



**THE IMPACT OF IMPLEMENTING NUMBERED HEADS TOGETHER
COOPERATIVE LEARNING MODEL ON THE COMMUNICATION SKILL
OF STUDENT AT JUNIOR HIGH SCHOOL 3 TEBO**

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Abstract

Low student communication skills have been the cause of this research, which had an impact on learning outcomes because there had not been training on students' communication skills through the application of appropriate learning models. The learning process, which still uses conventional learning models, namely group discussions, has not made each student active and responsible for group assignments and has not trained communication skills in scientific arguments. Therefore, an appropriate learning model is needed, one of which is the Numbered Head Together (NHT) type cooperative learning model. The aim of the research is to determine the effect of implementing the NHT type cooperative learning model on the communication skills of SMPN 3 Tebo students. The research uses a Quasi-Experimental type of research with a Nonequivalent Control Group Design. The research began with a pretest in the experimental class and control class, then treatment was given to the experimental class, and at the end of the learning process, a posttest was given to both classes. Samples were taken using purposive sampling technique. The test instrument consists of 13 description questions. Data were analyzed using Microsoft Excel to carry out prerequisite tests and hypothesis tests on overall communication skills and each ability indicator. The results of the research showed that there was an increase in students' overall communication skills between before and after treatment. Through the Mann Whitney test with $Z_{count} -5.32$ and $Z_{tabel} 1.96$ with the criterion that H_0 is accepted if $-Z_{tabel} \leq Z_{count} \leq Z_{tabel}$, then $Z_{count} -5.32 < -Z_{tabel} -1.96$, then H_0 is rejected, and H_1 is accepted. It can be concluded that there is a significant influence of implementing the Numbered Head Together type learning model on the communication skills of students at SMP Negeri 3 Tebo Regency.

Keywords: Numbered Head Together, Communication Skill, Science Education

Introduction

Current 21st century learning directs students to be able to master the 6C skills, namely critical thinking, communication, collaboration, creativity, citizenship and character. Communication skills are part of the 21st century skills that students must master. According to Amiroh and Admoko (2020), communication skills can be understood as the ability to communicate arguments from observation results based on analysis of oral and written activities. One form of communication skills is argumentation skills which aim to convey scientific ideas or opinions (Demircioğlu and Uçar, 2012). Scientific argumentation skills require students to state a claim and provide reasons using data to support or strengthen the claim (Anita, Afandi and Tenriawaru, 2019). Scientific argumentation skills are analyzed using the Toulmin argumentation pattern, namely claim, data, warrant, backing, rebuttal and qualifier/reservation (Toulmin, 2003).

According to Putri (2018), learning should be directed at training in good communication and collaboration skills, one of which is through scientific argumentation skills. In implementing science learning in schools, students should be able to play an active role by displaying communication skills regarding arguments that have been developed from the scientific process (Pratiwi and Putri, 2021). Argumentation is something that must be implemented in learning so that students' communication skills can be improved in order to achieve 21st century skills (Siregar and Pakpahan, 2020). In fact, Indonesian education has not succeeded in producing individuals who are competent in communicating. Based on PISA data in 2018 and 2022, Indonesia has a low score. The low PISA results are related to low science process skills, one of which is science communication skills (Ariyani, Jalmo and Yolida, 2019). The implementation of the independent curriculum is one of the effective ways for the Indonesian government to improve 21st century skills. In the independent curriculum, the role of teachers is not only as the main source of learning, but students

must be active in seeking learning resources (Pertwi, Nurfatimah and Hasna, 2022).

Based on the author's interview activities with science teachers at SMP Negeri 3 Tebo Regency, it is known that the average science scores of students are still low and do not meet the KKTP. This can occur due to various factors, namely the learning process still uses a conventional model in the form of discussion activities, lack of training in students' communication skills and low understanding of students. Lafiani et al. (2022) stated that a good learning process has been proven to improve communication skills. So, before trying to improve achievement, efforts must be made to improve communication skills first. Based on information obtained by the author from teachers at SMP Negeri 3 Tebo Regency, the teacher stated that students are passive and have difficulty conveying arguments about a phenomenon, resulting in low communication skills of students. Teachers still rarely implement activities related to communication skills training by giving questions containing discourse containing indicators of scientific communication skills.

