

THE USE OF NUMBERED HEADS TOGETHER (NHT) LEARNING MODEL WITH SCIENCE, ENVIRONMENT, TECHNOLOGY, SOCIETY (SETS) APPROACH TO IMPROVE STUDENT LEARNING MOTIVATION OF SENIOR HIGH SCHOOL

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ABSTRACT

This research was aimed to determine the increasing of students' motivation that has been applied by Numbered Heads Together (NHT) learning model with Science, Environment, Technology, Society (SETS) approach. The design of this study was quasi experiment with One Group Pretest-Posttest Design. The data of students' learning motivation obtained through questionnaire administered before and after NHT learning model with SETS approach. In this research, the indicators of learning-motivation were facing tasks diligently, showing interest in variety of problems, preferring to work independently, keeping students' opinions, and feeling happy to find and solve problems. Increasing of the students' learning motivation was analyzed by using a gain test. The results showed that applying NHT learning model with SETS approach could increase the students' learning motivation in medium categories.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui peningkatan motivasi belajar siswa setelah diterapkan model pembelajaran Numbered Heads Together (NHT) dengan pendekatan Science, Environment, Technology, Society (SETS). Desain penelitian ini adalah kuasi eksperimen dengan One Group Pretest-Posttest Design. Data motivasi belajar siswa didapatkan melalui angket yang diberikan sebelum dan sesudah dilaksanakannya pembelajaran NHT dengan pendekatan SETS. Dalam penelitian ini, indikator motivasi belajar yaitu tekun menghadapi tugas, menunjukkan minat terhadap bermacam-macam masalah, lebih senang bekerja mandiri, dapat mempertahankan pendapatnya, serta senang mencari dan memecahkan masalah. Peningkatan motivasi belajar siswa dianalisis menggunakan uji gain. Hasil penelitian menunjukkan bahwa penerapan model pembelajaran NHT dengan pendekatan SETS dapat meningkatkan motivasi belajar siswa dengan katagori sedang.

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Keywords: Learning Motivation; NHT; SETS

INTRODUCTION

The result study of *Program for International Student Assessment (PISA)* in 2012, shows that Indonesia ranks 64 out of 65 countries in the field of science. It makes Indonesia far behind with other countries. It happens due

to low students' learning-motivation. The low of students' learning-motivation is supported by several studies. Among these are research conducted by Susilo (2012), which states that the problem of science learning in 01 State Junior High School at Ngadirejo, namely the lack of students' learning-motivation due to saturate and boring learning. According to Bintasari & Supardi (2012), some of the problems that exist in physics learning in Grade 8th at 08 Sta-

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te Junior High School in Kediri, that are more dominant teacher's activity which resulted in students quickly get bored and saturated with lessons being faced so that it has less students' learning-motivation. According to Siregar (2012), there are two problems of physics learning in grade 8th at 18 State Junior High School in Medan. First, physics is a lesson that seems difficult, less interesting, and less fun among students. The second problem is the lack of effective use of learning models. Students' motivation need to be improved to overcome these problems. According to Sardiman (2014), in order to learn well it takes a process and a good motivation as well.

According to Uno (2011), there are several ways that can be done to improve students' learning-motivation, one of them is by using various methods in learning. According Trianto (2013), NHT learning model is the kind of cooperative learning that is designed to affect students interaction pattern and as an alternative to the traditional classroom structure. There are four phases in NHT learning, they are numbering, asking questions, thinking together, and answering. The advantages of NHT learning model according to Lie (2010), it provides wider opportunities for learners to share ideas and considers the most appropriate problem solving, which encourages learners to improve spirit of cooperation in solving problems.

