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## **Mathematical Communication and Social Skills of The Students Through Pair Check Type Cooperative Learning Models**

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### **Abstract**

*Lack of students 'social skills makes students' mathematics learning less optimal. The learning model that is carried out often does not maximize the learning process-oriented towards mathematical communication skills. The teacher strives for a learning method or strategy to foster students' social and mathematical communication skills. The Pair Check method is one of*

*the learning methods expected to train and improve students' social and mathematical communication skills. The subjects of this study were 24 students of class VII B MTs Riyadlul Ulum Bendungan. The results showed that: (1) students social skills had a percentage of 74.05% with the "most" criteria, which means that most of the students had quite good social skills. At the same time, students' mathematical communication skills have a percentage of 49.55% in the less category. (2) Applying the pair check method can improve students' social skills and mathematical communication. it can be seen from the post-tests average value, more significant than the pre-test, namely pre-test < post-test or  $13.88 < 19.58$ . (3) the application of the pair check method has implications for the social skills and mathematical communication skills of students at MTs Riyadlul Ulum Bendungan. It can be seen from the results of the questionnaire and the test results after the pair check method was applied. It was better than the questionnaire results, and the test results before the pair check method were applied.*

**Keywords:** Pair Check Learning, Social Skills, Mathematical Communication.

## **A. Introduction**

Mathematics is a basic science that can solve a problem in various fields of science and life. One of the characteristics of mathematics itself is having abstract objects (Harel & Tall, 1991). Mathematics is a science with a distinctive nature, namely abstract objects, using symbols that are not widely used in everyday life, and thinking processes limited by strict rules (Supatmono, 2002; Winarso, & Yuliyanti, 2017). As a result, students find it difficult to understand concepts and in solving math problems.

Learning mathematics should familiarize students to

gain an understanding of mathematics through experience and knowledge developed by students. However, in reality, in the implementation of mathematics learning, teachers generally only focus on achieving the target material according to the lesson plan or curriculum, not on learning outcomes. Meanwhile, teachers are required to have four teacher competencies. Competence is a skill, authority, power, and ability (Anggraeni, 2014). Meanwhile, Yuliyanti, Winarso & Misri (2019), teacher competence is a skill, ability, and skill possessed by someone in charge of educating students to have a noble and noble personality as the goal of education.

In addition, mathematics learning also pays less attention to developing students' thinking skills so that most students cannot solve the mathematical problems they face (Lesh & English, 2005). In addition, students cannot develop their mathematical communication skills in everyday life (Goldin, 2008). As a result, what happens in schools is that students' mathematical communication skills are getting less attention and are still relatively low (Maya & Setiawan, 2018; I'aanatul Fatkhiyyah, Winarso & Benefit, 2019). In comparison, communication skills are essential for students (Yusuf, Tarjiah & Satibi, 2018). One way to increase student activity is to apply alternative learning models that apply in the classroom. Teacher-centered learning becomes student-centered learning. Student Center is a student-centered learning method (Ramadhani, 2017). it, of course, can support students in improving their mathematical communication skills.

One of the factors that cause students' low mathematical communication skills is the lack of social skills possessed by students. According to Combs & Slaby (1977), social skills are the ability to interact with other people in a social context in a specific way that is socially acceptable or judged to benefit others. One aspect of social skills that students must possess is communication skills. Students who have social skills will express their feelings, both positive and negative, in interpersonal relationships without having to hurt others (Montroy, Bowles, Skibbe & Foster, 2014).

Based on observations made at Madrasah Tsanawiyah (MTs) Bendungan Cirebon, it turns out that many students still have low mathematical communication skills. As explained above, one of the factors causing students' low mathematical communication skills is the lack of social skills. This lack of social skills can be seen from the lack of student responses to the learning. Students do not understand, but students do not dare to ask the teacher or their friends due to their lack of social skills. It causes students who do not understand will still not understand so that mathematics learning achievement becomes low. This lack of social skills will undoubtedly be a problem for students to perform well in school.

Thus, learning methods are applied that can improve social skills to increase students' mathematical communication skills. One way to improve social skills is to use the pair check method. Pair Check is one way to help students who are passive in group activities. Students work together in pairs and apply to check in pairs (Yerizon, Farhani & Syarifuddin, 2020). The pair check method is a learning method that requires students to pair up with each other and solve problems given by educators (Ningsih, Andika, Sari, Ahmad & Kenedi, 2019).

Applying the pair check method can make students understand the importance of working together in groups to solve problems given by educators, teach students to respect each other, and help passive students become active. Because it only consists of two people, each member will learn more actively and foster a social sense of students. It can also affect their mathematical communication skills. Pair check learning needs to be applied to see its effectiveness on social skills and improve students' mathematical communication skills.