Based on the observation results, it was seen that students were passive and teachers used lecture and discussion methods in small groups. During the discussion, students often handed over assignments to only a few smart group members, so that other students were passive and irresponsible for the tasks given. According to Suhardiyanto (2009), discussion activities in learning that are carried out well should be able to increase student participation so that they have a positive impact on communication skills. In addition, through discussion, the ability to put forward scientific arguments and convey them with appropriate communication can be seen in each student (Pratiwi and Putri, 2021). However, in fact, the conventional model in the form of discussion activities applied by teachers has not been able to optimize students' communication skills. The group discussion model used by science teachers at SMP Negeri 3 Tebo Regency does not fully make students active, some are passive because they assume that group assignments are only the responsibility of smart group members.

Based on the facts that the author found, it can be concluded that the learning model applied has not been able to optimize student activity so that it has an impact on student communication skills. So a solution is needed in the form of implementing the right learning model. Through a literature review, to overcome this problem, the right learning model can be used, namely the Numbered Head Together (NHT) model. In the application of NHT, students are divided into groups consisting of 4-5 people and each member has a head number. All group members discuss completing the task then the teacher will call a certain member number, so that each student has an equal opportunity to be called and encouraged to prove responsibility related to the task that has been completed. Through the application of NHT, students are given the opportunity to be able to communicate and argue scientifically. According to Rachmawati and Wasis (2019) the use of cooperative learning models in learning is an alternative effort to train communication skills and develop students' thinking to be more effective.

This study applies the NHT learning model to the Ecology and Biodiversity material with a very complex scope of material equipped with various issues and phenomena that occur in the surrounding environment. Through the application of the NHT model, students can be more confident in communicating based on scientific arguments that have been developed based on various phenomena that occur in nature. Based on this, researchers are interested in examining the effect of the application of the NHT type cooperative learning model on students' communication skills.

Research Method

The study used a Quasi-Experimental Design type with a Nonequivalent Control Group Design. This design aims to see the differences in communication skills in two different groups, namely by providing treatment to the experimental class in the form of implementing the NHT model, while the control class uses a conventional model. The study population included all students of class VII of SMP Negeri 3 Tebo

Regency in the 2023/2024 academic year, namely 262 students. Purposive sampling was used in selecting samples based on certain characteristics. The sample included two classes, namely VII B (experimental) and VIII D (control) with the same teacher considerations, almost the same average scores and having the same number of 32 people in each class.

The research data are in the form of pretest and posttest results of communication skills from both sample groups. Furthermore, statistical analysis was carried out including prerequisite tests (normality and homogeneity) and hypothesis testing. In addition, an n-gain test was also carried out to see the increase in communication skills from each sample group. Hypothesis testing was carried out on all indicators of communication skills as a whole and on each indicator of communication skills.

Result and Discussion

Result

The research was conducted in February-March 2024 at SMP Negeri 3 Tebo Regency which was divided into two sample groups, namely the experimental class (VII B) and the control class (VII D). The instruments given were in the form of descriptive questions consisting of indicators of scientific communication skills sourced from Toulmin's scientific argumentation indicators, namely claims, data, warrants, backings and qualifiers/reservations.

This study produced data on students' communication ability scores consisting of pretest-posttest scores. A recapitulation of overall communication ability can be seen in the following table.

Table 1. Recapitulation of Overall Communication Skills

| | Pretest | | Posttest | | N-Gain | |
|-----------------------|-----------------------------|----------|--------------|-------------|-------------|------------|
| | Experi-ment | Con-trol | Expe-ri-ment | Con-trol | Experi-ment | Con-trol |
| Mean | 26,2 | 12,02 | 77,52 | 42,32 | 0,69 | 0,36 |
| Min | 9,68 | 0,00 | 38,71 | 9,68 | 0,27 | 0,03 |
| Max | 54,84 | 54,84 | 100 | 93,55 | 1,00 | 0,85 |
| Normality Test | | | | | | |
| L_{hit} | 0,223 | 0,227 | 0,087 | 0,156 | 0,089 | 0,112 |
| L_{tab} | 0,154 | | | | | |
| Concl- ion | Not normally distributed | | Nor- mal | Not Norm | Nor mal | Nor mal |