Education is not only oriented to science understanding but also understood the results of science and its effects. One approach that can be used to integrate science, the results of science and its impact is SETS approach. According to Binadja (1999), SETS approach is aimed at helping learners to know about science, its development and how science can affect the environment, technology, and society on a reciprocal basis. The research result showed that learning with SETS approach has several advantages. According to Sukaisih (2013), the application of STSE (Science, Technology, Society and Environment) approach in electric circuit learning, ohms law, and barriers can improve students' learning activities and outcomes. According to Ifadloh, Santosa & Supardi (2012), discussion method with SETS approach and media question card can give positive response for most students such as; it gives interesting and fun learning, it increases their curiosity, it can improve the ability to remember a lesson concept, student gets more active in learning, makes student not bored, and motivates student to learn more diligently.

In this study, the principal selected subjects are Work and Energy. In this subject, the concept of Work and Energy is associated with its application and impact in the environment, technology and society.

The NHT learning model with SETS approach is a lesson that connects the concept of science learned with other elements in SETS, and it is conducted in a discussion according to NHT learning steps. Lie (2010) explains that in cooperative learning, students who have high academic ability can help their friends who have low academic ability. This will give impact to the students to be more motivated and study more hard, so NHT learning model which is a cooperative learning and accompanied by SETS approach is expected to improve students' learning-motivation.

The purpose of this study is to determine the improvement of students' learning-motivation after applied NHT learning model with SETS approach .

METHOD

The design of this study was quasi experiment with *One Group Pretest-Posttest Design*. In this study, first of all, experimental groups were given an early test, then they were given treatment using NHT learning model with SETS approach, and then did the final test.

The population of this study were students of grade 8th Junior High School. Sampling is done by *purposive sampling technique* or sample determination with certain consideration. Samples taken were students of grade 8th 02 State Junior High School of Kawunganten, Cilacap Regency. The consideration of this sample determination is a condition that is generally the same in students grade 8th, which has lack of students' learning motivation.

Technique of taking data in this research used non test and test method. Non test method used was questionnaire. Questionnaire was used to obtain students' motivation score. In this study, learning-motivation indicators are facing tasks diligently, showing interest in various problems, preferring to work independently, keeping students' opinions, and students are happy to seek and solve problems (Sardiman, 2014). Questionnaire test conducted to determine the validity and reliability and to determine the scale value of each statement in the questionnaire. The test method used was a written test to obtain student cognitive learning outcomes. Questionnaires and tests

were given before (*pretest*) and after (*posttest*) treatment. Increasing students' motivation and cognitive learning result were analyzed using a gain test. The normal gain formula for improving the average motivation and students' learning result can be calculated through the following equation:

$$g = \frac{\langle S_{post} \rangle - \langle S_{pre} \rangle}{100\% \langle S_{pre} \rangle}$$

Notes:

$\langle S_{pre} \rangle$: Pretest average score of students motivation or learning result (%)

$\langle S_{post} \rangle$: Posttest average score of students motivation or learning result (%)

Criteria value gain as follows:

High if $g > 0.7$

Medium if $0.3 \leq g \leq 0.7$

Low if $g < 0.3$

RESULTS AND DISCUSSION

The stages of NHT learning model with SETS approach in this study consist of four phases. The first phase took place before the day of learning which is the phase of numbering and asking questions. In numbering phase, students divided into groups of three to five students and were numbered on each member of the group. In the phase of asking questions, teacher shared learning materials and Student Discussion Sheet (SDS) then students were assigned to read learning materials and worked on LDS independently. It is intended to train students in self-employment, facing tasks diligently, as well as finding and solving problems. The learning materials given contained concepts and materials related to SETS. One of the tasks in the SDS, students must look for an article that contained the impacts that occurred on the environment or community related to the material being studied.

The second phase took place in learning process, which consist of asking questions, thinking together, and answering questions. In

questioning phase, teacher asked questions or problems to students about the material to be studied. The question posed is the same as the questions in SDS. This step aimed to encourage students' interest in a variety of problems. In the phase of mutual thinking, students answered questions asked by the teacher by discussing in group and guided by learning materials. This phase aimed to train students finding and solving problems, and keeping their opinions. In answering phase, teacher called certain number at random by drawing. Some of the appropriate students raised their hands and answered questions. Next, the teacher guided class discussions to discuss students' answers and determine the correct answers.

