

Analysis of Mathematical Communication Ability and Self Confidence in the Numbered Head Together Learning Model with a Contextual Approach to Class VIII Opportunity Materials

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ABSTRACT

The purpose of this study was to determine the effectiveness of the Number Head Together (NHT) learning model with a Contextual approach to describe the mathematical communication skills of class VIII students based on Self Confidence. The method used in this study is a mixed method. Data was collected through tests, questionnaires, interviews, and documentation. The results showed that (1) the NHT learning model was more effective on mathematical communication skills which could be seen from the results of the experimental class mathematical communication ability test which was greater than the control class, (2) The pattern of mathematical communication skills in terms of Self Confidence varied. Of the 31 students there are students who fall into the less positive, positive and very positive categories. Therefore, this research can be an alternative in learning mathematics, especially the use of contextual approaches and mathematical communication skills that can be applied in learning with the NHT and Self Confidence models of students.

Keywords: Mathematical Communication Skills, Number Head Together, Self Confidence, Contextual

INTRODUCTION

Mathematical communication ability is one of the important processes in learning

mathematics. Communication is one of the focuses in learning mathematics because in essence mathematics is a language (Alamiah and Afriansyah, 2018). Mathematics is not only a means of thinking that helps students to find patterns, solve problems, and draw conclusions, but more than that, mathematics functions as a tool to communicate students' thoughts about ideas clearly, precisely, and concisely. The same thing was also stated by Suryadi (2011: 171) that as a language, mathematics uses terms and symbols that are precisely defined. In addition, learning mathematics is an interaction activity between teachers and students.

In addition to mathematical communication skills, self-confidence also needs to be possessed by students and is the focus of researchers. According to Reddy (2014: 56) concluded "Self confidence is critical to effective performance in the workplace and is the source of assertiveness, which is fully representing yourself to others". The meaning is that self-confidence is very important and is a source of assertiveness, which fully represents oneself to others. Self-confidence is a self-confidence that students must have in order to succeed in the learning process. Self-confidence is believing in one's own abilities that are

adequate and aware of their abilities, and can use them appropriately. A weak self-confidence ability is caused because someone often avoids a challenging problem. Then tend to doubt whether it is possible to find a solution to the problem he is experiencing

The low mathematical communication skills of students also occurred in Class VIII of SMP Negeri 5 Demak where researchers carried out observation activities. Based on preliminary observations made by researchers and unstructured interviews with mathematics teachers in Class VIII SMP Negeri 5 Demak, it was found that problems related to efforts to improve students' mathematical communication skills were not optimal, especially the subject of opportunitie

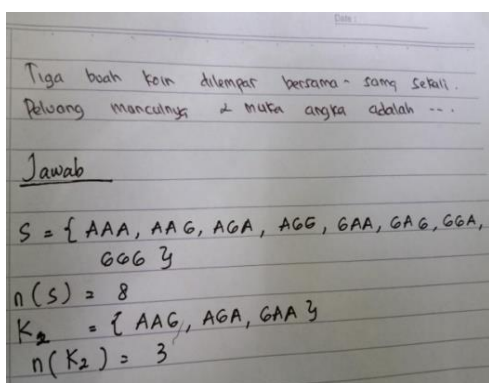


Figure 1. Results of Student Work

The low mathematical communication skills of students can be caused by various factors, one of which is the application of learning models that do not provide space for students to develop their mathematical communication skills. This happens because the education system in Indonesian schools generally targets students' mathematical abilities to reach an average level (Makur, Prahmana, and Gunur, 2018).

Based on the results of the observations above, it is necessary for the teacher's efforts to train students' mathematical communication skills and students' self-confidence. One of the good learning models to train students' mathematical communication skills and self-confidence is

the Numberd Head Together learning model with a contextual approach.

