PROCEEDINGS OF INTERNATIONAL CONFERENCE ON EDUCATION
TEACHER TRAINING & EDUCATION FACULTY
UNIVERSITAS SERAMBI MEKKAH
NO. ISSN 2987-4564

COMMUNICATION SKILL ENHANCEMENT AND MATHEMATICAL REASONING MADRASAH ALIYAH STUDENTS BY MODEL TYPE COOPERATIVE LEARNING GAMES TEAMS TOURNAMENT

Nur Ainun[1*], Kahirul Asri[2], Cut Nurul Fahmi[3], Monadia Liiman[4], and
Dinda Ayu Sapitri Saragih[5]
[1,2,3,4,5]Universitas Serambi Mekkah, Indonesia
*nurainun@serambimekkah.ac.id

ABSTRACT

Communication skills and mathematical reasoning are two of the objectives study of mathematics. Communication is defined as the ability to write, read, listen, examine, interpret, and evaluate ideas, symbols, terms, and mathematical information. Mathematical reasoning is a habit that when the brain is well developed and consistent will facilitate the mathematical communication both written and oral. Therefore, the necessary relevant learning model is needed to optimize, improve, and develop the communication and mathematical reasoning abilities of students. One of the learning model is a cooperative learning model called Teams Games Tournament (TGT). The aim of this study is to determine: (1) the increase in communication and mathematical reasoning abilities that students acquire with cooperative learning model TGT better than students who receive conventional learning approaches, and (2) the attitude of students towards learning mathematics with cooperative learning model TGT. This research is an experimental research design with a pretest-posttest control group design. The populations in this study were all students of class XI MAN 2 Aceh Besar, which consists of five classes. While the sample is composed of two classes of experimental classes and control classes were taken by random sampling. The instruments used to obtain research data communications test and mathematical reasoning ability, and attitude scale questionnaire. The statistical test used for analyzing data to increase communication skills and mathematical reasoning is two lanes ANOVA test, while the attitude scale questionnaire is calculated based on a percentage. The results showed that overall improvement in communication and mathematical reasoning abilities that students acquire learning with the cooperative learning model Teams Games Tournament better than students who received study with conventional approaches. The results of student questionnaire concluded that, in general the students have a positive attitude towards learning mathematics using the cooperative learning model TGT.

Keywords: *Learning TGT, Communication, Reasoning.*

1. INTRODUCTION

In achieving a good quality of education, National Education Standards Agency (Kurniati et al., 2019) stipulates that students from the start of primary school should be equipped with the ability to think logically, analytically, systematically, critically, creatively, and the ability to work together. In addition, the National Council of Teachers of Mathematics (Kurniati et al., 2019) argues that there are five standard processes for students to acquire and using mathematical knowledge: solving problems (*problem solving*), reasoning and proof (*reasoning and proof*), communication (*communication*), connection (*connection*), and representation (*representation*).

Based on the above opinion, it is necessary to develop students' thinking and reasoning in mathematics learning for personal development of students in the future. Through the study of mathematics, thinking students are expected to develop well as mathematical structure and strong and clear linkages between existing concepts that allow can improve reasoning skills. In addition to the ability of mathematical reasoning, mathematical communication skills students need to be developed. Communication in mathematics learning into something in dispensable. According to Afgani (2019), "Communication mathematics (mathematical communication) is defined as the ability to write, read, listen, examine, interpret, and evaluate ideas, symbols, terms, and mathematical information. Students are expected to have the ability to support communication in the classroom

and social activities outside the classroom". (D. Afgani, 2019) also stated that when students understand what is being learned through the activities of thinking, responding to, and discussed in math class, they actually have to use communication skills.

Communication skills and mathematical reasoning is a major part of the learning objectives to be achieved in mathematics. This is in accordance with the Ministerial Regulation No. 20 of 2006 (Wijaya, 2012) about the content standards, stated that the aim of mathematics learning so that students have the following capabilities:

1. Understand the concepts of mathematics, explains the relationship between concepts and apply concepts or algorithms, are flexible, accurate, efficient, and precise, in solving the problem.
2. Using the pattern and nature of the reasoning, mathematical manipulation in making generalizations, compile evidence, or explain ideas and mathematical statements.
3. Solve problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution.
4. Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.
5. Have respect for the usefulness of mathematics in life, namely curiosity, attention, and interest in studying mathematics, tenacious attitude and confidence in solving problems.

Communication skills and mathematical reasoning is an aspect that is very important and essential. (Wahyuni, 2020) says that the aspects of communication and reasoning should be an important aspect in the study of mathematics. Mathematical reasoning is a habit that when the brain is well developed and consistently will make it easier to communicate mathematics both written and oral. Expressing ideas and mathematical ideas is not easy, because there quire accuracy and good reasoning power.

