DIFFERENCES OF LEARNING RESULT OF STUDENT'S TAUGHT MATHEMATICS USING COOPERATIVE LEARNING MODEL *STUDENT TEAM ACHIEVEMENT DIVISONS (STAD)* AND CONVENTIONAL IN CLASS X SMA NEGERI 8 MEDAN

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ABSTRACT

The study was conducted to see whether the results of learning mathematics students are taught using cooperative learning model STAD higher than conventional learning models taught on the logarithmic material in class X SMA Negeri 8 Medan. This study includes a kind of quasi experiment. The sample of this study is class X-2 as the experimental class A applied cooperative learning model type STAD And class X-1 as experimental class B applied conventional learning model. From the research results obtained that the average of pretest experiment class A 36,8 and postes 82,1 while experiment class B has an average of pretes 35,9 and postes 75,1. By using statistical test t on level α = 0,05 In proving the hypothesis is obtained t_{hitung} =3,147 and t_{tabel} =1,667 due to price $t_{hitung} > t_{tabel}$, Means that H $_a$ is accepted, then it is concluded that the results of learning mathematics students are taught by using cooperative learning model STAD higher than conventional learning models in class X SMA Negeri 8 Medan school year 2013/2014.

Keywords: *Cooperative Learning Model STAD, Results of learning mathematics.*

1. INTRODUCTION

Education is a process of human soul formation to develop in accordance with its potential and capability. Education is also a supporting factor in the development and competition in various fields. Nowadays, the world of education especially mathematics has become the main concern of various circles. It is realized that the importance of the role of mathematics in the development of various sciences and technology and in everyday life.Mathematics is also a field of study that occupies an important role in education, this can be seen from school hours more hours than other lessons. In addition, mathematics also can not be separated from science and technology. This is because math can train someone to think logically, critically, creatively, and skillfully to solve problems in everyday life.

This is also in accordance with the opinion of Cockroft (in Abdurrahman, 2009: 253) [1] said that: "Mathematics needs to be taught to students because: (1) Always used in terms of life; (2) All fields of study require appropriate mathematical skills; (3) It is a powerful means of communication, short and clear; (4) Can be used to present information in various ways; (5) Improve the ability of logical thinking, thoroughness, and financial awareness; And (6) Provide satisfaction to solving challenging problems ".

Considering the importance of mathematics, then students are expected to master mathematics lessons. The process of learning to teach mathematics required interest and high motivation of students to support the success of mathematics learning so that learning results obtained high. But in reality in learning mathematics students tend to be less interested and motivated to learn math. This is

marked by the number of students who are absent and skip over during mathematics. Students regard mathematics as a boring subject and most students make the math as a frightening specter causing less than optimal learning outcomes.

Based on observations made by researchers in grade X SMA Negeri 8 Medan on April 2, 2013 shows there are still many weak students in math lessons. This can be seen from the achievement of the average value of student learning outcomes through tests related to logarithms. From the results of the test indicated that 33 students (82,5%) had a value <70 and only 7 students who have value   70. This shows that student learning outcomes, especially on logarithmic material is very low.

One of the factors causing low mathematics learning achievement of students is inseparable from the ability of teachers in teaching. The selection of varied teaching methods will help improve teaching and learning activities and foster students' motivation to learn. In order to make students can learn well, then teaching methods should be cultivated as efficiently and effectively as possible. As revealed Slameto (2010: 65) [7] suggests that: "Teaching methods that are less good will affect students learning is not good anyway. The unfavorable methods can occur for example because the teacher is less prepared and less mastering the lesson material so that the teacher presents it is not clear or the teacher's attitude towards the student and or against the subject itself is not good, so that students are less happy about the lesson or the teacher. Consequently students are lazy to learn ".