The third phase was guiding students to draw conclusions with class discussions. Class discussion aimed to train students in keeping their opinions, as well as finding and solving problems.

Improving Student Motivation

Based on analysis results of *pretest* and *posttest* score about students' learning-motivation questionnaire, it obtained increasing of students' learning-motivation as listed in Table 1.

Based on Table 1, increasing of students' motivation can be seen in each of the indicators. The first indicator is facing the task diligently. Students' persistence facing tasks trained because students have to do independent tasks before the lesson start. Tasks that have been done independently are discussed during the lesson. This process will grow students' diligence in dealing with the task because the students not only once do the task but also must ensure the answer in group discussions. According Oktavianti (2013), one of advantages giving task is to train students study hard and diligently.

The second indicator is pointing interest in various issues. The second phase in this learning model is the teacher asks questions or problems to students about the material to

Table 1. Increasing of students' learning-motivation

Indicator	<i>Pretest</i> Score (%)	<i>Posttest</i> Score (%)	<g>	Criteria
Facing the task diligently	55.5	75.9	0.46	Medium
Showing interest in various issues	47.3	80.1	0.62	Medium
Keeping opinion	46.6	70.4	0.45	Medium
Preferably working independently	44.6	67.0	0.40	Medium
Finding and solving problems happily	44.7	74.7	0.54	Medium
Class Average	48.5	74.2	0.50	Medium

be studied. This is one way to encourage student interest in variety of issues. According to Slameto (2010), one way to motivate students is growing students' curiosity and desire to conduct exploration, by asking questions or problems that stimulate students to work.

The third indicator is students can keep their opinion. In this learning model, most of the learning process carried out by the discussions, both group and class discussions. In the discussion established communication among students in form of giving opinions, questions, suggestions, or arguments so that students are trained to keep their opinions. According to Rahman (2007), discussions can train students' ability to issue opinions about a problem, defend opinions, and make adjustments of others opinion based on good exchange of thoughts.

The fourth indicator is to prefer working independently. In the first phase of this learning model application, students are given learning materials and tasks in the form of SDS before the school day begins. Students are assigned to read the learning materials and do the tasks independently. Giving tasks and learning materials is important to train students working independently. According to Danial, Rahel & Dini (2013), the advantage of giving homework is more stimulating students in conducting individual or group learning activities, growing student responsibility and discipline, and developing student independence outside of teacher supervision.

The fifth indicator is to find and solve problems happily. In this learning model, students have to do the task in the form of SDS independently. In the classroom, students' answers are discussed with the group so that they get correct conclusion of the answer. When looking for a conclusion of the answer, there will be new problems again, that is when there is difference of answers between each student. After the discussion finished, some random students should present results of discussion in front of the class. It is used to encourage students so that they really understand the results of discussion that have been discussed. The whole process will train students finding and solving problems. According Hertiavi, Langlang & Khanafiyah (2010), giving questions before the learning in form of tasks, group discussions, and tests is an attempt to improve students' problem solving skills.

According to Binadja (1999), one of SETS approach characteristics is students

are taken to consider the benefits or disadvantages of applying science concepts in life. One of the tasks given before learning is students should look for articles from the Internet about the impacts of science learned on the environment and society then they presented in front of the class. This will increase students' insight more broadly about the material being studied, its application, benefits or disadvantages that occur in the environment and society so that it will motivate students to learn. According to Hotimah (2008), integrated science learning with SETS approach can make students more interested in science materials. Giving learning materials prepared using materials with SETS approach is one important factor to motivate students to learn. Based on Trisnaningsih's research result (2011), learning implementation using learning tool with SETS visionary shows students' enthusiastic and understands learning material because it deals with many things around the environment and society.

