



**THE EFFECT OF NUMBERED HEADS TOGETHER (NHT)
LEARNING STRATEGY ON THE RETENTION OF
SENIOR HIGH SCHOOL STUDENTS IN MUARA BADAK,
EAST KALIMANTAN, INDONESIA**

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Abstract:

This quasy experimental research aimed at investigating the effect of NHT learning strategy on student's retention. The design of this research was Pretest-Posttest Non-equivalent Control Design. The population of this research was all the students of class XI of state senior high school in Muara badak, East Kalimantan, Indonesia in the first semester of 2015/2016 academic year. The samples of this research were students of class XI natural science 1 and XI natural science natural 2. There were 30 students in each of hte class. The data obtained from essay tests were analysed using Ancova. The results of the analysis showed that the learning strategy had an effect on the retention. The corrected mean score of the NHT learning strategy was 24.03% higher compared to that of the conventional learning.

Keywords: learning strategy, numbered heads together, retention, senior high school

1. Introduction

Along with development of science and technology today science learning aims to produce students who are literate in science and technology, able to think logically, critically, creatively, and to argue correctly. The education of natural science, especially Biology, is expected to be a medium for students to learn and to discover phenomena

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that occur within themselves and the environment, and to apply it in everyday life (Department of National Education, 2006).

To understand the phenomenon happening within themselves and the surroundings, in the biology learning, students should be stimulated to actively think through an observation or experiment supported by social interaction with the other students or with the teacher. Thus, students can build their own knowledge in their mind. According to Rustaman et al (2005) the learning process is not only related to teaching biology as a mere concept product, but also related to teaching students to actively think through biology.

The bad learning process is a big problem existing in the world of education. The bad learning process will affect the student's retention. Retention is closely related to memory. Memory is the information from time to time, which involves encoding, storing, and retrieving information from memory (Santrock, 2004). According to Rahman (2002), student's retention is the process of remembering new understandings and behaviours obtained after a process of receiving information. If the teacher can implement the learning process well, the students will have a good retention, so that the student's level of understanding of the learning material will be better.

In fact, teacher centered learnings are still implemented in schools, where teachers play more active roles because the method is considered practical and can control the whole class. By using the lecturing method, teachers often assume that when students sit quietly and listen to the lecture, they are learning (Suryosubroto, 2002). In fact, the learning method does not likely stimulate students to think, and does not give the students the chance to build their own knowledge, but it only requires the students to listen carefully and to take notes what the teachers tell. It will only make the students bored, passive, and not concentrate on the lesson (Slameto, 1995). As a result, students do not understand what they have learned, and the learning results do not hold out long in students' memories. Since the information does not stay in the student's memory, it is difficult to retrieve when needed (forget).

Based on cognitive models of information processing, input or information obtained during the learning will be recorded by the students on their senses and will be stored temporarily in the short-term memory, then to be stored in long-term memory, and the information will be retrieved as the output when necessary (Yulaelawati, 2004). The capacity of short-term memory is very limited, so that in short-term memory or working memory it will determined which information needs to be stored in long-term memory as well as how it is stored. In order that the information can last long in the memory, it is necessary to practice either by associating the new information that will be remembered with the existing knowledge, or by constant

repetition of information in mind in order to be stored in short-term memory in an unlimited time (Yulaelawati, 2004). The longer an information or knowledge stay a in the short-term memory, the greater the chance that the information or knowledge to be transferred to long-term memory (Trianto, 2007).

Dahar (1989) defined retention as learned material in memory which was not forgotten, so that the retention referred to the storage of the information obtained in the memory. According to De Porter & Hernacki (2000), we will remember information very well if the information has the following qualities:

1. There is an association among the senses, especially involving the sense of sight. The experience involving sight, sound, touch, taste or movements is usually very distinct in our memory.
2. There is any motional context such as love, happiness, and sadness
3. Prominent or different quality
4. Intense association
5. The need to survive
6. Things that have a personal virtue
7. Repetitious things

Kintsch (1970) suggested that the ability to recall was the result of the learning activity. Retention, as one aspect of learning, is essential in the learning process, as expressed by Sawrey & Telford (1988) that "*Without retention there could be no learning, and without learning there would be nothing to retain*". This means that students who have experienced the learning process will have more storage of information (knowledge and understanding) in memory or an increase in retention. Learning can be considered useful when a person can save and apply the results of his study in the new situation. Anything that has been learned will eventually be used in other situations (Ibrahim, 2002).