| | Pretest | | Posttest | | N-Gain | |
|--------------------|-------------------|--------------|-----------------|--------------------------|---------------------------|--------------|
| | Experi- ment | Con- trol | Expe- riment | Con- trol | Experi- ment | Con- trol |
| | | | | ally Distri- buted | | |
| Homogeneity Test | | | | | | |
| F _{hit} | 1,98 | | 2,130 | | 1,220 | |
| F _{tab} | | | 1,804 | | | |
| Concl usion | inhomogene ous | | inhomogeneous | | Homogeneous | |
| Hypothesis testing | | | | | | |
| Z _{hit} | -4,53 | | -5,34 | | T _{count} -5,759 | |
| Z _{tab} | | | 1,96 | | T _{table} 1,999 | |
| Concl ion | Different | | Different | | Different | |

Overall communication skills in the experimental class were higher than in the control class. The highest posttest score in the experimental class was 100 with an average of 77.52, in the control class the highest score was 93.55 with an average of 42.32. Based on the hypothesis test in the form of a nonparametric Mann Whitney test, it was obtained that $Z_{count} -5.32 \leq -Z_{table}$ with the acceptance criteria H_0 if $-Z_{table} \leq Z_{count} \leq Z_{table}$. Then H_0 is rejected, so there is an effect of the implementation of the NHT type cooperative learning model on students' communication skills. In addition, there is also a difference in the average N-gain with a score in the experimental class of 0.69 and is categorized as moderate while the control class has a score of 0.36 with a moderate category.

Communication Skills Based on Claim Indicators in Scientific Argumentation

The communication skills of students for each indicator are analyzed through the same stages as the analysis of overall communication skills. A recapitulation of the communication skills of students for the claim indicator can be seen in Table 2.

Table 2. Recapitulation of Communication Skills Based on Claim Indicators in Scientific Argumentation

| | Pretest | | Posttest | | N-Gain | |
|------------------|-----------------|--------------|-----------------|--------------|-----------------|--------------|
| | Experi- ment | Con- trol | Experi- ment | Con- trol | Experi- ment | Con- trol |
| Mean | 54,55 | 32,83 | 96,97 | 75,00 | 0,92 | 0,60 |
| Min | 25,00 | 0,00 | 75,00 | 25,00 | 0,00 | 0,00 |
| Max | 75,00 | 75,00 | 100 | 100 | 1,00 | 1,00 |
| Normality Test | | | | | | |
| L _{hit} | 0,272 | 0,275 | 0,357 | 0,191 | 0,366 | 0,187 |

| | Pretest | | Posttest | | N-Gain | |
|------------------|--------------------------|--------------|-----------------|--------------|-----------------|--------------|
| | Experi- ment | Con- trol | Experi- ment | Con- trol | Experi- ment | Con- trol |
| L _{tab} | | | 0,154 | | | |
| Conc | Not Normally Distirbuted | | | | | |
| Homogeneity Test | | | | | | |
| F _{hit} | 1,668 | | 11,95 | | 4,134 | |
| F _{tab} | | | 1,804 | | | |
| Ke- Conc | Inhomogeneous | | | | | |
| Hypothesis Test | | | | | | |
| Z _{hit} | -3,97 | | -3,83 | | -5,759 | |
| Z _{tab} | | | 1,96 | | | |
| Conc | Different | | Different | | Different | |

In the claim indicator, the highest posttest score was obtained in the experimental class, which was 100 with an average of 96.97. While in the control class, the highest score was 100 with an average of 75. Based on the Mann Whitney hypothesis test, there was a difference in the average posttest results of the claim indicator, namely with $Z_{count} -3.83 \leq -Z_{table} -1.96$. The N-gain value of the experimental class was 0.92 (high) and the control class was 0.60 (moderate).

Communication Skills Based on Data Indicators in Scientific Argumentation

Recapitulation of students' communication skills data indicators can be seen in the following table.