Tamur (2012: 105) suggests that the application of the ethnomathematical-based Student Team Achievement Division (STAD) type cooperative learning model can improve students' mathematical communication skills. Based on the results of Tamur's research, cooperative learning can show an increase in students' mathematical communication, while the difference from the research that will be carried out by researchers in this case lies in the type of cooperative learning model used and the level of education of the research object. Similarly, Pratiwi (2010: 85) suggests that applying the NHT type of cooperative learning model improves students' mathematical communication. The research conducted by the researcher has an additional contextual approach to the NHT type of cooperative learning model used and the subject matter of the subject matter is different

METHOD

The type or research method used is Mixed Methods research, which is a combination of quantitative and qualitative research. The research design used is a sequential explanatory design. This design is a research procedure that combines the use of quantitative methods and qualitative methods.

Quantitative research is used to acquire students' mathematical communication skills. This quantitative data was obtained through a test of mathematical communication skills. The design used in quantitative research is a non-equivalent control group design. Mathematical communication skills will be tested on the effectiveness of the Number Head Together model with a contextual approach and Student Self Confidence. Analysis of the data used in this study using learning completeness test, classical completeness test, average difference test, different proportion test, simple linear regression test, and an increase in the

average pretest and posttest of the experimental class.

Qualitative research is used to obtain an overview of mathematical communication skills in terms of self-confidence. Data obtained from qualitative research conducted with the results of mathematical communication skills tests and interviews. The research subjects in this study were three students who were selected based on the results of the mathematical communication ability test which were taken from the response levels of very positive, positive, and less positive. Student response criteria can be seen in the table.

Percentage	Category
$85 \% \leq SC$	Sangat Positive
$70 \% \leq SC < 85 \%$	Positive
$50 \% \leq SC < 70 \%$	Kurang positive
$SC < 50 \%$	Tidak Positive

Tabel 1. Student Self Confidence Criteria

Data collection techniques used in this study were tests, questionnaires, interview guidelines, and documentation. The test is used to determine the value of students' mathematical communication skills. Questionnaires are used to determine self-confidence after learning is complete. The response questionnaire consists of 4 aspects, namely Believing in One's Own Ability, Acting Independently in Making Decisions, Having a Positive Sense of Self, Dare to Express Opinions and Pleasure. Interviews were used to find out more about mathematical communication skills and Self Confidence in learning mathematics. The interview technique in this study used semi-structured interviews. Documentation is used to obtain student data needed in research.

RESULTS AND DISCUSSION

Quantitative Data Analysis

Based on the results obtained from the mathematical communication skills test, the following tests were carried out.

(1) Normality Test

The normality test used in this study was the results of the pretest and posttest of mathematical communication skills in the experimental and control classes. This test uses Kolmogorov-Smirnov with the help of the SPSS 22 application program. Below are the results of the pretest and posttest normality tests of mathematical communication skills in table 2.

Class	The Calculation Results	
	Pretest	Posttest
Experimental	0.095	0.178
Control	0.048	0.152

Table 2. Normality Test Results

Based on table 2. shows that the normality test on the pretest and posttest data of students' mathematical communication skills is said to be normally distributed.

(2) Homogeneity Test

Homogeneity test was conducted to find out whether the data had the same variance (homogeneous) or not. This test uses Levene Statistics with the help of the SPSS 22 application program. The results of the homogeneity test analysis for pretest data are 0,48 while for posttest data are 0,265. this shows that the homogeneity test on the pretest and posttest data of the experimental class and control class is the same or homogeneous.

(3) Test the Similarity of Two Averages

This test was conducted to see the ability of the initial data (pretest) owned by students. This test uses the Independent Samples Test with help of the SPSS 22 application program. The result of the analysis can be seen in table 3.

