



## THE INFLUENCE OF THE NUMBERED HEAD TOGETHER (NHT) TYPE COOPERATIVE MODEL WITH THE ASSISTANCE OF QUIZZ ON THE MATHEMATICAL CONNECTION ABILITIES AND LEARNING MOTIVATION OF VOCATIONAL STUDENTS

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### ABSTRACT

*This research aims to determine whether students' mathematical connection abilities and learning motivation after using the Numbered Head Together learning model with the help of Quizizz are better than classes given conventional learning. This research uses experimental quantitative methods to determine the effect of the Numbered Head Together learning model with the help of Quizizz on students' mathematical connection abilities and learning motivation. From the calculation results of the posttest test in the experimental class it was 85.08, in the control class the posttest average was 80.66. Independent Sample t-Test, namely Sig Value. (2-tailed) is  $0.000 < 0.05$  so that  $H_0$  is rejected and  $H_1$  is accepted. Indicators of efforts to overcome difficulties and quality of learning outcomes are 99%. the smallest percentage of learning indicators outside school hours is 91%. So it is concluded that students' mathematical connection abilities and learning motivation using the Numbered Heads Together learning model with the help of Quizizz are better than mathematical connection abilities using conventional learning models.*

*Keywords: Mathematical Connection, Numbered Head Together, Learning Motivation.*

### INTRODUCTION

Education plays an important role in ensuring the continuity of human resources and (HR) preparing for problems in current and future life. Improving the quality of human resources is much more urgent to be realized immediately, especially in the era of global competition (Aditya et al., 2019). Therefore, a country's progress can be measured by the quality of its education. Education can be obtained through learning at school or through conscious and planned experiences.

If education is one of the main instruments for human resource development, educational staff, in this case teachers, as one of the elements that play an important role, are responsible for developing tasks and overcoming all problems that arise. Teachers are a very determining component in the good implementation of education. Education is closely related to the success of the learning process in the classroom as a micro element of educational success (Rahmawati, 2020). Learning is a reciprocal communication process, between teacher and student or student and student (Harijito, 2018). In the learning process in the classroom, the teacher acts as a transmitter of the material while the students listen and if there is student motivation to learn that is still not optimal in participating in the learning, which means there are still students who are not serious about following the learning process, then here the problem arises of what the teaching staff should do. So the learning model that will be used here needs to be improved so that students understand the material presented and can increase students' learning motivation, especially in mathematics subjects.

Mathematics is one of the subjects in the 2013 school curriculum, which students will later apply in their daily lives (Lestari, 2022). Learning mathematics is a sufficient requirement to continue to the next level, because by studying mathematics, we will learn to reason critically, creatively and actively (Savriliana et al., 2020). Mathematics should be a subject that is fun and popular with students. However, for most students, mathematics is the subject that is considered the most difficult, most boring and often also considered the most frightening subject (Arsana et al., 2019). This condition results in mathematics subjects being disliked, ignored and even ignored. Various efforts have been made to improve the quality of education, considering the importance of education in improving the quality of human resources. It is hoped that various efforts to improve the quality of education will lead to increased student learning outcomes, especially in mathematics subjects (Vivi Muliandari, 2019).

Teachers can make an effort to change mathematics learning from old habits by using learning models. In the teaching and learning process, a learning model is needed that is interesting and of interest to students so that it can stimulate students to participate in the teaching and learning process actively. One model that can be used is the cooperative learning model for students' mathematical connection abilities and learning motivation in mathematics subjects. The cooperative learning model for students' mathematical connection abilities and learning motivation in mathematics lessons is the Numbered Heads Together (NHT) Learning Model with the help of Quizizz.

The Numbered Head Together (NHT) Learning Model is a method developed by Kagan to involve students in gaining their understanding of the material presented in class and can influence interaction patterns (Nourhasanah & Aslam, 2022). Numbered Head Together (NHT) is a model for group learning where there are positive relationships and collaboration skills in class in groups of 4-5 students to improve learning outcomes (Nourhasanah & Aslam, 2022).