Table 3. Recapitulation of Communication Skills Based on Data Indicators in Scientific Argumentation

| | Pretest | | Posttest | | N-Gain | |
|------------------|--|--|-----------------|---------------------------------------|--|--------------|
| | Experi- ment | Con- trol | Expe- riment | Con- trol | Experi- ment | Con- trol |
| Mean | 25,25 | 12,12 | 74,75 | 37,71 | 0,66 | 0,30 |
| Min | 0,00 | 0,00 | 44,44 | 0,00 | 0,20 | 0,29 |
| Max | 55,5 | 55,55 | 100 | 100 | 1,00 | 0,88 |
| Normality Test | | | | | | |
| L _{hit} | 0,22 | 0,408 | 0,152 | 0,183 | 0,185 | 0,134 |
| L _{tab} | 0,154 | | | | | |
| Conc | Not Distrib uted Norma lly | Not Distribu ted Normal ly | Nor mal | Not Distrib uted Nomall y | Not Distribu ted Normal ly | Nor mal |
| Homogeneity Test | | | | | | |
| F _{hit} | 1,115 | | 2,561 | | 1,613 | |
| F _{tab} | 1,804 | | | | | |
| Conl | Homogen | | Not Homogen | | Homogen | |
| Hypothesis Test | | | | | | |
| Z _{hit} | -4,12 | | -4,68 | | -4,17 | |
| Z _{tab} | 1,96 | | | | | |
| Conc | Different | | Different | | Different | |

In the data indicator, the highest posttest value was obtained in the experimental class, which was 100 with an average of 74.75. While in the control class, the highest value was 100 with an average of 37.71. Based on the Mann Whitney hypothesis test, there was a difference in the average posttest results of the data indicator, namely with $Z_{count} -4.68 \leq -Z_{table} -1.96$. The N-gain values of the experimental and control classes were respectively 0.66 and 0.30 with a moderate category.

Communication Skills Based on Warrant Indicators in Scientific Argumentation

A recapitulation of the communication skills of students using the warrant indicator can be seen in Table 4.

Table 4. Recapitulation of Communication Skills Based on Warrant Indicators in Scientific Argumentation

| | Pretest | | Posttest | | N-Gain | |
|------------------|--------------------------|----------|-------------------------|----------|------------------------|--------------------------|
| | Experi-ment | Con-trol | Expe-riment | Con-trol | Experi-men | Con-trol |
| Mean | 20,87 | 7,07 | 71,72 | 35,35 | 0,65 | 0,31 |
| Min | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,14 |
| Max | 77,78 | 33,3 | 100 | 88,9 | 1,00 | 0,89 |
| Normality Test | | | | | | |
| L _{hit} | 0,213 | 0,359 | 0,131 | 0,15 | 0,119 | 0,159 |
| L _{tab} | 0,154 | | | | | |
| Conc | Not Distributed Normally | | Nor-mal | Nor-mal | Nor-mal | Not Distributed Normally |
| Homogeneity Test | | | | | | |
| F _{hit} | 4,759 | | 1,467 | | 1,054 | |
| F _{tab} | 1,804 | | | | | |
| Conc | Homogen | | Homogen | | Homogen | |
| Hypothesis Test | | | | | | |
| Z _{hit} | -2,74 | | T _{hit} -5,285 | | Z _{hit} -3,94 | |
| Z _{tab} | 1,96 | | T _{tab} 1,999 | | Z _{tab} 1,96 | |
| Conc | Different | | Different | | Different | |

In the warrant indicator, the highest posttest value was obtained in the experimental class, which was 100 with an average of 71.72. While in the control class, the highest value was 88.0 with an average of 35.35. Based on the parametric hypothesis test, the t-test showed that there was a difference in the average posttest results of the warrant indicator, namely $t_{count} -5.285 < -t_{table} 1.999$ with the acceptance criteria H_0 if $-t_{table} \leq t_{count} \leq t_{table}$. The N-gain values of the experimental and control classes were

respectively 0.65 and 0.31 with a moderate category.

Communication Skills Based on Backing Indicators in Scientific Argumentation

The recapitulation of students' communication skills using the backing indicators can be seen in Table 5.

