken by data instrument is in score form. The presentation of descriptive statistic of students' mathematics learning consist of mean, median, standard deviation, range, minimum score, and maximum score. The summary statistic descriptive for every treatment group are shown in the Table 2 below:

**Table 2. Summary of Descriptive Statistic**

Statistic	X <sub>1</sub>	X <sub>2</sub>
Mean	8.42	7.67
Median	9.00	8.00
Mode	11.00	11.00
Standard Deviation	2.42	2.73
Sample Variance	5.85	7.43
Range	9.00	9.00
Minimum	3.00	2.00
Maximum	12.0	11.00
Sum	303.00	276.00
Count	36.00	36.00

Notes:

X<sub>1</sub>: Group of Students by contextual teaching and learning (CTL)

X<sub>2</sub>: Group of Students by direct instruction

**3Students’ Mathematics Achievement Taught By Contextual Teaching and Learning (CTL) Approach**

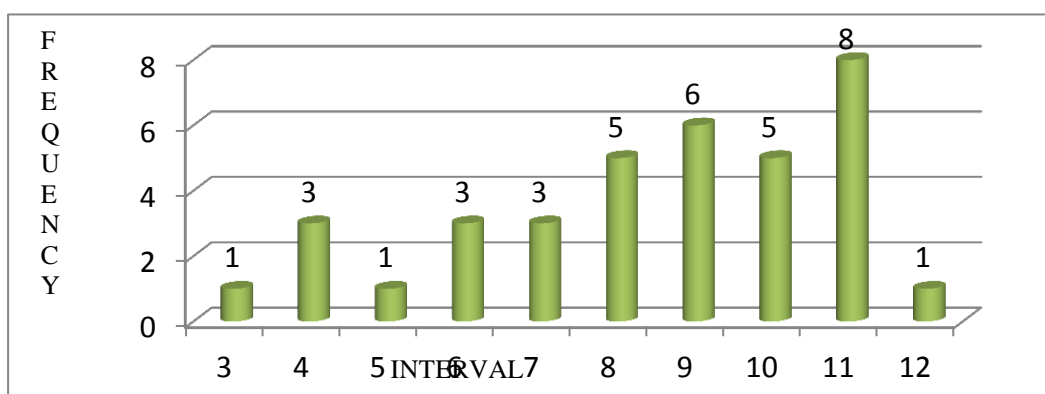
Based on the data of students’ mathematics achievement is taught by contextual approach, the minimum score is 3 and the maximum is 12 based on the

calculation, the mean score is 8.42, the variance is 5.85, the standard deviation is 2.42, the mode is 11.00 and the median is 9.00. The frequency distribution of students’ mathematics achievement taught by contextual approach can be shown on Table 3.

**Table 3. The Students’ Mathematics Achievement Taught By CTL**

Score	Absolute Frequency	Relative Frequency
3	1	2.77%
4	3	8.33%
5	1	2.77%
6	3	8.33%
7	3	8.33%
8	5	13.88%
9	6	16.77%
10	5	13.88%
11	8	22.22%
12	1	2.77%
<b>SUM</b>	<b>36</b>	<b>100%</b>

The data of distribution table can be drawn in bar diagram (histogram) that can be seen on figure 1



**Figure 1 Histogram of data distribution Achievement Taught by Contextual Teaching and Learning (CTL) Approach**

From the diagram can be seen that the students’ mathematics achievement

taught by contextual teaching and learning (CTL) approach, most of

students get score 11 with the total of 8 students (22.22%), and few of students get score 3,5, and 12 with the total of 1 students (2.77%).