This is now implemented is still a lot of learning that uses conventional teaching and learning model which only emphasizes the immediate ands of the curriculum so that in practice the students are passive in the learning process. The involvement of the students tend to be minimized, resulting in communication and mathematical reasoning abilities of students are less well developed.

Relevant models needed to optimize, improve, and develop communication and mathematical reasoning abilities of students. One way to improve the lack of communication and students 'mathematical reasoning is to use a model that is more supportive of learning activities of students in understanding the material an deemphasize the student splay an active role in learning so as to improve students' communication and mathematical reasoning(Faroh, 2011). Effective learning model and is expected to improve communication skills and mathematical reasoning student is cooperative learning model, because there is a cooperative learning model or syntax elements that require students to work together, discussions and group presentations.

Learning Teams Games-Tournament (TGT) is considered as one type of cooperative learning that can motivate students to improve communication skills and mathematical reasoning. Where cooperative learning model Teams Games-Tournament (TGT) has five main components, namely a class presentation, team, game, tournament, and team recognition requires students to work in small groups. Therefore, in an effort to improve communication skills and mathematical reasoning students, cooperative learning model Teams Games Tournament(TGT) is expected to increase the involvement of the student so that they can construct their own knowledge in learning.

(Purnamasari, 2014) to report that an increase in the ability of reasoning and mathematical connections of students who take cooperative learning Teams Games-Tournament (TGT) is better than that following the direct learning, and (Slavin, 1995) also reported that mathematical communication skills of students who take cooperative learning Teams Games-Tournament (TGT) is better than that following the usual learning.

Cooperative learning model Teams Games-Tournament (TGT) it is possible to improve mathematics learning outcomes in the subject matter of statistics that have many diverse problems. The subject matter of statistical have systematic formulas to solve the problems that required a lot of practice using questions that varied so that students gain a better mastery of the material (Rahmat, 2019). With the provision in question in every component of IGT, both given in classical delivered teacher in the classroom and given presentations in groups by using games, students can practice the questions that more and varied in a fun way so that students do not feel

bored and remain viable in the course. Expected with cooperative learning model Teams Games Tournament (TGT), students can obtain a better mastery of the material, so that a better mastery of the material, student learning outcomes will be better.

There are several previous studies that have been done with the cooperative learning model Team Games Tournament (TGT). One is research (Purnamasari, 2014) shows the influence Effect of Cooperative Learning Model Team Games Tournament (TGT) Against Independence Learning and Capacity Building Mathematical Reasoning and Connections Students SMPN 1 Tasikmalaya. Furthermore, the research (Muharom, 2014) conclusion that the effort to improve communication and mathematical reasoning abilities of learners, application of learning models of type Student Teams Achievement Division (STAD) is expected to increase active learners so that they can construct their own knowledge in learning. While previous studies based on gender, one of themin research (Meltzer, 2002) shows the influence of reasoning and communication capabilities to the ability to solve math word problems subject matter set.

2. METHODS

This study used an experimental method with a quantitative approach. There are two groups of samples in this research that the experimental group doing mathematics learning through cooperative learning model TGT and the control group did conventional learning. Both groups were given a pre-test and post-test, using an equivalent test instruments.

The design used in this research is the design of "Pretest-Posttest Control Group Design"(Sugiono, 2014) with a design as shown in Table 3.1 below:

Table 1. Research Design

Groups	*Pretest*	Treatment	*Posttest*
Experiment	O	X	O
Control	O		O

Description O: pretest and posttest
X: Learning mathematics with cooperative models TGT

The population in this study were all students of class XI MAN 2 Aceh Besar regency. While the study sample was taken two classes of random sampling of the entire class XI experimental class (XI IPA_1) and the control class (XI IPA_2). Classroom learning experiments conducted with cooperative models TGT, while the other class as a class learning control is done by means of conventional learning.

Test instrument used to measure the ability of communication and mathematical reasoning in this study a set of questions that shape description. Tests communication skills and mathematical reasoning was developed by researchers from the material statistics the first step in devising tests conducted by researchers is to make the lattice about new then continued preparing the questions and answer keys and determine a score for each item. Before use, the instrument validated test first to determine the content validity and face validity. Validation of instruments carried by four men validator which consists of one lecturer of Mathematics Studies Program Faculty and Teaching MT IAIN Ar-Raniry two teachers of mathematics that teachers MAN Darussalam Tungkop Aceh Besar and Banda Aceh office MAN teacher and one colleague. Tests that have been validated and then tested empirically on SMA Negeri 2 Banda Aceh which does not include the study sample. The trial was conducted to determine the level of reliability, validity, and the level of difficulty distinguishing.