Quizizz is a digital and online-based learning media with complete features. As we know, Quizizz can certainly be used as an interactive learning medium that can foster enthusiasm for learning in every student and Quizizz is also equipped with sufficient features to be used in just one application (Pusty, 2021).

Mathematical connections generally are internal (in mathematics) and external (outside mathematics) relationships. Internal relationships are the relationship between mathematical ideas and the mathematics being studied or other mathematics. External relationships are between mathematics and other scientific fields outside mathematics or everyday life (Julaeha & Fathani, 2020). The ability to connect between concepts will make it easier for students to formulate inductively or deductively new mathematical concepts, ideas and procedures that can be applied in solving mathematical problems or problems in other scientific disciplines (Junedi & Sari, 2020).

Motivation is a very important element in student success in the learning process. Motivation to learn is an impulse that exists in a person regarding achievement, namely the urge to master, manipulate and regulate the social and physical environment, overcome obstacles and maintain high quality work, compete through efforts to exceed past actions and to outperforming other people's actions (Caesarani et al., 2022). High learning motivation will positively affect good learning outcomes, while students with low learning motivation will also have a low learning outcome (Hikmah & Saputra, 2023).

## METHOD

This research method is a quantitative method that is experimental, where this research is to determine the effect of the Numbered Head Together learning model with the help of Quizizz on students' mathematical connection abilities and learning motivation at Patia Science and Technology Vocational School.

The place where the research was carried out was at the PATIA Science and Technology Vocational School, JL. Raya Patia-Pagelaran Patia, District. Patia, Kab. Pandeglang, 42267. The researcher chose this place because the researcher wanted to know the Mathematical Connection Ability of PATIA Science and Technology Vocational School students and the students' learning motivation with the learning model that will be used, namely Number Head Together (NHT). The results of this research can be input into the learning process that will be used in the future

### Population

Population is defined as a general area of objects with certain qualities and characteristics determined by researchers to study and then draw conclusions. The population of this research is all students in class

**Table 1. Number of Class XI Students**

No	Classes	The number of students
1.	XI Nursing Assistant	30
2.	XI Multimedia A	30
3.	XI Multimedia B	30
4.	XI Automotive Engineering	30
<b>Total</b>		<b>120</b>

Researchers chose class XI students because they were intermediate between classes X and XII. Class X students are still adapting to the school environment, while class XII students must focus on preparing for school exams. Therefore, the researcher chose class XI students as the objects to be studied.

### Sample

The sample is part of the population and its characteristics. In this research, the sample is determined by the sampling technique that has been carried out. This research used two classes. The sample size in this research was 30 students from XI Automotive as an experimental class that applied the Number Head Together type cooperative learning model and 30 students from Class XI Asper as a control class that applied conventional learning to mathematics learning. So the sample in this study was 60 students.

## RESULTS AND DISCUSSION

Descriptive Statistical Analysis discusses how to collect, summarize, and present data so that it becomes information that is easier to understand. The following is a table that describes data on initial and final test scores from the experimental class and control class

Table 17. Pretest and Posttest Descriptive Analysis Results

Information	N	Min	Max	Mean	Std. Deviation
<i>Pre-Test Eks</i>	30	17,5	50	36,75	7,9911
<i>Post-Test Eks</i>	30	67,5	100	85,08	7,2956
<i>Pre-Test Control</i>	30	17,5	50	33,83	7,9799

<i>Post-Test Control</i>	30	65,5	100	80,66	7,9853
Valid N (listwise)	30				

Table 17 shows that the average pretest score for the experimental class is 34.08 with the highest score being 50 and the lowest score being 22.5. Meanwhile, in the control class the average pretest score was 33.83 with the highest score being 50 and the lowest score 20.

This shows that students' initial mathematical connection abilities are almost the same. The average posttest score in the experimental class was 85.33 with the highest score being 100 and the lowest 75. Meanwhile, the control class had a posttest average of 78.00 with the highest score being 82.5 and the lowest 65. Overall, after being given different treatment between the experimental and control classes, the results show that the experimental class was given treatment using the Number learning model. Head Together (NHT) in sequence and series material obtained an average score on the students' mathematical connection ability test which was higher than the control class which used conventional learning models in general.