Application of NHT learning model with SETS approach can improve students' learning-motivation. This means that NHT learning model application with SETS approach gives positive impact for students' learning-motivation. This is in accordance with Zhang T, Asher, Zhang M & Yang's opinion (2017), which states that by applying SETS approach, learning is more fun so students are motivated to learn. According Hadiyanti, Kusni & Suhito (2012), through NHT learning model, learning activity becomes more interesting so that students get spirit and motivated in teaching and learning activities.

Increasing Student Cognitive Learning Results

Based on the result of analysis on *pretest* and *posttest* score, recapitulation of students' cognitive learning result as listed in Table 2.

Table 2. Score Recapitulation of *Pretest* and *Posttest*

Results	<i>Pretest</i>	<i>Posttest</i>
The lowest score	46.25	71.25
The highest score	91.25	100
Average	68.55	90.55
Percentage of mastery	43.75%	93.75%
N Gain	0.70	
Criteria	Medium	

Student learning results have improved after applying NHT learning model with SETS approach. Providing independent tasks in form of SDS and reading learning materials before the day starts to be an important factor so that students are better prepared when the learning process takes place so that the learning outcomes can increase. This is in line with Mulyani's opinion (2013), which states that readiness is an important factor in determining success in learning. Students who are ready to learn then the learning achievement will be better. In addition, giving task to read learning materials and to work on SDS can increase independence, so that students better understand the material being studied. This is in accordance with Pratiwi, Budiyo & Subanti's opinion (2013), which states that the higher the independence of student learning, the higher the student achievement.

The material that students learned in NHT learning model with SETS approach, is related material between elements of science and environment, technology and society, so that students can understand the material in more depth. According to Binadja (1999), teaching used SETS approach, students are asked to connect associate between SETS elements, allowing students to obtain clearer picture of interrelationships between these concepts with other elements in SETS both in form of their advantages and disadvantages.

Application of NHT learning model with SETS approach can improve student learning outcomes. This is in accordance with Destiningsih, Usodo & Mardiyana's research results (2013), which states that NHT learning model can improve student learning outcomes and student activeness in the classroom and make teaching and learning activities more fun. Zhang et al (2017) states that using SETS approach can help students understanding science more broadly and clearly. In addition, Hartikasami research results, Khanafiyah & Sutikno (2013) also states that the application of NHT learning model with SETS approach can develop creativity, increase individual responsibility and student learning outcomes.

CONCLUSION

The motivation of junior high school students increased after applied the NHT learning model with SETS approach. This can be shown from the average increasing in student learning-motivation, with a gain value of 0.50 in

medium criteria.

The cognitive learning outcomes of junior high school students were improved after NHT learning model was applied with SETS approach. This can be shown from the average increasing in student learning outcomes, with a gain value of 0.70 in medium criteria.

REFERENCES

- Binadja, A. (1999). *SETS (Science, Environment, Technology, Society) Education, Its Application to Teaching*. Semarang: Paper presented in National Seminar on SETS Education Workshop
- Bintasari, I., & Supardi, Z. A. I. (2012). The Influence of Application of Cooperative Learning Model Numbered Heads Together (NHT) Towards Student Results of Class 8th in 08 State Junior High School of Kediri. *Physics Education Innovation, E-Journal Unesa*, 1(1), 134-145
- Danial, M., Rahel, J., & Dini, I. (2013). Comparison of Student Learning Outcomes Assigned with Home Duties and Quizzes on Direct Learning Model (Study on Redox Reaction Main Material). *Journal of Cemica*, 14(1), 66-73
- Destiningsih, N., Usodo, & Mardiyana, M. (2013). The Effectiveness of Cooperative Learning Model Numbered Head Together (NHT) and Make a Match on Student Mathematics Learning Achievement in terms of Student Social Skill in Class X Vocation School in Wonogiri Regency Year 2012/2013. *Journal of Scientific Mathematics Education*, 2(1), 1-12
- Hadiyanti, R., Kusni, & Suhito. (2012). The Effectiveness of Cooperative Learning Model *Numbered Heads Together* on the Ability to Understand Concepts. *Unnes Journal of Mathematics Education*, 1(1), 59-65
- Hertiavi, M. A., Langlang, H., & Khanafiyah, S. (2010). Application of Jigsaw Type Cooperative Learning Model for Improving Students Problem Solving Ability at Junior High School. *Jurnal Pendidikan Fisika Indonesia*, 6(1), 53-57
- Hotimah, K. (2008). Implementation of Integrated Science Learning Model with SETS Vision for Improving Junior Student Learning Outcomes. *Thesis*. Semarang: Universitas Negeri Semarang
- Ifadloh, V. N., Santoso, N. B., & Supardi, K. I. (2012). Discussion Method with Approach Science, Environment, Technology, Society, and Media Question Card. *Unnes Science Education Journal*, 1(2), 119-125
- Kartikasami, H., Khanafiyah, S., & Sutikno. (2013). Application of NHT Learning Model with SETS Approach on Light Material to Develop Student Creativity. *Unnes Physics Education Journal*, 2(2), 55-65