Table 5. Recapitulation Communication Skills Based on Backing Indicators on Scientific Argumentation

| | Pretest | | Posttest | | N-Gain | |
|------------------|--------------------------|----------|-------------|----------|----------------|-------------|
| | Experi-ment | Con-trol | Expe-riment | Con-trol | Experi-men | Con-trol |
| Mean | 23,74 | 8,08 | 78,79 | 43,43 | 0,68 | 0,39 |
| Min | 0,00 | 0,00 | 33,33 | 0,00 | -1,00 | -0,25 |
| Max | 83,33 | 66,67 | 100 | 100 | 1,00 | 1,00 |
| Normality Test | | | | | | |
| L _{hit} | 0,307 | 0,418 | 0,202 | 0,122 | 0,186 | 0,157 |
| L _{tab} | 0,154 | | | | | |
| Conc | Not Normally Distributed | | Nor-mal | Nor-mal | Not Normally | Distirbuted |
| Homogeneity Test | | | | | | |
| F _{hit} | 3,24 | | 1,715 | | 1,538 | |
| F _{tab} | 1,804 | | | | | |
| Conc | Not Homogeneity | | Homogeneity | | Homogenegenity | |
| Hypothesis Test | | | | | | |
| Z _{hit} | -2,25 | | -4,12 | | -3,41 | |
| Z _{tab} | 1,96 | | | | | |
| Conc | Different | | Different | | Different | |

In the backing indicator, the highest posttest value of the experimental class was 100 with an average of 78.79. The highest value of the control class was 100 with an average of 43.43. Based on the Mann Whitney hypothesis test, there was a difference in the average posttest results of the backing indicator, namely with $Z_{count} -4.12 \leq -Z_{table} -1.96$. The N-gain values of the experimental and control classes were 0.68 and 0.39, respectively, in the moderate category.

Communication Skills Based on Qualifier/Reservation Indicators in Scientific Argumentation

The recapitulation of students' communication skills using the qualifier/reservation indicators can be seen in Table 6.

Table 6. Recapitulation of Communication Skills Based on Qualifier/Reservation Indicators in Scientific Argumentation

| | Pretest | Posttest | N-Gain |
|--|---------|----------|--------|
|--|---------|----------|--------|

| | Experi- ment | Con- trol | Expe- riment | Con- trol | Experi- ment | Con- trol |
|------------------|----------------------------|--------------|----------------------------|--------------|----------------------------|--------------|
| Mean | 12,12 | 6,06 | 78,79 | 35,35 | 0,75 | 0,60 |
| Min | 0,00 | 0,00 | 33,33 | 0,00 | 0,00 | 0,00 |
| Max | 66,67 | 66,67 | 100 | 100 | 1,00 | 1,00 |
| Normality Test | | | | | | |
| L _{hit} | 0,523 | 0,514 | 0,214 | 0,343 | 0,186 | 0,379 |
| L _{tab} | 0,154 | | | | | |
| Conc | Tidak berdistribusi normal | | Tidak berdistribusi normal | | Tidak berdistribusi normal | |
| Homogeneity Test | | | | | | |
| F _{hit} | 1,531 | | 3,318 | | 2,366 | |
| F _{tab} | 1,804 | | | | | |
| Conc | Homogen | | Not Homogeneity | | Not Homogeneity | |
| Uji Hipotesis | | | | | | |
| Z _{hit} | -1,47 | | -4,06 | | -3,91 | |
| Z _{tab} | 1,96 | | | | | |
| Conc | Not Different | | Different | | Different | |

In the qualifier/reservation indicator, the highest posttest score was obtained in the experimental class, which was 100 with an average of 78.79. While in the control class, the highest score was 100 with an average of 35.35. Based on the Mann Whitney hypothesis test, there was a difference in the average posttest results of the qualifier/reservation indicator, namely with $Z_{count} -4.06 \leq -Z_{table} -1.96$. The N-gain value of the experimental class was 0.75 (high) and the control class was 0.60 (moderate).

Discussion

The study began with a validity test of the research instrument to be used. The test instrument consisted of 20 descriptive questions on communication skills that had gone through a rational validity process by an expert validator. Furthermore, empirical validity was carried out in the form of a trial of questions until 13 valid questions were produced, consisting of 4 true-false type questions with claim indicators and 9 descriptive type questions containing other communication skills indicators. Furthermore, both class groups were given pretest questions. Based on the results of the overall communication skills pretest in the experimental and control classes, there were initial differences in communication skills. Likewise, in the results of the pretest of communication skills for claim, data, warrant and backing indicators. Meanwhile, in the results of the pretest of communication skills for

qualifier/reservation indicators, there were no initial differences in students' communication skills.