The type of approach used in this research is a quantitative approach. It is because quantitative research emphasizes its analysis of numerical data (numbers), which are processed by statistical methods (Azwar, 2009). The design used in this research is pre-experimental, with the form taken being a one-group

pretest-posttest design. The form of one-group pretest-posttest design is a design that has a pre-test before being treated. Thus, the treatment results can be known more accurately because they can compare before and after treatment (Sugiyono, 2016). In this design, only one class is the subject of research and is given treatment. This class is called the experimental class. The sample is class VII B MTs Riyadlul Ulum Bendungan Cirebon with research sample taking using a simple random sampling technique.

The technique used to collect data in this research is in the form of questionnaires and tests. The questionnaire instrument consisted of 30 statements each. Measurement of the questionnaire using a Likert scale with four alternative answer choices, namely strongly agree, agree, disagree, and strongly disagree. Then, the scores for positive statements were SS = 4, S = 3, TS = 2, and STS = 1, for negative statements SS = 1, S = 2, TS = 3, STS = 4 (Riduan, 2008). The scoring method for each answer choice is as follows.

Table 1 Questionnaire Scoring Guidelines (Sukardi, 2015)

Favorable (F)	Score	Unfavorable (UF)	Score
Strongly Agree (SS)	4	Strongly Agree (SS)	1
Agree (S)	3	Agree (S)	2
Disagree (TS)	2	Disagree (TS)	3
Strongly Disagree (STS)	1	Strongly Disagree (STS)	4

The data obtained will then be analyzed descriptively quantitatively using the average score. The score obtained is used to determine the interpretation obtained from each measured aspect. Questionnaire interpretation is described in the questionnaire answer interpretation table 2.

Table 2 Interpretation of Student Questionnaire Answers (Arikunto, 2003)

Percentage of Answers	Interpretation
0 %	Nobody
1 % - 24 %	Small part
25 % - 49 %	Almost half

50 %	half
51 % - 74 %	most
75 % - 99 %	almost all
100 %	whole

In this study, the test given to the research object was a description of 7 questions. It was intended to facilitate the researcher's assessment of learning outcomes and scoring results. The description test is a question that requires students to answer it in the form of describing, explaining, discussing, comparing, giving reasons, and other similar forms following the demands of the question using their own words and language (Sudjana, 2004).

## B. Results and discussion

### 1. *Data of Student Social Skills*

The social skills questionnaire results distributed before the pair check method application showed that students had good social skills. It can be seen in the following table.

Table 3 Social skills before the implementation of Pair Check

No	Indicator	Percentage	Interpretation
1	Demonstrate environmentally caring behavior	81,59%	almost all
2	Show caring behavior to friends	75,41%	almost all
3	Controlling greetings to others	75%	almost all
4	Able to work together and respect others	81,77%	almost all
5	Ability to express feelings, ideas, or ideas	60%	most
6	Demonstrate responsible behavior	72,91%	most
7	Ability to complete tasks	74,65%	most
8	The behavior of following lessons and or school activities	71,09%	most

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Average	74,05%	Good
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Based on the table above, the cumulative percentage of students' social skills questionnaires before applying the pair check method from each indicator is 74.05%, with suitable criteria.

While the social skills questionnaire results after applying the pair check method have increased, the cumulative percentage of the student social skills questionnaire after applying the pair check method from each indicator has increased by 80.44% with outstanding criteria. Here are the results.

Table 3 Social skills After the implementation of Pair Check

No	Indicator	Percentage	Interpretation
1	Demonstrate environmentally caring behavior	83,68%	almost all
2	Show caring behavior to friends	79,79%	almost all
3	Controlling greetings to others	78,47%	almost all
4	Able to work together and respect others	84,89%	almost all
5	Ability to express feelings, ideas or ideas	71,46%	Sebagian Besar
6	Demonstrate responsible behavior	86,80%	almost all
7	Ability to complete tasks	79,51%	almost all
8	The behavior of following lessons and or school activities	78,91%	almost all
Average		80,44%	Very Good

Tabel 5 Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	angket_1	88,04	24	5,879	1,200
	angket_2	95,04	24	6,111	1,247

Based on the table above, the average value of questionnaire1 (before the implementation of pair check) is 88.04, while the average value of questionnaire2 (after the implementation

of pair check) is 95.04. Because the average value of students' social skills in questionnaire 1 < questionnaire 2 or 88.04 < 95.04 means that descriptively there is a difference in students' average social skills between the questionnaire results before and after the pair check method is applied.