### Descriptive Analysis of Questionnaires

Questionnaire data analysis aims to determine students' learning motivation during the learning process using the Numbered Head Together learning model and conventional learning. Questionnaire analysis test calculations using Microsoft Excel and SPSS version 23 software. With the following data obtained:

Table 24. Descriptive results of motivation

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Experimental Questionnaire	30	86	120	115,97	7,435
Control Questionnaire	30	60	86	72,07	6,486
Valid N (listwise)	30				

Based on table 24 above, it can be seen that the 30 respondents who filled out the student learning motivation questionnaire in the experimental and control classes had average scores with maximum and minimum scores.

You can see the percentage results for each indicator of student learning motivation carried out in the experimental class of 30 respondents.

Table 25. Percentage Results of Learning Motivation Indicators

No	Indicators of Student Learning Motivation	Max Score	Experimental Class Presentation	Criteria	Control Class Percentage	Criteria
1	School attendance	240	96%	Very strong	60%	Enough
2	Follow PBM in class	480	95%	Very strong	56%	Enough
3	Study outside school hours	360	91%	Very strong	58%	Enough

4	<b>Attitude towards difficulties</b>	480	98%	Very strong	59%	Enough
5	<b>Efforts to overcome difficulties</b>	240	99%	Very strong	58%	Enough
6	<b>Habits in attending lessons</b>	360	97%	Very strong	54%	Enough
7	<b>Enthusiasm in following PBM</b>	360	96%	Very strong	54%	Enough
8	<b>Desire to achieve</b>	360	98%	Very strong	57%	Enough
9	<b>Quality of results</b>	240	99%	Very strong	58%	Enough
10	<b>Completion of assignments/home work</b>	240	98%	Very strong	57%	Enough
11	<b>Take advantage of opportunities outside of class hours at school</b>	240	97%	Very strong	60%	Enough
<b>Average percentage</b>			97%	Very strong	57%	Enough

The percentage results in table 25 show that all indicators in the experimental class have very strong criteria. The largest percentage of indicators for Efforts to Overcome Difficulties and quality of learning outcomes is 99%. Meanwhile, the smallest percentage in the learning indicator outside school hours was 91%, while the indicators in the control class had sufficient criteria with an average percentage of 57%. The largest percentage in the indicators of Attendance at school and Using opportunities outside of class hours while at school is 60%, the smallest percentage is in Habits of following lessons and Enthusiasm in following PBM. The experimental class has an average percentage of 97% with very good criteria, while the control class has an average percentage of 57% with sufficient criteria. This indicates that the learning motivation of students in the experimental class who were given NHT learning with the help of Quizizz is better than the students' learning motivation. control class which was only given conventional learning.

## DISCUSSION

This research aims to determine the use of the Numbered Head Together (NHT) learning model on students' mathematical connection abilities and learning motivation in class XI of PATIA Science and Technology Vocational School. In the experimental class the Numbered Head Together (NHT) learning model was applied, while in the control class conventional learning was applied. The learning materials taught in the experimental and control classes during the research were sequences and series.

This research, which was carried out on students of class XI Automotive and

The learning process refers to Numbered Head Together (NHT) learning with the help of Quizizz. The steps that can be taken in the Numbered Heads Together (NHT) learning model with the help of Quizizz are as follows:

1. Students are formed into 6 groups (4 or 5 students in one group with different abilities (high, medium and low). Then head numbers are distributed to each student.
2. The teacher explains the steps for learning NHT with the help of Quizizz
3. The teacher conveys learning material or problems to students according to the basic competencies to be achieved.
4. The teacher gives assignments/questions in the Quizizz application then each group works on them.
5. The group discusses the correct answer and its solution and ensures that each group member can do it or knows the answer.
6. Students are allowed to ask questions about the teacher's questions in Quizizz.
7. Students whose numbers are called will present their group's work results, and students with the same number in other groups will respond.
  - a. Example of how to call student numbers.
  - b. No. 3 from group 2 (presenting)
  - c. No. 3 From groups 4,1,5,3,6 (respond)
8. Other groups respond and add to it if it is inappropriate or has a better alternative answer.
9. The teacher directs students to make conclusions about the material and questions in the Quizizz given.