The NHT type cooperative learning model is applied in the experimental class, namely class VIIB. The core activities consist of the numbering phase, namely dividing the participant groups and giving head numbers to each group member. The next stage is continued with the question-asking phase, namely the teacher directs students to ask questions about the material. The next phase is the thinking together phase, each group member puts their minds together to answer the questions in the LKPD which is designed by including communication ability indicators. The last phase is the answering phase, the teacher calls a certain number to come forward and convey the results of the discussion. At this stage, the same head number from other groups is given the opportunity to respond to each other and exchange arguments. Based on the data from the learning implementation observation sheet, the results showed that the implementation of the learning process carried out by the researcher reached 100%.

The communication skills of students were seen by comparing the results of the posttest and n-gain of the experimental class and the control class. The overall communication skills of students obtained an average score of 77.52 in the experimental class and an average score of 42.32 in the control class. The average n-gain values of the experimental and control classes were 0.69 and 0.36 respectively with a moderate category. The percentage of n-gain in the experimental class was 68.97% with a fairly effective category, while the control class was 35.61% with an ineffective category. This shows that the use of the NHT type cooperative learning model in the experimental class is more effective in improving students' communication skills compared to the control class with the use of conventional models. Based on the hypothesis test, the difference in the posttest average showed a Z_{count} result of $-5.32 \leq -Z_{table} -1.96$ with the criterion of accepting H_0 if $-Z_{table} \leq Z_{count} \leq Z_{table}$. So H_0 is rejected, meaning that there is an influence of the

implementation of the Numbered Head Together type cooperative learning model on the communication skills of students at SMP Negeri 3 Tebo Regency.

Analysis and statistical tests on each indicator of communication ability show that NHT has an effect on all indicators of communication ability. In the claim indicator, based on the average difference test, the results show that there is a difference in communication ability between the two classes. The claim indicator received the highest increase compared to other indicators. According to Siska et al. (2020), expressing claims on an issue is relatively easy for students because it can be based on student knowledge and solved logically, but students cannot answer carelessly because claims are the basis for the following indicators.

In the data indicator, there is a difference in the average posttest of the experimental class which is 74.75 and the control class is 37.71. The increase in n-gain in both class groups is categorized as moderate. The data indicator is the indicator with the second lowest increase order after the warrant indicator in the experimental class and is the lowest indicator in the control class. Based on the answers given by students, the researcher found several people who were not yet able to provide data accurately and only repeated the claims or discourse contained in the questions.

In the warrant indicator, there is a difference in the average and an increase in n-gain. This warrant indicator in the experimental class obtained the lowest increase compared to other indicators because students tend to have difficulty connecting claims with the data provided as justification or guarantee for the claims given. This is supported by research by Putri (2018) that students tend to have difficulty connecting claims with data or supporting theories so they must be guided and accustomed to arguing verbally and in writing.

In the backing indicator, there is a difference in the average posttest of the experimental and control classes. The N-gain of the experimental and control classes were 0.68 and 0.39, respectively, in the

moderate category. The backing indicator is a statement of support for a claim that can be given by students based on experience. The experience that students have can be linked to the subject matter to explain the arguments presented, meaning that students' communication skills are stimulated by the experience they gain (Zairina and Hidayati, 2022).

In the qualifier/reservation indicator, there is no difference in initial ability obtained through pretest data, but based on the hypothesis test on the posttest data, there is a difference in the average of the experimental and control classes. In this indicator, there is an increase in n-gain in the high category experimental class, namely 0.75. Based on the answers written by students, the researcher found that students were able to provide reinforcement and limitations to the claims submitted.

Conclusion

The results of the study indicate that there is a significant influence of the implementation of the Numbered Head Together (NHT) cooperative learning model on the communication skills of students of SMP Negeri 3 Tebo Regency. This can be seen from the Man Whittney nonparametric hypothesis test with a Z_{count} value of $-5.32 < -Z_{\text{table}} -1.96$ with the category of accepting H_0 if $-Z_{\text{table}} \leq Z_{\text{count}} \leq Z_{\text{table}}$, so H_0 is rejected. A significant influence also occurs in all indicators of communication skills.

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