Class	Sig.
Experimental	0.593
Control	0.593

Table 3. Test the Similarity of Two Averages

(4) Study Mastery Test

The learning mastery test was conducted to determine whether the experimental class achieved minimum mastery. Mastery learning test using one sample T-test with

the help of SPSS22 application programs with a minimum completeness criteria of 70. Based on the results of the posttest data analysis of experimental class students' mathematical communication skills, it shows that the data is normally distributed and homogeneous, then a learning mastery test is carried out and the results are $t = 7,201$ while for $t_{table} = 1,567$. Because $t > t_{table}$, then H_0 is rejected means average the value of students' mathematical communication skills reached the minimum completeness criteria.

(5) Classical Mastery Test

The classical mastery test was used to determine that the experimental class students' mathematical communication skills achieved classical mastery. In this study, learning is said to have achieved classical completeness if the number of students in the class reached 75% completeness. The test used is the one sample proportion test on the right. Based on the results of posttest data analysis, the experimental class students' mathematical communication skills that exceed the KKM score are 28 out of 30 individual experimental class students' mastery. Because $t > t_{table}$, Based on table 3, it can be seen that the experimental class and control class have the same sig value of 0.593. So that the average mathematical communication ability test results in the experimental class are the same as the control class, so H_0 is rejected. This means that the proportion of students who get a mathematical communication skill test score is greater than 75% in a class that uses the NHT model with a Contextual approach, already exceeding the KKM on the mathematical communication skills test, which is 28 of it. Then H_0 is rejected. This means that the proportion of students who get a mathematical communication skill test score is greater than 75% in the class using the NHT model with a Contextual and Self Confidence approach that has exceeded the KKM on the mathematical communication skill test, which is 28 of the classical 30

experimental class students' completeness by 75%.

(6) Average Difference Test

The average difference test in this study was used to determine whether students' mathematical communication skills in the NHT model with a Contextual and Self Confidence approach were better than students' mathematical communication skills in the conventional model assisted by student worksheets. The test carried out is the t-test (Independent sample test) on the right hand side with the help of the Excel application program. Based on the results of the posttest data analysis of students' mathematical communication skills in the experimental class and control class, it shows that the data is normally distributed and homogeneous, then the average difference test is carried out and the results obtained

$t = 1.671$ while for $t_{table} = 2.229$. Because $t > t_{table}$, then H_0 is rejected, meaning that the average mathematical communication ability of students in classes that use the NHT model with a Contextual and Self Confidence approach is better than the mathematical communication skills of students in classes that use conventional models assisted by student worksheets.

(7) Proportion Difference Test

The different proportion test was used to determine the proportion of students who completed individually in the posttest of students' mathematical communication skills. This proportion difference test uses the right side test. Based on the results of the posttest data analysis of students' mathematical communication skills in the experimental class and control class in the previous test, the data was normally distributed and homogeneous and then tested by manual calculation, it was obtained while for $t = 0.967$. Because $t > t_{table}$ then H_0 is rejected. This means that the proportion of students' mathematical communication skills in classes that use the NHT model with a Contextual and Self Confidence

approach is more than the proportion of students' mathematical communication skills in classes that use conventional models with the help of student worksheets.

(8) Simple Linear Regression Test

Simple linear regression test was used to determine the effect of student responses on students' mathematical communication skills in classes using the NHT model with Contextual and Self Confidence approaches. This test uses the help of the Excel application program. The calculation results obtained the value of sig. 0.009 which is smaller than 0.05 then H_0 is rejected. That is, students' responses have an effect on mathematical communication skills with a simple linear regression equation obtained: $= 72.32 + 0.183574X_1$.

(9) Experimental Pretest and Posttest Improvement

After the data is said to be normally distributed, a homogeneity test is carried out to determine whether the data are the same or not. Based on the results of calculations using the SPSS 22 application program, a significance value of > 0.05 was 0.621 so that the pretest and posttest data showed the same or homogeneous data.

Next, a paired t-test was performed (paired sample test). Based on the calculation results, the sig value is 0.000, which means it is smaller than 0.05 so that H_a is accepted. This means that the average posttest results in the experimental class are higher than the pretest results.