- Lie, A. (2010) . *Practicing Cooperative Learning in Classrooms*. Jakarta: Grasindo
- Mulyani, D. (2013). Relationship Readiness Learning Students with Learning Achievements, *Journal of Scientific Counseling*, 2(1), 27-31
- Nuryanto, & Binadja, A. (2010). The Effectiveness of Chemical Learning with SaLingTeMas Approach in terms of Student Interest and Results. *Journal of Chemical Innovation Education*, 4(1), 552-556
- Oktavianti, R. (2013). Improving Students' Learning Outcomes in Learning Parenting Numbers by Task Assignment Method. *Creative Journal of Tadulako Online* , 1 (4): 41-54 w
- Pratiwi, K. H., Budiyo, & Subanti, S. (2013). *Experimentation Jigsaw Cooperative Learning Model And Numbered Heads Together (NHT) Judging from Independence Learning On Mathematics Learning Achievement Senior High School around Magelang District Academic Year of 2012-2013*. (Doctoral Dissertation). Postgraduate Program of Sebelas Maret University, Surakarta
- Rahman, T. (2007). *Teaching Materials of Biology (Learning Methodology of Junior high / Senior High School)*. Bandung: Department of Biology Education UPI
- Sardiman. (2014). *Interaction and Teaching-Learning Motivation*. Jakarta: Rajawali Pers
- Siregar, F. A. (2012). Influence of Cooperatif Model with NHT Type Of Student Results Class 8th at 18 State Junior High school in Medan. *Journal of Physics Education*, 1(1), 33-38
- Slameto. (2010). *Learning and Factors Affecting It* . Jakarta: Rineka Cipta
- Sukaisih, R. (2013). Application of Science Approach, Technology, Society, and Environment as an Effort to Improve Student Activities and Learning Outcomes on Electric Circuit Learning and Ohm's Law. *Journal of Lens for Physics Education*, 1(1), 65-68
- Susilo, A. B. (2012). Development of Problem Based Learning Science Model to Increase Students' Motivation and Critical Thinking of Junior High School Students. *Journal of Primary Educational*, 1(1), 57-63
- Trianto. (2013). *Designing Innovative-Progressive Learning Models: Concepts, Platforms, and Implementation on Education Unit Level Curriculum (KTSP)*. Jakarta: Kencana Prenada Media Group
- Trisnarningsih, T. W. (2011). Efforts to Increase Activity and Learning Results of Optical Students of Class X of Semester II of 01 State Senior High School in Semarang by Implementing Sources of Service for SETS. *Jurnal Pendidikan Fisika Indonesia*, 2(1), 45-56
- Uno, H. B. (2011). *Motivation Theory and its Measurement*. Jakarta: Earth Literacy
- Zhang, T., Asher, E., Zhang, M., & Yang, J. (2017). Thinking about Science: Understanding the Science, Technology, Society and Environmental Education of Canada. *International Journal of Education and Social Science*, 4(2), 15-20