**Students' Mathematics Achievement Taught By Direct Instruction**

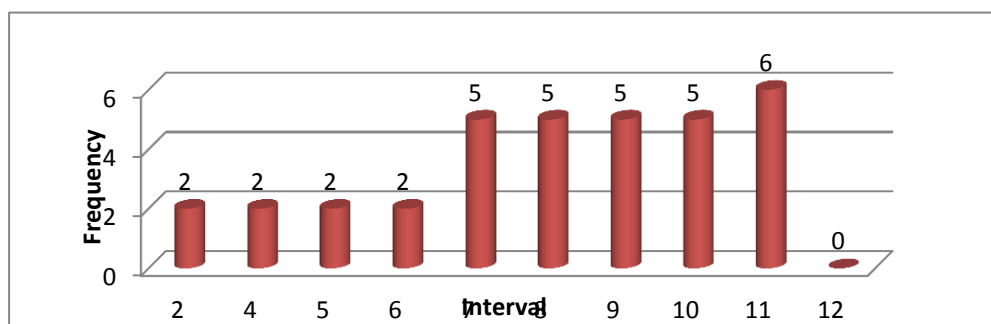
Based on the data of students' mathematics achievement taught by

contextual approach, the minimum score is 2 and the maximum is 11 based on the calculation, the mean score is 7.67, the variance is 7.43, the standard deviation is 2.73, the mode is 11.00 and the median is 8.00. The frequency distribution of students' mathematics achievement taught by direct instruction approach can be shown on Table 4.

**Table 4. The Students' Mathematics Achievement Taught By Direct Instruction**

Score	Absolute Frequency	Relative Frequency
2	4	11.11%
4	4	11.11%
5	4	11.11%
6	4	11.11%
7	5	13.89%
8	5	13.89%
9	5	13.89%
10	5	13.89%
11	6	16.67%
12	0	0%
<b>SUM</b>	<b>36</b>	<b>100%</b>

The data of distribution table can be drawn in bar diagram (histogram) that can be seen on figure 2.



**Figure 2 Histogram of data distribution Achievement Taught By Direct Instruction**

From the diagram can be seen that the students' mathematics achievement taught by direct instruction, most of students get score 11 with the total of 6

students (16.67%), and few of students get score 12 with the total of 0 students (0%).



**Assumption Analysis Test**

**Normality of Test**

Normality test is calculated by using Liliefors where the null hypothesis ( $H_0$ ) states that the data sample have normal distribution. The rejection of null hypothesis based on the comparison value of  $L_{\text{calculation}} < L_{\text{table}}$

concludes that the data sample have normal distribution. The normality test is calculated for two treatments, they have group of students taught by contextual approach and direct instruction approach. The result of normality's test can be seen in Table 5:

**Table 5 Summary of Normality Test of Students' Mathematics Achievement Taught by Contextual Teaching and Learning and Direct Instruction Approach**

Group	N	$L_{\text{calculation}}$	$L_{\text{table}} (\alpha = 0.05)$	Conclusion
Contextual ( $X_1$ )	36	0.123	0.148	Normal
Direct Instruction ( $X_2$ )	36	0.111	0.148	Normal

From the calculation result as seen on table 4.4, for students' mathematics achievement taught by contextual approach gives  $L_{\text{calculation}} = 0.123$ , while the  $L_{\text{table}} (\alpha = 0.05, 32) = 0.148$ . Since  $L_{\text{calculation}} (0.123) < L_{\text{table}} (0.148)$  then the data has normal distribution. While for the students' mathematics achievement taught by direct instruction gives  $L_{\text{calculation}} = 0.111$ , while  $L_{\text{table}} (\alpha = 0.05) = 0.148$ . Since  $L_{\text{calculation}} = 0.111 < L_{\text{table}} (\alpha = 0.05) = 0.148$  then the data have normal distribution.

**Variance Homogeneity of Test**

The variance homogeneity test is calculated to see that data variances of

each normal distribution group are different or not. The homogeneity test is calculated by using Fisher Test.

**The Calculation of Homogeneity Test of Students' Mathematics Achievement Taught by Contextual Teaching and Learning (CTL) approach and Direct Instruction.**

The variance homogeneity test of students' mathematics achievement taught by contextual teaching and learning (CTL) and direct instruction is calculated by using Fisher Test. The summary of Fisher Test can be seen on Table 6:

**Table 6 Summary of Fisher Test of Students' Mathematics Achievement Taught by Contextual Teaching and Learning and Direct Instruction**

Group	N	Dg	$S_i^2$	$F_{\text{count}}$	$F_{\text{table}}$
Contextual ( $X_1$ )	36	35	5,85000	1.270	1.757
Direct Instruction ( $X_2$ )	36	35	7,42857		

From the summary of calculation of variance of students' mathematics achievement taught by contextual teaching and learning (CTL) and direct instruction approach can be seen that value of  $F_{\text{count}} < F_{\text{table}}$ . Hence, it follows that the sample variance is homogeny.

