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STUDENTS' LEARNING RESULTS ON TRIGONOMETRY MATERIAL THROUGH NUMBERED HEADS TOGETHER COOPERATIVE MODEL WITH MNEMONIC STRATEGY

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Abstract

Trigonometry is one of materials at Grade X of second semester of senior high school. It is an important material to be learned because it is not only an examination material, but also has a continuation at Grade XI. In addition, the material has many contributions to daily life, such as tree height calculation and determination of Qibla direction. In the learning of trigonometry, mnemonic strategy can be implemented, which is a way to help the students remember the information more effectively and easily. Mnemonic learns new information by linking the existing information through visual images or letters and words combination. Therefore, this research was conducted in terms of trigonometry material learning through NHT (Numbered Heads Together) cooperative learning with mnemonic strategy at Grade X of MAN Darussalam. The research is aimed to find out students' learning mastery classically as well as individually and to find out students' responses toward trigonometry learning process through mnemonic strategy that was applied in cooperative model of NHT type. The research population was all of Grade X students of MAN Darussalam while the sample was 31 students of X-IPA 1. Based on the students learning result, the lowest score was 50, the highest was 100 and the mean was 81.8. This means that the mathematics achievement of MAN Darussalam Grade X students reached successful or completed stage. While students' responses toward learning activity which based on the observation showed less effective. It could be seen from students' responses percentage toward positive statement that was less than 80%.

Keyword: *Mnemonic Strategy, Numbered Heads Together, learning results.*

INTRODUCTION

Education is one of life aspect which has an important role in an effort to develop and establish qualified human being, so it is proper that education gets a serious concern and requires a renewal from time to time. Mulyasa (2003, p. 4) stated, "Education is a life, so the learning activity should be able to equip the students with life skills or life competency in accordance with environment and students' need." The efforts to improve education quality are constantly carried out conventionally and innovatively. It was more focused after getting a mandate that the goal of national education is to improve education quality on every type and level of education. Nowadays, Mathematics is still one of uninteresting subjects. In fact, some people think that Mathematics is the scariest or the most overwhelming subject. Therefore, it is not surprising when some students have difficulties in learning certain materials such as trigonometry.

In consequence, John Santrock (2008, p. 331) said that there are some ways to help the students improve their memory ability, namely (1) motivate the students to remember comprehension material, it is not to remember it casually, (2) help them organize what they insert into the memory, and (3) teach the mnemonic strategy. Whereas, according to Wolgemuth, Cobb, and Alwell (2008), mnemonic is a way to help the students remember the information more effectively and easily. Mnemonic helps students learn new information by connecting the existing information through visual images or letters and words combination (Wolgemuth, Cobb, & Alwell, 2008). Shmidman and Ehri (2010, p. 160) added, mnemonic becomes effective by accelerating the learning, decreasing the confusing between the same items, strengthening long-term memory, and applying the information. The research result of Delashmutt (2007, p. 22) also stated that the use of mnemonic can help the students to maintain Mathematics concepts so that the students are able to solve Mathematics problems and overcome the concept confusion that they get. In addition, they are also interested in Mathematics, want to improve the ability and earn the benefits of the use of mnemonic in it.

Based on the definitions above, it can be said that mnemonic is a method to remember something easily. In other words, mnemonic means the method to utilize the memory in certain ways.

Some mnemonic techniques based on Joyce and Weil (2000) that can be used to remember is:

(1) Acronym is a combination of letters or syllables from a word arranged to form a new word for example, BEMDAS (*Brackets, Exponent, Multiplications, Divisions, Additions, Subtractions*) solving series or Math equation evaluation. Another example in trigonometry comparison at Senior High School, the acronym can be used to simplify in understanding sine, cosines, and tangent meaning, by: Sin-ring (front per slant), it means that the sine of angle (in a right-angled triangle) is a ratio of side at the front corner with the length of the slant side of the triangle.

(2) Acrostic is a sentence method. The technique is taking the first letter from the word that will be remembered and arranged to become interesting words string. As an example, to remember an angle sign in every quadrant of trigonometry ratio is used All of Ray without Cosmos or All of Empty Hand Syndicate (**All** is positive in the first quadrant, **Sin** is positive in the second quadrant and **Tan** is positive in the third quadrant, and **Cos** is positive in the fourth quadrant).

(3) Rhyme is a poem that is made in such a way which consists of words and terms that used to be remembered by the students. The poem will have a better effect if it is sung a song often heard by the students. For instance, the teachers teach students about special angles by using a certain song rhythm.