Next, the findings in this research will be discussed:Kemampuan Koneksi Matematis Siswa

Based on the Numbered Heads Together (NHT) learning process with the help of Quizizz, it can be seen that students' mathematical connection skills are effective because in the Numbered Heads Together (NHT) learning process with the help of Quizizz there are activities such as groups discussing the correct answers and their solutions and ensuring that each member groups can work on it or find out the answer

Figure 1. Students discussing



The picture above shows that students are discussing to solve problems regarding contextual problems of arithmetic sequences and series. During discussions, students share information to understand various concepts and solve problems from the questions given using the Quizizz application. With this activity, students can improve their mathematical connection skills by discussing.

**Figure 2. Students are asking questions**



The picture above shows students asking questions to the teacher. When students are experiencing difficulties or cannot solve problems from the questions given, students can ask the teacher, not just friends. This is by the activities seen from the Numbered Heads Together (NHT) learning model with the help of Quizizz, namely that students are allowed to ask questions about the questions given by the teacher in Quizizz, so that by having this activity of asking the teacher, students can improve their connection skills by how to ask either friends or teachers. Based on the results of research conducted by Muchlis et al., (2018) with the title Increasing Middle School Students' Mathematical Connections Through an Open-Ended Approach with a NHT Type Cooperative Setting, it was found that the mathematical connection abilities of students who used an open-ended approach with a type of cooperative learning model setting NHT is better than the mathematical connection abilities of students whose learning uses learning.

#### 1) **Student Learning Motivation**

Student learning motivation can be seen based on student learning motivation indicators: 1). Attendance at school; 2). Follow PBM in class; 3). Studying outside school hours, 4). Attitude towards difficulties; 5). Efforts to overcome difficulties; 6). Habits in attending lessons; 7). Enthusiasm in following PBM; 8). Desire to achieve; 9). Quality of results; 10). Completion of assignments/homework; 11). Take advantage of opportunities outside of class hours at school. The NHT learning process assisted by Quizizz can improve students' learning motivation, so this learning model is very effective in increasing students' learning motivation..



**Figure 18. NHT Learning Activities with the Help of Quizizz**

From the picture above, it can be seen that in learning activities students are given learning using the NHT model with the help of Quizizz so that students are motivated to learn. Motivation is crucial to foster student interest and interest in the learning process. Here students will discuss solving problems given by the teacher so that they are required to be more active in learning. Efforts that can be made to increase students' learning motivation are using active and innovative learning, one is by grouping using NHT number heads and game media such as Quizizz. With the NHT learning model with the help of Quizizz, this has become something new so that students are more motivated and want to study well. This is based on indicators of student learning motivation, namely, school attendance, following PBM in class, habits in attending lessons, enthusiasm for following PBM, desire to achieve. So implementing NHT learning with the help of Quizizz can increase students' learning motivation. According to Firmansyah & Solihah, (2019) the mathematics learning motivation of students who receive learning using the Numbered Heads Together (NHT) learning model increases, because of the teacher's role in facilitating and accommodating the teaching and learning process by creating interesting activities that make students more motivated.

Based on the results of data management, it can be concluded that there are differences in students' mathematical connection abilities before and after learning in the experimental and control classes. There were differences in mathematical connection abilities in the control class using the conventional learning model before and after learning. Likewise, the experimental class that used the NHT learning model experienced differences in students' mathematical connection abilities before and after learning.

Students' final mathematical connection abilities in the experimental and control classes experienced differences. The experimental class got an average value greater than the control class's average value. So the NHT learning model is better than the conventional model for students' mathematical connection abilities.

## CONCLUSION

Based on the results of the research and discussions that have been carried out, several conclusions can be obtained as follows:

1. There is no difference in the initial abilities of experimental class and control class students.

2. Mathematical Connection Ability using the Numbered Heads Together (NHT) Learning Model with the help of Quizizz is better than Mathematical Connection Ability using the conventional Learning Model.
3. Student learning motivation using the Numbered Heads Together (NHT) Learning Model with the help of Quizizz is better than student learning motivation using the conventional Learning Model.

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