## 2. Data of Mathematical Communication skill

The data calculated using SPSS Software obtained descriptive statistics from the pre-test results for the pre-test data.

Descriptive Statistics of Pretest 6 Table

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Pretest	24	6	25	333	13,87	4,749
Valid N (listwise)	24					

Based on the output, the number of students who took the pre-test was 24 students. The test that was distributed before applying the pair check method obtained an average score of 13.87. The standard deviation was 4.749, the minimum value was 6, and the maximum value was 25. The test results were categorized as less than the average value obtained before the pair check method was applied. From the results of the post-test, calculations using SPSS Software obtained descriptive statistics as follows.

Tabel 7 Deskriptif Statistik Posttest

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
posttest	24	9	25	470	19,58	4,159
Valid N (listwise)	24					

Based on the table, the number of students who took the post-test was 24 students. The test that was distributed after applying the pair check method obtained an average score of



19.58. The standard deviation was 4.159, the minimum value was 9, and the maximum value was 25. The test results were categorized as good from the average value obtained after applying the pair check method.

### 3. Inferential statistical analysis

Inferential statistical analysis used in this study is the paired-samples t-test. A prerequisite analysis test must be carried out first, namely the normality test and homogeneity test.

Table 8 Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	115,	24	*200,	967,	24	586,
Posttest	102,	24	*200,	934,	24	120,
.This is a lower bound of the true significance.*						

		Levene Statistic	df1	df2	Sig.
score	Based on Mean	,567	1	46	,455
	Based on Median	,440	1	46	,511
	Based on Median and with adjusted df	,440	1	45,305	,511
	Based on trimmed mean	,566	1	46	,456

a. Lilliefors Significance Correction

Based on the table above, the pre-test significance value is 0.586, and the post-test significance value is 0.120. Following the interpretation above, if the significance value is, then the data is normally distributed. That is,  $0.586 > 0.05$  and  $0.120 > 0.05$  then the two data are normally distributed.

### Homogeneity Test 9 Table

Based on the table above, a significance value of 0.456 is obtained. Following the interpretation above, if the significance value is  $> 0.05$ , then the data is homogeneous. That is,  $0.456 > 0.05$ , then the data is declared homogeneous. To test the hypothesis in this study, the researcher used the Paired Samples T-Test. The following is the calculation of the Paired Samples T-Test.

Tabel 10 Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	13,88	24	4,749	,969
	posttest	19,58	24	4,159	,849

,13.88 Based on the table above, the average pre-test value is Because the average value of .19.58 while the post-test value is mathematical communication skills in the Pre-test  $<$  Post-test or descriptively, there is a difference in students' average ,19.58  $>$  13.88 mathematical communication ability between the pre-test and the .post-test results

Paired Samples Correlations 11 Tabel

		N	Correlation	Sig.
Pair 1	Hasil pretest & Hasil posttest	24	,603	,002

Based on the table above, it is known that the correlation coefficient value is 0.603 with a significance value of 0.002. Because of Sig.  $0.002 < 0.05$ , it can be said that there is a relationship between pre-test data and post-test data.

Tabel 12 Paired Samples T-Test

Mean	Paired Differences				t	df	Sig. (2-tailed)
	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			

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Pair 1	Pretest - Post- test	-5,708	4,005	,818	-7,400	-4,017	-6,982	23	,000
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Based on the output table above, we obtained a significance value of 0.000. Because  $0.000 < 0.05$ , then  $H_0$  is rejected, and  $H_a$  is accepted. So it can be concluded that there is an average difference between the pre-test and post-test results, which means that applying the Pair Check method on the mathematical communication skills of MTs Riyadlul Ulum Bendungan students.

In this study, researchers used two instruments, namely a questionnaire instrument and a test instrument. Experts have validated the test instruments and questionnaire instruments. Questionnaires measure students' social skills, and tests are used to measure students' communication skills.

Students' social skills before learning with the Pair Check method obtained the highest percentage in indicator 4, namely being able to work together and respecting others by 81.77%, and the lowest percentage value found in indicator 5, the ability to express feelings, ideas, or ideas by 60%. The average value obtained from the questionnaire is 88.04.

After learning with the Pair Check method, students' social skills obtained the highest percentage on indicator 6, which shows responsible behavior by 86.80%, and the lowest percentage value is found in indicator 5, the ability to express feelings and ideas or ideas of 71.46%. The average value obtained from the questionnaire is 95.04.