Attitude scale questionnaire is given to know the percentage of students' attitudes towards learning mathematics using cooperative learning model TGT. The criteria used in the attitude scale was strongly agree, agree, disagree end strongly disagree, without a neutral choice. This is intended to avoid being hesitant students to choose a statement filed. Given to the student attitude scale experimental class after carrying out final tests.

Test data communication and mathematical reasoning abilities of students learning model cooperative type TGT and conventional learning, analyzed by comparing pretest and posttest scores. Testing was conducted to

gain normalized score data communication skills and mathematical reasoning. The statistical test used level test with the test criteria is received Ho if sig. Based Mean > significance level (α =0.05). Test two average difference for the data normalized gain scores in both classes. If the average score gain normal distribution and homogeneous, the statistical test used was t-test. Questionnaire used measure student attitudes. Data results of the questionnaire were analyzed using descriptive statistics such as the average score of each question.

3. RESULTS & DISCUSSION

In accordance with the formulation of the problem, then the results of this study describes about the ability of communication and mathematical reasoning, as well as a questionnaire scale of students' attitudes toward cooperative learning model TGT. Increasing students' mathematical abilities can be seen in the results table test average difference communication and mathematical reasoning abilities are shown in the table below.

Table 1.Test Results N-Gain Difference Mathematical Communication Capabilities

Class	t-test	Sig. (2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	1,723	0,090	0,045	$H_{0\ rejected}$
Control				

Based on Table 1 was obtained sig (2-tailed) = 0.045. Until sig. (1-tailed) = 0.090 / 2 = 0.045 <0.05, which indicates that Ho is rejected. It can be concluded increase students 'mathematical communication skills experimental class better than student grade students' mathematical communication skills are reviewed based on the student's overall control.

Table 2.Test Results N-Gain Difference Mathematical Reasoning Ability

Class	t-test	Sig. (2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	-0,079	0,037	0,0035	$H_{0\ rejected}$
Control				

Based on Table 1 was obtained sig (2-tailed) = 0.0035. So sig. (1-tailed) = 0.037/2 = 0.0035 < 0.05, which indicates that Ho is rejected. It can be concluded in crease students 'mathematical reasoning abilities experimental class better than student grade students' mathematical reasoning abilities are reviewed based on the student's overall control.

To class if the students are taken based on the value of N-Gain obtained student. Grouping students are divided into three: high, medium, low. To see the differences increase communication and mathematical reasoning abilities of students in the high group with the experimental class (high, medium, low) control class difference test. The result of differences in the N-Gain is presented in the table below:

Table 3. Results of Student Communication Ability Test Group Differences High

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	2,937	0,010	0,005	$H_{0\ rejected}$
Control	high				
Experiment	high	16,098	0,000	0,000	$H_{0\ rejected}$
Control	medium				
Experiment	high	32,256	0,000	0,000	$H_{0\ rejected}$
Control	low				

Based on Table3 obtained sig. < 0.05. So it can be concluded that the increase in students' mathematical communication skills high grade experimental group is better than control class.

Table 4. Results of Test of Reasoning Ability Students Group Differences High

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	0,197	0,046	0,023	$H_{0\ rejected}$
Control	high				
Experiment	high	17,288	0,000	0,000	$H_{0\ rejected}$
Control	medium				
Experiment	high	12,343	0,000	0,000	$H_{0\ rejected}$
Control	low				

Based on Table 4 obtained sig. < 0.05. So it can be concluded that the increase in mathematical reasoning ability in the experimental group students high grade better than the control class.

Table 5. Test Results Student Communication Ability Difference Medium Group

Class	Sub Group	t-test	Sig. (2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	-12,027	0,000	0,000	$H_{0\ rejected}$
Control	high				
Experiment	high	2,921	0,007	0,0035	$H_{0\ rejected}$
Control	medium				
Experiment	high	17,741	0,000	0,000	$H_{0\ rejected}$
Control	low				

Based on Table 5 obtained sig. < 0.05. So that can be concluded that the increase in students' mathematical communication skills class experimental group were better than control class.

Table 6. Results of Test of Reasoning Ability Students Difference Medium Group

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	-17,122	0,000	0,000	$H_{0\ rejected}$
Control	high				
Experiment	high	0,692	0,045	0,0225	$H_{0\ rejected}$
Control	medium				
Experiment	high	6,970	0,002	0,001	$H_{0\ rejected}$
Control	low				

Based on Table 6 obtained sig. < 0.05. So that can be concluded that the increase in students' mathematical reasoning abilities experimental class groups are better than control class.