To overcome these problems, learning strategies that can improve students' retention are required. Rusman (2010) stated that a learning method that made the students more active, fun, and effective needed to be implemented in order to achieve the learning objectives. One of the learning strategies that can be applied is cooperative learning. Slavin (1995) suggested that a cooperative learning was a learning process in which students worked on assignments together to help each other as a group. The roles of teachers in cooperative learning are no longer dominating the learning activities, but the students are required to be more active in the learning activities (Huda, 2011).

According to Panitz (1997), cooperative learning helped to develop higher retention and self-efficacy. Slavin (2005) stated that the most important goal of

cooperative learning model was to provide students with the knowledge, concepts, skills and understanding they needed in order to become happy members of society and to have contribution. Sadker (2005) said that cooperative learning was helpful in improving students' cognitive and affective skills.

One type of cooperative learning models is NHT which is a variation of group discussions, and it can ensure total involvement of all students (Suprijono, 2009). NHT cooperative learning model has several advantages including: improving learning achievement, curiosity, self-confidence, teamwork, communication between students, and help students learn to use courtesy and respect the opinions of others (Isjoni and Ismail, 2008). According to Kagan (2007), NHT indirectly trains the students to share information, listen carefully, and speak with the calculation, so that students become more productive in learning. NHT learning strategy gives priority to group work rather than individual work, so that students work in an atmosphere of mutual cooperation and have many opportunities to distribute information and to improve communication skills.

NHT cooperative learning model is one type of cooperative learning that emphasizes on the special structure designed to influence the pattern of students' interaction, and its goal is to improve the academic mastery. NHT is one of alternative learning strategies that can be used to solve the problems. NHT learning strategy promotes the cooperation between students in groups to achieve learning objectives. The students are divided into small groups and directed to study the learning material that has been assigned. The purpose of the grouping is to provide opportunities for students to be actively involved in the thinking process and the learning activities. In this case, most of the learning activities are centralised on students, that is studying the subject matter as well as discussing and solving problems. NHT learning strategy is one type of cooperative learning that emphasizes on the special structure designed to influence the pattern of students' interaction, and its goal is to improve the academic mastery, so that it can develop and increase students' retention.

This research aims at investigating the effect of NHT learning on the retention of senior high school students. The results of this research are expected to be beneficial in the development of science and its applications.

2. Method

The type of this research was a quasi-experimental research. The design of this research was *Non-equivalent Control Group Design* illustrated in Table 1.

Table 1: Non-equivalent Pretest-Posttest Control Group Design

Experimental group	O ₁	X ₁	O ₂
Control group	O ₃	X ₂	O ₄

(Source: adapted from Sugiyono, 2009)

Note:

O₁: *pre-test* in the experimental class

O₂: *post-test* in the experimental class

O₃: *pre-test* in the control class

O₄: *post-test* in the control class

X₁: Numbered Heads Together (NHT)

X₂: conventional learning

The population of this research was all the students of class XI natural science at state senior high school in Muara Badak. The samples used in this research were the students of class XI Natural science 1 as the experimental class taught by using NHT learning strategy, and the students of class XI natural science 2 as the control class taught by using a conventional learning strategy. Each class consisted of 30 students. The classes were randomly chosen. The independent variables used in this research were a learning strategy, consisting of NHT and conventional learning. The dependent variable in this research was students' retention.

The data were obtained by giving pre-test and post-test before and after the treatments using the essay test. The tests were used to measure students' retention of the material that has been delivered. The tests were an essay test consisting of 20 items. The data analysis techniques used in this research were statistical analysis using analysis of covariance with SPSS version 22.0 for windows. Before the data were analysed, the data were initially tested for the normality and the homogeneity.