Mankind adapt to the community life since the beginning of creation. They are social and civilian in their tendencies. They rarely live or work alone, but they always tend to interact in a safety social medium which supplies them the necessary support to continue their life. So, cooperation is the basic characteristic of human beings both in life and education. (Nikou, 2014) [5]. Of that opinion then one of the efforts to improve the learning outcomes is by using cooperative learning model. Cooperative learning model is not the same as simply learning in groups. There are basic elements of cooperative learning that distinguish it from the perfunctory group division. In cooperative learning, students work in pairs, to maximize their own and other learning. In addition, cooperative learning frequently new ideas and their solution ie the process gain, deve lop high level of reasoning and transfer of information and knowledge from one situation to another situation ie the group to individual transfers than any type of other learning, (Roger & Johnson , 1994) [4] . This learning provides an opportunity for students of different backgrounds and conditions to work interdependent with each other. High achievers will become tutors for low achievers, learning has not been completed if one of the friends of the group has not mastered the lesson. Furthermore, Slavin (in Sanjaya, 2009: 242) [6] says: "Cooperative learning is a learning model using a small grouping system / small teams that is between four to six people with different academic, gender, race or ethnic background skills (heterogeneous). The purpose of the establishment of the group is to provide opportunities for all students to be actively involved in the process of thinking and learning activities ". There are several types of cooperative learning model that can be developed in mathematics learning, one of which is a cooperative learning model *Student Team Achievement Divisons* (STAD).

2. Cooperative learning model *Student Team Achievement Divisons* (STAD)

The essence of STAD is that teachers convey a material, while students joined in group consisting of 4 to 6 and each heterogeneous group, consisting of men and women, possessing high, moderate, and low ability to solve the problems given by the teacher. Furthermore, students are given a quiz / test individually. The score of the quiz / test results in addition to determining the individual score is also used to determine the group score. Team members use activity sheets or other learning tools to complete their lessons and then help each other to understand the lesson material through tutorials, quizzes to each other and or conduct discussions. Individually given a quiz on each student.

Suggested that the STAD learning can encourage students and teachers to be innovative and creative to improve teaching and learning in the classroom, enhance individual and group skills in problem solving, improve communication and commitment and eliminate prejudice against peers (Ling and Ghazali, 2016) [3] .

Table-1: Cooperative Learning Syntax Type STAD

Phase	Teacher's Activity
Phase 1 Convey goals and motivate students	The teacher conveys all the lesson objectives to be achieved in the lesson and motivates the student to learn.
Phase 2 Presents information	Teachers present information to students in a demonstrations or reading material
Phase 3 Organizing students into study groups	Teachers explain to students how to form learning groups and help each group to transition efficiently

Phase 4 Guide group work and study	Teachers guide learning groups as they do their work
Phase 5 Test the students' mastery of teaching materials	Teachers evaluate learning outcomes about the material they have learned or each group presents their work.
Phase 6 Give rewards	Teachers seek ways to appreciate both individual and group effort and learning outcomes.

3. Conventional Learning

Conventional learning is a learning model that we usually see everyday. In this lesson, teachers teach a number of students, usually between 30 to 40 students in a room. In general the teacher's way of determining the speed of presenting and the degree of material difficulty to the students is based on the student's general ability information. Teachers seem to be very dominant in determining all learning activities. The number of materials taught, the sequence of subject matter, the speed of teachers teaching, and others entirely in the hands of teachers. This is in line with that of Trianto (2009: 1) [9] that: "In a more substantial sense, that today's learning process still provides teacher dominance and does not provide access for students to develop independently through discovery and thought processes."

The Conventional Learning Model is characterized by the teacher teaching more about non-competence concepts, the goal is for students to know something, and in the learning process, the students listen more. On Conventional learning the classroom atmosphere tends to be *teacher- centered* classroom so that students become passive. In other words, the active learning process is the teacher while the students are passive. Whereas the learning process of students related to learning outcomes, can develop creativity, can remember the lesson material longer, and learning becomes more meaningful for students. In this case students are not taught learning strategies that can understand how to learn, self motivate.

Learning with conventional models does not seem to be able to serve students' individual learning needs. Some students complain because the teacher is teaching very quickly. Others complain that the teacher teaches verbally, and many other complaints. For that we need to find another way so that all students can be served as well as possible. This problem is commonly encountered in teaching and learning activities in the classroom, therefore, need to apply a learning strategy that can help students to understand the teaching materials and its application in everyday life.