(4) Keyword method, in which a lively imagination is put on pronouns.

Based on the problems explained above, it is necessary for the teachers to plan a learning model with certain strategy to increase an ability to comprehend the material, such as cooperative learning model of NHT (*Numbered Heads Together)* type with mnemonic strategy. According to Kagan (2007), the NHT learning model indirectly trains the students to share information with each other, listen accurately and speak full of calculation, so they become more productive in learning. The cooperative learning has been implemented in schools due to the great benefits in increasing their interaction in learning and encouraging to help each other in learning the material.

By the explanation, the researcher combines cooperative learning model of NHT type with mnemonic strategy to give a chance for the students to improve the ability to comprehend and remember Math concepts so as to give a positive impact for their learning result.

Based on the background, the problem statement is (1) how are the students' learning result in trigonometry material by using cooperative learning material of NHT type with mnemonic strategy and (2) how are the students' responses toward the use of the learning model.

METHOD

This research was conducted to examine the trigonometry through cooperative learning material of NHT type with mnemonic strategy at Grade X of MAN Darussalam. The research instruments used are students' worksheet and test to find out the level of their comprehension on trigonometry material, then questionnaire was used to find out their responses about the learning.

The data obtained from test result and worksheets were analyzed by comprehension criteria accordance with Permendikbud 104 year 2014.

Tabel 1. Assessment criteria based on Permendikbud 104 year 2014.

Scale	*Predicate*
86 – 100	Very Good (A)
70 – 85	Good (B)
59 – 69	Enough (C)
≤ 55	Less (D)

The data about students' responses were obtained by way of delivering questionnaire analyzed using descriptive statistics on the percentage. According to Mukhlis (2005, p. 79), "The percentage of every student's responses is obtained by dividing the number of their responses for each aspect that came up with the total number of students multiplied by one hundred percent". Systematically, *the percentage of each student's responses* can be written:

$$P = \frac{the\ number\ of\ students'\ responses\ for\ each\ aspect\ that\ came\ up}{the\ total\ number\ of\ students}\ x\ 100\%$$

In which:
P = percentage
F = frequency
N = the number of sample

The criteria for students' responses are said effective if their answers toward positive statement for each aspect that is responded to every learning component obtained the percentage ≥ 80%.

RESULT AND DISCUSSION

Learning activity by applying mnemonic method was conducted on April 12th, 2015 on the material about the total of sine and cosine with students of Grade X of MAN Darussalam. The data of students learning were gained through a final test, which consisted of 5 essay questions and given after doing trigonometry learning process through cooperative learning model of NHT type with mnemonic strategy at Grade X of MAN Darussalam. The research was conducted in about three meetings, in which two of them were for learning process and a meeting was for implementing the learning result test (final test) and fulfilling the questionnaire of the students' responses. Based on the results, the lowest score was 50, the highest was 100 and the mean was 81.8. It means that the mathematics achievement of MAN Darussalam Grade X students reached successful or completed stage.

In the implementation, the students were grouped into some groups that consist of 5-6 students and given the number so that every student in a group had a different number. The teacher provided various questions from specific until general. Every group member cooperated and helped each other in comprehending the material and made sure that the group members understood the material. Then, the teacher called a number from one of the groups and the one who had the same number raised their hand and prepared an answer to the class.

Despite explaining many advantages, trigonometry learning by cooperative model of NHT type with mnemonic strategy had some weaknesses. At the time of research, every time the learning started, the students took too much time in preparing the seats to form a group, especially the researcher only conducted the learning process for two meetings. Moreover, there were students who were unfamiliar with the group learning and as a result they prefer to learn individually.

According to the analysis above, it can be concluded that trigonometry learning through cooperative learning of NHT type with mnemonic strategy at Grade X of MAN Darussalam reached the completeness. Furthermore, the students' responses questionnaire were given for every student at the end of learning which was aimed to find out the students' opinion and feeling about the learning model. Meanwhile, the observation of the students' responses toward learning activity showed ineffectiveness. From the percentage which was less than 80%, it can be concluded that trigonometry learning through cooperative model of NHT type with mnemonic strategy got less positive responses from the students.

CONCLUSION

According to research result and discussion, it can be concluded that:

(1) Trigonometry learning through cooperative model of NHT type with mnemonic strategy at Grade X of MAN Darussalam reached the completeness even though the learning process was only conducted for 2 meetings.

(2) From the data analysis, the students' responses toward trigonometry learning through cooperative model of NHT type with mnemonic strategy was ineffective because every aspect that responded less than 80% indicated less positive responses.

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