The n-gain test was used to find out more about the increase from pretest to posttest scores. The results of the analysis were calculated manually and can be seen in Table 4.

Table 4. N-Gain Test for Experimental class and Control Class

Class	Mean		N - Gain	Criteria
	Pretest	Posttest		
Experimental	64	86	0,71	Sedang
Control	60	74	0,40	Rendah

Based on Table 4. the average N-gain for the class using the NHT model with a Contextual and Self Confidence approach is 0.71. This means that mathematical communication skills are in the medium category and for the control class an average of 0.40 is obtained, which means that mathematical communication skills are in the low category. The graphic form between the increase in the pretest posttest in the experimental class and the control class can be seen in Figure 2.

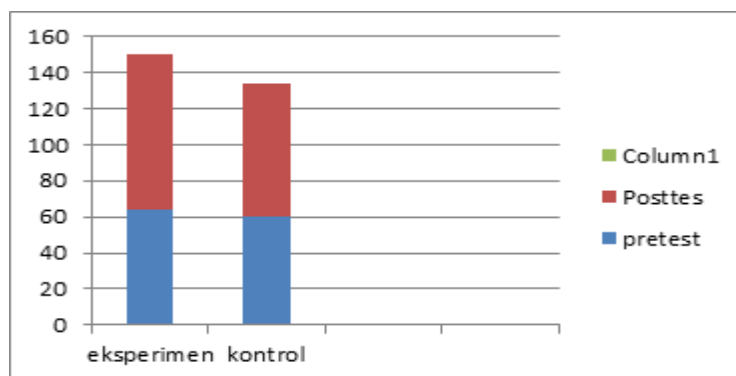


Figure 2. Graph of the experimental and control class pretest posttest score

Qualitative Data Analysis

The results of the mathematical communication ability test consist of five questions that are assessed with an assessment guide based on the mathematical communication skills carried out by the indicator. After knowing the achievement of

mathematical communication skills, then based on the posttest data on indicators of mathematical communication skills and the results of interviews with selected research subjects, triangulation techniques can be applied. Triangulation technique is a research effort to obtain in-depth data.

Fill out the Student Self-confidence Questionnaire and Determine Research Subjects Student questionnaires were given to the experimental class after the learning was completed. The questionnaire used in this study refers to Khairiyah (2019) which consists of 4 aspects, namely Believing in One's Own Ability, Acting Independently in

Making Decisions, Having a Positive Sense of Self, Dare to Express Opinions and Pleasure. opportunity material, a questionnaire instrument consisting of 20 statements with the answer "Yes" or "No" was used. The results of student responses can be seen in Table 5.

Table 5. The Result of Student Self Confidence

Aspect	Interval (%)	Self Confidence Category
Believe in Your Own Ability	78	Positive
Acting Independently in Making Decisions	85	Very Positive
Have a Positive Sense of Yourself	74	Positive
Dare to Express Opinions	85	Very Positive
Rata-rata	80,5	Positive

In the aspect of interest, the percentage score is 78% with a positive response category that after participating in learning using the NHT model with a Contextual and Self Confidence approach makes students interested in learning. As in the research conducted by Musharafa (2018) at SMK Santo Aloisius Ruteng class X which concluded that the NHT model was more effective than direct learning in improving students' mathematical communication skills. In the aspect of motivation, the percentage score of 85% with a very positive response category indicates that learning by using individual manipulative teaching aids provides a new experience for students to be motivated in learning.

In the aspect of Believing in Your Own Ability, the percentage score is 78% with a positive response category. shows that Believing in One's Own Ability can make students believe in their abilities. In the aspect of Acting Independently in Making Decisions, the percentage score is 85% with a very positive response category indicating that learning if followed by learning has a contextual approach. As in Binangun's research (2016), students who study mathematics can happily explore themselves to understand the subject matter. Based on the results of the mathematical communication ability test, it is known that some students get different results with different criteria. The research subjects selected were three out of 30 students who

had different criteria from the results of the mathematical communication ability test and student response questionnaire with details in Table 6. Based on the results of the student questionnaire there were 10 subjects who had less positive responses and 2 were selected for research subjects. Furthermore, 18 subjects were obtained with positive response criteria and 2 research subjects were selected. while for the subject with a very positive response there are 2 which are then used as research subjects.