For more details, below will be presented the difference of cooperative learning with conventional learning. As noted by Killen (in Trianto 2009: 58-59) [9] these differences can be seen in the table below:

Table-2: Differences of Learning Group Cooperative and Conventional

Cooperative Learning Group	Conventional Learning Group
The existence of positive interdependence, mutual help, and mutual motivation so that there is a promotive interaction	Teachers often allow the presence of students who dominate the group or rely on the group.
Individual accountability measures the mastery of the subject matter of each group member, and the group is given feedback on the learning outcomes of its members so that they can know who needs help and who can provide assistance	Individual accountability is often ignored so that tasks are often encouraged by one group member while the rest of the group "hicks out" the success of the "contractor".
Heterogeneous learning groups, whether in academic ability, gender, race, ethnicity, etc. so that they can know who needs help and who provides assistance.	Study groups are usually homogeneous
Group leaders are elected democratically or rotate to provide leadership experiences for group members.	Group leaders are often determined by teachers or groups to be allowed to choose their leaders in their own way.
The social skills needed in mutual work such as leadership, communication skills, trusting others, and managing conflict are	Social skills are often not directly taught.

directly taught.	
At the time of cooperative learning is ongoing teachers continue to monitor through observation and intervene in case of problems in cooperation among group members.	Monitoring through observation and intervention is often not done by the teacher while group learning is in progress.
Teachers pay attention to the group processes that occur in learning groups.	Teachers often do not pay attention to the process of group learning that occurs in study groups.
Emphasis is not only on task completion but also on interpersonal relationships	Emphasis is often only on task completion.

4. Learning outcomes

Learning outcomes consist of two words that are result and learning. The outcome is the result of being caused by an activity. While learning is a series of activities to obtain behavioral changes as a result of individual observations in interaction with the environment. The outcome of the learning effort is the achievement of the learning objectives commonly known as the learning achievement, with the learning outcomes, a teacher can understand whether the policies that have been made in the class have given satisfactory results or otherwise, the learning outcomes can also give an idea of what the teacher can do in the future . Some definitions of experts about learning outcomes include:

Dimyati and Mudjiono (2006: 250-251) [2] that the learning outcomes are the result of the learning process. Active participants in study are students. Active actors in learning are teachers. Thus, learning outcomes are things that can be viewed from both sides of the student side and from the teacher side. In terms of students, learning outcomes are a better level of mental development when compared to before learning. The level of mental development is manifested in the types of cognitive, affective, and psychomotor domains. Whereas from the teacher side, the learning outcome is the time of completion of the lesson material. Learning outcomes are assessed by teacher measures, school level and national level. With these measures, an outgoing student may be graduated or not graduated.

According to Sudjana (2009: 22) [8] that: "The learning outcomes are the abilities that the students has after he/she receives the learning experience". Learning outcomes are used by teachers to be used as a measure or criteria in achieving an educational goal. To measure learning outcomes that have been achieved by students, then given the test. From these results, usually said to perform well if it has a high value and said to have a low achievement if it has a low value. Based on the above understanding, it can be concluded that the learning outcome is a final assessment of the process and the introduction that has been done repeatedly. And learning outcomes participate in shaping individuals who always want to achieve better results so that will change the way of thinking and generate better behavior.

5. RESEARCH METHODS

The type of research used is quasi experiment A, namely research that is intended to determine whether there is a result of something imposed on the subject of student. This research involves two classes of experimental class A and experimental class B, where the two classes are treated differently. The experimental class A is given cooperative learning model type STAD while the experimental group was given m odel B Conventional learning. In this research is given twice test before treatment and after treatment. Tests given before treatment (T_1) are called the pre-test and tests given after treatment (T_2) are called postes. The difference between T_1 and T_2 which $T_2 - T_1$ is assumed to be the effect of the treatment.

The sampling technique in this research is done randomly simple *(simple random sampling)* that is by taking a sample as much as two class. One class is made into experimental class A that is class X-2 taught by cooperative learning model STAD and one class become experimental class B that is class X-1 taught by conventional learning. The research procedure is the stages of activity with a set of data collection tools and a set of learning. So that the research is easy to implement, then there are several stages to be implemented that is:

1.Preparation phase
   In the stage of preparation is done:
   1. Preparing research schedules tailored to the schedule in the school.
   2. Preparing lesson plans using STAD type of cooperative learning model and conventional learning models on logarithmic materials.

3. Prepare data collection tools in the form of pretest and postest.

2. Implementation Phase

At this stage of the implementation of the activities undertaken are:

1. The sample in this study was taken randomly as much as 2 classes of experiment class A and experiment class B. Random sampling because each class has the same opportunity to sample.
2. Provide the first test (T_1) to the two classes to measure the initial ability of mathematics, then calculate the mean (average) of each class.
3. Doing the treatment that is for experimental class A learning using STAD cooperative model, while experimental class B with conventional learning.
4. Providing the second test (T_2) to both classes. This test is given after the treatment is completed, then calculate the mean (average) of each class.
5. Calculating the difference between the results of the first test (T_1) and the second test (T_2) for each class, so $((T_{2(e)}) - (T_{2(e)}))$ dan $((T_{2(k)}) - (T_{2(k)}))$
6. Compare these differences, to determine whether the mathematical learning outcomes with the STAD cooperative model were higher in the experimental group A, so $((T_{2(e)}) - (T_{2(e)})) - ((T_{2(k)}) - (T_{2(k)}))$
7. To test the hypothesis by using t-test to determine whether the difference in score (step 5) is significant, ie whether the difference is large enough to reject the null hypothesis.