3. Finding and Interpretation

Based on the observation sheet data related to the learning syntax, the learning activity has been implemented according to the steps of NHT learning strategy. The learning syntax in the conventional learning measured using the observation sheet also showed also that learning process had run well.

Table 2 contains a summary of data description of the students' retention scores. The data were obtained from the pre-test and post-test in the experimental class (Numbered Head Together) and control class (conventional). Figure 1 shows the differences between the mean score of retention in the experimental class (Numbered Head Together) and control class (conventional). The mean score of retention of the

students in experimental class (Numbered Head Together) was as much as 63.50 and the mean score of the retention of the students in control class (conventional) was 49.57.

Table 2: Summary of the data Description of Retention Scores Related to the Learning Strategies

Learning Strategies	Mean	Std. Deviation	N
1 = control	49.57	6.658	30
2 = experiments	63.50	6.208	30
Total	56.53	9.491	60

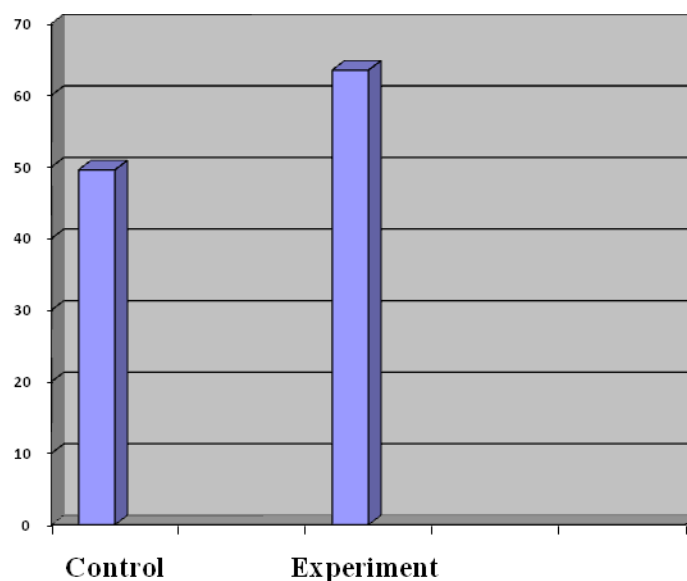


Figure 1: Diagram of Mean score of the Students' Retention

The results of the Ancova test are shown in Table 3. The table shows that significance value of learning strategies was 0.000 or less than 0.05. It means that there are significant differences in critical thinking skills between experimental class (NHT learning strategy) and control class (conventional). This fact shows that learning strategies have an effect on students' retention.

Table 3: The results of the Ancova test on the Student's Retention

Source	number Squares	df	Mean	F	Sig.
Corrected Model	2957.254 (a)	2	1478.627	35.748	,000
Intercept	1300.712	1	1300.712	31.446	,000
YBH	45.187	1	45.187	1.092	,000
CLASS	1057.762	1	1057.762	25.573	,000
Error	2357.679	57	41.363		
Total	197,076.000	60			
Corrected Total	5314.933	59			

Corrected mean score of the retention can be found in Table 4. It can be seen that the mean of the experimental class was 62.60, while the mean of the control class (conventional) was 50.47. The results indicate that NHT learning strategy has an effect on students' retention 23.83% greater than the conventional learning.

Table 4: Comparison of the corrected Mean score of Learning Strategies related to Retention

Learning strategies	XYHB	Yretention	DIFFERENCE	RETEN COR
Conventional	54.03	49.57	-4.47	50.47
NHT	66.33	63.50	-2.83	62.60

The results of data analysis related to the effect of learning strategies on the retention using Ancova test show a significance value of 0.000. These values indicate that learning strategy had an effect on the student retention students of state senior high school class XI in Muara Badak. It is proven that the NHT learning strategy has a greater effect on students' retention. The corrected mean score of NHT learning strategy was 23.83% higher, compared to the effect of the conventional learning strategy.