Table 6. Research Subject

Code	Student Response Category	Criteria Test
E-05E-06	Less positive	Low
E-20E-27	Positive	Currently
E-08E-28	Very Positive	High

Quantitative Discussion

The NHT model with Contextual and Self Confidence approaches was carried out for quantitative research, so that in this study the results obtained were in the form of scores on the mathematical communication ability test. The experimental class uses the NHT model with a Contextual and Self Confidence approach, while the control class uses a conventional model with the help of student worksheets.

After learning the NHT model with a Contextual approach was completed, the researchers gave a test of mathematical communication skills and a questionnaire on students' self-confidence in the experimental class, while the control class was only given a test of mathematical communication skills.

Mathematical communication ability tests were conducted by students. After that, the researcher then conducted interviews in the experimental class with the selected students. In the interview, the researcher looked at the students' mathematical communication skills verbally and the researcher also looked at the students' self-confidence towards the NHT model with a contextual approach. After everything is done, then the normality and homogeneity tests are carried out for the final data (posttest). The normality test obtained a significance value = $0.156 > 0.05$. As for the homogeneity test, the significance value = $0.231 > 0.05$ so that the data is normally distributed and has the same or homogeneous variance.

Based on the results of students' mathematical communication skills, it is known that learning using the NHT model with a Contextual and Self Confidence approach is more effective than the conventional model assisted by student worksheets. This can be seen from (1) the completeness of students who have achieved a score of 70 more than 75%; (2) the average test results of students' mathematical communication skills in the experimental class are greater than the control class, namely 77.86 for the experimental class and 69.86 for the control class.

QUALITATIVE DISCUSSION

Mathematical Communication Ability Judging from Self Confidence

In this study, students' mathematical communication skills were analyzed based on Self Confidence

Students' Mathematical Communication Ability on Self Confidence Less Positive

Based on the analysis obtained from 10 subjects in the less positive questionnaire, 2 were selected as research subjects with results of 65 and 70. Subjects were only able to achieve one mathematical communication ability, namely being able to convert mathematical ideas into

mathematical models while for the other three indicators of mathematical communication skills they did not achieve.

Mathematical Communication Ability on Positive Self Confidence

The results obtained indicate that of the 18 subjects in the positive category, 2 were selected as research subjects with 80 students' results, while for the results of the mathematical communication ability test, the score was 80. This subject tends to write mathematical problem solving procedures in their own language but there are still shortcomings. The student was able, however, not able to achieve all indicators of mathematical communication skills. This is what ultimately makes the answer is not correct.

Mathematical Communication Ability on Self Confidence Very Positive

The results that have been obtained show that of the 2 subjects in the very positive category, the results of the questionnaire response are 90, while the results of the mathematical communication ability test are scored 90. These subjects tend to be able to achieve all indicators of mathematical communication well. The results of the interview also mentioned the results that the subject was able to answer all the questions.

CONCLUSION

Based on the results of the discussion, it is concluded that learning using the NHT model with a Contextual approach and self-confidence is effective on students' mathematical communication skills and the average mathematical communication ability of students using the NHT model with a Contextual approach and self-confidence has increased, where the posttest value is higher than the pretest value. The posttest results of the experimental class students' mathematical communication skills were higher than the control class posttest results. Mathematical communication ability with less positive

self confidence category shows that the subject is able to achieve one of the indicators. Mathematical communication skills with positive self-confidence indicate that the subject is able to achieve three indicators. Meanwhile, mathematical communication skills with a very positive self-confidence category indicate that the subject is able to achieve all indicators.

Conflict of Interest: None

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