3. Final Stage

Drawing conclusions from data that has been analyzed.

Before doing the learning with two different learning model that is learning with model of cooperative STAD and conventional learning, firstly done pretest (preliminary test). The goal is to know the students' early skills without being influenced by learning and become the basis for grouping students at the time of learning.

6. RESULT OF THE RESEARCH

From the students' mathematics learning outcomes obtained that the highest score in the experimental group A for pretest was 80, whereas the lowest score was 12, with many classes of 5, the length of class 14 was obtained the list of frequency distribution.

Table-3: List of Frequency Distribution of Pretest Data of Experiment Class Student A

No	Interval Class	F	%
1	12 - 25	12	30
2	26 - 39	10	25
3	40 - 53	15	37.5
4	54 - 67	2	5
5	68 - 81	1	2.5
amount		40	100

From the results of pretest obtained the average value of pretest students experimental class A Is 35,9 with a standard deviation of 13,9. The table above shows that from the pretest value there are 10 people (25%) in the average group, 12 people (30%) are below the average group, and as many as 18 people (45%) who are above the average group . From the students' mathematics learning outcomes obtained that the highest score in the experimental group B for the postes is 68, whereas the lowest value of 12, with many classes of 5, the length of class 12 obtained the list of frequency distributions such as tables.

Table-4: List of Frequency Distribution of Pretes Data of Experiment Class Students B

No	Interval Class	F	%
1	12 - 26	11	27.5
2	27 - 41	14	35
3	42 - 56	11	27.5
4	57 - 71	3	7.5
5	72 - 86	1	2.5
amount		40	100

From the results of pretest obtained the average value of pretest students experimental class B Is 36,8 with a standard deviation of 15,5. Table 4.3 shows that from the pretest score there are 14 people (35%) in the average group, 11 people (27,5%) are below the average group, and as many as 15 people (37,5%) are above the average group.

The results showed that in general the level of mastery of students on logarithmic material is categorized well, it is seen from the number (percentage) of students who achieve a score of 65% or more as many as 61 students (76,25%) from 80 students. But the results of student learning on cooperative learning model STAD higher when compared with conventional learning. This can be seen from the achievement of 70% or more score on the model of cooperative learning STAD by 90% when compared with the percentage of conventional learning by 62,5%. Overall it can be seen the average results of learning mathematics student whose teaching with model of cooperative learning STAD equal to 82,1 (high category) while for conventional learning equal to 75,9 (medium category).

The t-test calculation is based on mathematics learning result of student on level $\alpha = 0,05$ obtained $t_{hitung} > t_{tabel}$ yaitu $3,147 > 1,667$, then H_0 rejected and H_a accepted. The data indicate that the result of student learning that is taught by using model of cooperative learning type *Student Team Achievement Divisons* higher than with the student learning result which is taught by using Conventional learning model, it means cooperative learning model of *Student Team Achievement Divisons* type have positive effect to students' mathematics learning result on logarithm material in grade X SMA Negeri 8 Medan compared with conventional learning models.

7. CONCLUSIONS

Statistically by using t-test and classical thoroughness result concluded that student learning outcomes taught by using cooperative learning model *Student Team Achievement Divisons* (STAD) is higher compared with conventional learning in the logarithmic of student of class X SMA Negeri 8 Medan, FY 2012/2013. This is evidenced from the results of testing the hypothesis where $t_{hitung} > t_{tabel}$ yaitu $3,147 > 1,668$. Because the result of learning mathematics of students who are taught by using model of cooperative learning *Student Team Achievement Divisons* (STAD) higher compared with result of student learning taught by using conventional learning model, hence cooperative learning model *Student Team Achievement Divisons* (STAD) have positive effect to increasing result of student mathematics learning on logarithms material in class X SMA Negeri 8 Medan compared to conventional learning models.

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