These findings are in line with Bokau (2015) stating that there were significant differences in the learning outcomes and retention of students taught using Number Heads Together (NHT) learning model and those taught using conventional learning strategy. Similarly, Jamaluddin (2014) also stated that the retention of the students who taught by using TEQ- NHT learning model was higher than that of the students taught by using TEQ, TEQ-TPS, and conventional learning.

The increase in the mean score of students' retention cannot be separated from the characteristics of the NHT learning syntax. NHT can provide the opportunities for students to share ideas, consider the most appropriate answer and to encourage them to improve their cooperative spirit (Lie, 2004). This is supported by the research results of

Ekawati (2005) stating that the cooperative learning model NHT was more effective than the conventional learning.

Retention is the learners' ability to remember what has been taught by a teacher at a certain range of time (Herleny, 1999). Based on those opinions, it can be stated that the retention is associated with the process of encoding, storing and recalling of the learning material within a certain time. Meyer (1999) classified the learning results into two categories: retention and transfer abilities. Retention is the learning ability measured by the question "*How much was learned*". Thus the retention also means how much lesson was learned and can be stored by learners in their memory. Furthermore, Meyer explained that the retention capability was equal to knowledge in Bloom's taxonomy.

One way to improve the learning process and learning results is to use the NHT learning strategy. The use of this model can make the learners to be involved in the thinking activity, so that they can be directly involved in the learning process. The involvement of students in the learning process can improve their understanding and knowledge. Thus, students can observe a process or event by themselves, so it will be an enriching experience and arouse their curiosity, and their ability to remember the learning material can be increased.

Students' retention in NHT cooperative learning model was higher than that in the conventional learning. This condition is caused by the aspects of the students themselves, how they learn from experience in the learning process by using NHT cooperative learning model that might provide a more optimal experience, both the individual experience, responsibility experience in the *Numbering* stage, and the group experience in *Heads Together* stage. As it is known, the experience is the best teacher. Learning from experience is better than just talking without acting. It is also supported by NHT cooperative learning strategy which ran well. Cooperation among students in the learning process can provide the experience, train students to have thinking skills and remembering skills. Therefore, NHT cooperative learning strategy has greater effect on the retention achieved.

As it was occurred at NHT learning strategy the students were given worksheets containing questions to be discussed and then presented to the class. It also meant that students should seek any information regarding the material to be presented, of course, with the guidance from the teacher. As students search for information to be presented to the class, it is expected that their retention of the learning material improves, because NHT could improve the achievement and deepen the understanding. Therefore, it can indirectly improve students' retention. The students that have never experienced NHT learning before, can get new experiences, so that they will have more interest in

learning. Generally adult students (especially senior high school students) will be more interested and try new things that have never been experienced before. NHT was first developed by Spencer Kagan (1993). NHT learning gives students the opportunity to share ideas and consideration of the most appropriate answer. Additionally, NHT encourages the students to improve their group work spirit. The purpose of this learning model is to make the students get involved in studying the material covered in a learning activities and check their understanding of the learning material. The purpose of NHT will provide a deeper understanding of the learning material, so that it increases students' retention.

NHT cooperative learning strategy emphasizes on the special structure designed to affect the pattern of students' interaction, and its goal is to improve the students' academic mastery. Students who experience an improvement in their academic mastery will have an effect on their retention.

NHT learning strategy helps students to find the information independently. The worksheets given to the students are used to stimulate their interest to pay more attention on the learning material during the learning process. Learning content also becomes more meaningful, so that it will be easily remembered by the students. A more clear and concrete learning activity will make the students remember more easily.

4. Suggestions

Based on the results of the research, it is suggested that:

- a) NHT learning strategy should be used in the learning process, especially for Biology learning in the level of senior high school because it can improve students' retention
- b) The effect of NHT on students' retention need to be investigated further at different levels of education.

5. Conclusion

Based on the results of data analysis and discussion, it could be concluded that there is a difference of the retention between the students taught by using NHT learning strategy and those taught by using conventional learning. The students' retention of the NHT learning strategy is 23.83% higher compared to that of the conventional learning.

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