### Hypothesis Test

For hypothesis testing using test t that is distinguish the average of post-test result students in experiment and control class to know hypothesis test for the difference of student's mathematics achievement who taught by contextual teaching and learning (CTL) and direct instruction.

The statistical hypothesis test is:

$$H_o : \mu_1 \leq \mu_2$$

$$H_a : \mu_1 > \mu_2$$

Note:

$\mu_1$  : The average of students taught by contextual teaching and learning (CTL)

$\mu_2$  : The average of students taught by direct instruction

Hypothesis testing criteria is: accept  $H_o$  if  $-t_{1-\frac{1}{2}\alpha} < t_{\text{count}} < t_{1-\frac{1}{2}\alpha}$

Hypothesis testing using t-test to know whether the sample group comes from a homogeneous population or not. For information, the calculation by SPSS 18 and excel of the homogeneity test listed in the table below:

**Table 7. Summary Hypothesis Test in Control and Experiment Class**

	Average	$t_{\text{count}}$	$t_{\text{table}}$	Sig	Conclusion
<b>Contextual (X1)</b>	8.417	1.2349	1.9944	0.015	There is a difference
<b>Direct Instruction (X2)</b>	7.667	1.2349	1.9944	0.039	

The summary test t in table shows that  $t_{\text{count}} (1.2349) < t_{\text{table}} (1.9944)$  and Sig. Contextual (0.015) < 0.05 and Sig Direct Instruction (0.039) < 0.05. It shows  $H_o$  is accepted for confidence interval 95%. Based on the mean score for both group (experiment class and control class), it show that the mean score for mathematics achievement taught by contextual approach is higher than the mean score for mathematics achievement taught by direct instruction approach, where the experiment group has mean score 8.417; while the control group has mean score 7.667. It means that the contextual approach gives a higher effect than the direct instruction approach due to students' mathematics achievement.

### Discussion

Based on the data analysis result above due to the statistic calculation used gives the discussion as follow:

**The Difference of Achievement between the students Taught By Contextual Teaching and Learning (CTL) and Direct Instruction.** The learning approach has a significant effect to students' mathematics achievement. It is showed by the value of statistical test is less than the value of critical test  $t_{\text{count}} (1.2349) < t_{\text{table}} (1.9944)$ . It shows that  $H_o$  is **accepted** for significant interval 5%. Based on the learning for both class (experiment class and control class) it same, meanwhile that the mean score for mathematics

achievement taught by contextual approach is same (is not different) the mean score for mathematics achievement taught by direct instruction approach, where the experiment class has mean score 8.417; while the control class has mean score 7.667. It means that the contextual approach gives a higher effect than the direct instruction approach due to students' mathematics achievement.

The study result above support the relevant study of Rafiah (2012) stated that the students' mathematics achievement taught by contextual approach is higher than students' mathematics achievement taught by direct instruction. The relevant study of Malau (2013) also states that the students' physics achievement taught by contextual approach is higher than students' physics achievement taught by direct instruction approach.

It can be accepted since by using contextual teaching and learning (CTL), students were placed as learning subject and try to gain or find the learning themselves. The students have a meaningful learning since the materials by teacher are connected with real-life situation in every daily activity of students. In contextual teaching and learning (CTL) approach, students learned through cooperative learning that makes students are more active while learning process. While in direct instruction approach, the students are placed as learning object and have a main role as a receiver of information. It made students are less active while learning process and focus centered on teacher learning (teacher centered), where students just accept what is given by the activity and the teacher without meaningful participation of students.

### Conclusion

Based on the result and discussion in the previous chapter can be

conclude that there is the different of Contextual Teaching and Learning (CTL) approach to the students mathematics achievement. It can be shown by:

1. The mathematics achievement of students taught by contextual teaching and learning (CTL) approach is higher than the mathematics achievement of students by direct instruction.
2. Based on the teachers' observation that it can be concluding that the teacher who implement the learning contextual attractive rather than who implement the direct instruction.

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