From the results above, it can be said that learning after using the Pair Check method has fairly good effectiveness than learning before using the Pair Check method. It can be shown from the calculation that the average value of the questionnaire after using the Pair Check method is higher at 95.04, while the average value before using the Pair Check method is 88.04. Because  $95.04 > 88.04$ , descriptively, there is a difference in the average social skills of students between the questionnaire results before and after the pair check method is applied. The results of the Paired Samples T-Test obtained a significance value of 0.000. Because

$0.000 < 0.05$ , then  $H_0$  is rejected, and  $H_a$  is accepted. So it can be concluded that there is an average difference between the results of the questionnaire before the pair check method was applied and the questionnaire results after the pair check method were applied, which means that there is an effect of the implementation of the Pair Check method on the social skills students of MTs Riyadlul Ulum Bendungan.

The results of students' mathematical communication tests before learning with the Pair Check method obtained the highest percentage of the second indicator, namely explaining ideas, situations, and mathematical relations orally or in writing, with natural objects, pictures, graphs, and algebra by 63.54% which are included in enough category. Moreover, the lowest percentage value is found in the fifth indicator, namely reading with an understanding of a written mathematical presentation, 30.21%, included in the inferior category.

After learning with the Pair Check method, students' mathematical communication tests obtained the highest percentage of the first indicator, connecting natural objects, pictures, and diagrams into mathematical ideas of 88.54%, included in the first good category. Moreover, the lowest percentage value is found in the fifth indicator (reading with an understanding of a written mathematical presentation) and seven (making conjectures, compiling arguments, formulating definitions and generalizations) of 62.5%, included in the excellent category.

For test analysis, after being calculated using SPSS 25, a significance value of 0.200 was obtained for the normality test, then the data was  $> 0.05$ , which means that the data is typically distributed. Then obtained a significance value of  $0.456 > 0.05$ , which means the data is homogeneous. Furthermore, in the hypothesis test, the Paired Samples T-Test was tested, and the average value of the pre-test was 13.88, while for the post-test, the average value was 19.58. Because the average value of mathematical communication skills in the Pre-test  $<$  Post-test or  $13.88 < 19.58$ , descriptively, there is a difference in students' average

mathematical communication skills between the pre-test and the post-test results. Then the correlation coefficient value is 0.603 with a significance value of 0.002. Because of Sig.  $0.002 < 0.05$ , it can be said that there is a relationship between pre-test data and post-test data. From the Paired Samples T-Test, a significance value of 0.000 was obtained. Because  $0.000 < 0.05$ , then  $H_0$  is rejected, and  $H_a$  is accepted. So it can be concluded that there is an average difference between the pre-test and post-test results, which means that applying the Pair Check method on the mathematical communication skills of MTs Riyadlul Ulum Bendungan students.

This study indirectly supports the research results from A'yun (2020) that students' mathematical communication skills increase by using the Pair Check learning method compared to conventional learning methods. In addition, Kurniasari & Setyaningtyas (2017), with the results obtained that students' mathematical communication skills have increased. Students' cognitive learning outcomes have also increased and supported the results of research conducted by Melani, Candiasa & Hartawan (2019) that the mathematical communication skills of students who apply the pair check learning method are better than mathematical communication skills with conventional learning.

The research results on students' social skills on their mathematical communication skills align with Ramelan (2012), who says that by communicating, students will increase vocabulary, develop speaking skills, write ideas systematically, and have better learning abilities. Good. By learning pair check, students will be able to practice mathematical communication skills as the advantages of pair check. Nurhidayah, N. (2016) explained that the advantages of pair check learning are that students can train students' mathematical communication skills with this learning method. The pair check method can also help passive students become active in groups. It is in line with the research results conducted by Hadi (2015) that the pair check method is one way to help passive students in group activities.

Based on the results described above, it can be concluded that the application of the pair check method has implications for the social skills and mathematical communication skills of students at MTs Riyadlul Ulum Bendungan. It can be seen from the results of the questionnaire and the test results after the pair check method was applied. It was better than the questionnaire results, and the test results before the pair check method were applied.

### **C. Conclusion**

The study results showed that learning mathematics using the Pair Check method could improve students' social and mathematical communication skills. The pair check method applies to contour opportunities for students to communicate or have conversations with their friends and make them more responsible in solving math problems. So that the social skills possessed by students will be better and their mathematical communication skills can also increase. For this reason, it can be concluded that applying the pair check type cooperative method has implications for students' social skills and mathematical communication skills at MTs Riyadlul Ulum Bendungan Cirebon. It can be seen from the results of the questionnaire and the test results after the pair check method was applied, which were better than the questionnaire results and the test results before the pair check method were applied.

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