Table 7. Test Results Student Group Communication Ability difference Low

Class	Sub Group	t-test	Sig.(2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	low	-48,259	0,000	0,000	$H_{0\ rejected}$
Control	high				

Experiment	low	-14,530	0,000	0,000	$H_{0\ rejected}$
Control	medium				
Experiment	low	1,191	0,255	0,0515	$H_{0\ rejected}$
Control	low				

Based on Table 7 obtained sig. < 0.05. So that can be concluded that the increase in mathematical communication skills in low- grade experimental group students better than control class.

Table 8. Results of Test of Reasoning Ability Students Group Differences Low

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	Low	-21.252	0,000	0,000	$H_{0\ rejected}$
Control	High				
Experiment	Low	-11,428	0,000	0,000	$H_{0\ rejected}$
Control	Medium				
Experiment	Low	-0,781	0,047	0,0335	$H_{0\ accepted}$
Control	Low				

Based on Table 8 obtained sig. < 0.05. So that can be concluded that the increase in mathematical reasoning ability in low-grade experimental group students better than control class.

To see the results of a questionnaire based on the attitude scale large percentage of indicators statement to the interpretation aspects explored in the experimental class students can be seen in the table below:

Table 9. Students Demonstrate Passions Attitude Towards Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Complete the tasks assigned	10Negative	I am grateful if there is a friend who will complete the tasks assigned	Frequency	7	2	4	17
			Percentage	23,3%	6,7%	13,3%	56,7%
				30%		70%	
	16 Positive	For me complete the task on time is a certain satisfaction	Frequency	14	12	4	0
			Percentage	46,7%	40,0%	13,3%	0,0%
				86,7%		13,3%	
Likes math has been taught	2Positive	Learning mathematics is taught by a teacher can give me the freedom to think	Frequency	7	20	3	0
			Percentage	23,3%	66,7%	10,0%	0,0%
				90%		10%	
	5Negative	I try to avoid math when taught by teachers who do not give a motivation	Frequency	0	4	10	16
			Percentage	0,0%	13,3%	33,3%	53,4%
				13,3%		86,7%	

Based on Table 9 can be seen, almost half (30%) of students grateful if someone is willing to complete the assigned task, and most (70%) students are not grateful if someone is willing to complete the assigned task. In general (86.7%) students completed the task on time is ascertains at is faction and a small portion (13.3%) of

students do not complete the task on time is ascertains at is faction. So in general (78.35%) students have positive attitudes complete the assigned task.

Generally (90.0%) of learning mathematics taught by teachers can give students the freedom to think and a fraction (10%) of learning mathematics is taught by teachers cannot give students the freedom to think. A small portion (13.3%) of students try to avoid math when taught by teachers not provide motivation and in general (86.7%) of students try to avoid math when taught by teachers provide motivation. So, in general (88.35%) students have a positive outlook like math has been taught. In conclusion, in general (83.35%) students have a positive attitude showing liking for math.

Table 10. Attitudes Students Demonstrate Approval of The Use Fulness of Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Mathematics can help solve every day problems	1 Positive	Learn math can help me in solving everyday day problems	Frequency	14	14	2	0
			Percentage	46,7%	46,7%	6,6%	0,0%
				93,4%		6,6%	
	4 Negative	Learning mathematics in school was useless because it cannot be applied in everyday day life	Frequency	1	4	15	10
			Percentage	3,3%	13,4%	50%	33,3%
				16,7%		88,3%	
Resolving mathematics in various ways	6 Positive	By studying mathematics can help me in resolving the problems that exist in other subjects	Frequency	13	14	3	0
			Percentage	43,3%	46,7%	10,%	0,0%
				90%		10%	
	3 Negative	By studying mathematics can help me in completing my thinking about math ability is limited to that exemplified by the existing problems of teachers in other subjects	Frequency	5	4	2	19
			Percentage	16,7%	13,3%	6,7%	63,3%
				30%		70%	

Based on Table 10 it can be seen, in general (93.4%) can help students learn math in solving everyday problems and a small portion (6.6%) studied mathematics cannot assist students in solving everyday problems. While a small proportion (16.7%) of students studying mathematics at school was useless because it cannot be applied in everyday life and in general (88.3%) of students studying mathematics in the school does not seem futile because it can be applied in daily life. So in general (90.85%) students have a positive attitude can help solve problems math every day.

Generally (90.0%) of students to learn mathematics can help students in solving problems that exist in other subjects and a small proportion (10%) of students to learn mathematics cannot assist students in resolving the problems that exist in other subjects. While nearly half (30.0%) students 'ability to think about mathematics is

limited to that exemplified by the teacher and the majority (70%) students' ability to think about mathematics is not limited to that exemplified by the teacher. So, in general (80.0%) students have a positive attitude completing mathematics in various ways. In conclusion, in general (85.43%) students have a positive attitude showing the approval of the use fullness of mathematics.

Table 11. Attitudes Students Demonstrate Approval of Use of Cooperative Learning Model TGT

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Completing math lessons with various learning models	9 Positive	Learning with teacher taught TGT model can train my skills in solving math problems	Frequency	14	16	0	0
			Percentage	46,7%	53,3%	0,0%	0,0%
				100%		0%	
	12 Negative	Suppose I tend not to be allowed to follow the math using TGT model	Frequency	0	5	11	14
			Percentage	0,0%	16,6%	36,7%	46,7 %
				16,6%		83,4%	
	13 Positive	I am grateful for following the math lessons that are taught by using TGT model	Frequency	11	19	0	0
			Percentage	36,7%	63,3%	0,0%	0,0%
				100%		0%	
	7 Positive	For me learning math using TGT model can help me to understand the math	Frequency	9	19	2	0
			Percentage	30,0%	63,3%	6,7%	0,0%
				93,3%		6,7%	
	17 Negative	Learning with TGT model made by the teacher made me hard in doing math problems	Frequency	2	3	19	6
			Percentage	6,7%	10,0%	63,3%	20,0 %
				16,7%		83,3%	
	18 Negative	I feel there is no difference between learning model TGT learning model that teachers do during this	Frequency	2	5	17	6
			Percentage	6,7%	16,7%	56,6%	20,0 %
				23,4%		77,6%	

Based on Table 11, it can be seen, all (100%) of learning with the teacher taught TGT model can train students 'ability in solving mathematical problems and none (0%) learning with the teacher taught TGT model cannot train students' ability to solve problems of mathematics. So begin small (16.6%) suppose that allowed students are less likely to follow the math using TGT model and in general (83.4%) suppose that allowed students tend to follow the math using TGT model. Entirely (100%) of students are grateful for follow taught math using

TGT model and no (0%) of students who are not grateful for follow taught math using TGT model. In general (93.3%) for students learning mathematics by using TGT model can help students to understand math and a small portion (6.7%) for students learning mathematics by using TGT model cannot help students to understand math. A small portion (16.7%) with a model of learning TGT conducted by the teacher makes students work hard in math and in general (83.3%) with a model of learning TGT conducted by teachers make students not difficult to do about- math problems. While a small proportion (23.4%) of students felt there was no difference between TGT learning model with a model of learning that teachers do for this and in general (77.6%) of students feel there is a difference between learning model TGT learning model that teachers during Here you are. In conclusion, in general (89.6%) students have a positive attitude above shows the approval of the use of cooperative learning model TGT.

Table 12. Attitudes Students Demonstrate Approval of Student Activities in Learning Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Completing math learning activities of students	8 Positive	Learn by my facilitate group discussion in solving math problems	Frequency	13	17	0	0
			Percentage	43,3%	56,7%	0,0%	0,0%
				100%		0%	
	15 Negative	With self, I study concentrate more on completion of math problems	Frequency	1	13	13	3
			Percentage	3,3%	43,3%	43,4 %	10,0 %
				46,6%		53,4%	
	14 Positive	I can share the knowledge with other friends when applied discussion group	Frequency	16	14	0	0
			Percentage	53,3%	46,7%	0,0%	0,0%
				100%		0%	
	11 Negative	Learning with model stand TGT active in the group only a few people	Frequency	3	9	17	1
			Percentage	10,0%	30,0%	56,7 %	3,3%
				40%		60%	

Based on Table 12 it can be seen, all (100%) studied by means of group discussions help students do math and none (0%) studied by means of discussion in the group is not easy for students to do math. Almost half (46.6%) with their own learning students do not concentrate on solving math problems and most (53.4%) with the student's own learning concentrate on solving math problems. Entirely (100%) students can share their knowledge with other friends when applied to a group discussion and no (0%) of students who are not able to share knowledge with other friends when applied to a group discussion. While nearly half (40.0%) of students studying with TGT models are not likely to be active in the group only a few people and the vast majority (60%) of students studying with IGT models tend active in the group just a few people. It can be concluded that in general (78.35%) of students in the experimental class showed a positive attitude to the approval of the student activity in the learning of mathematics.

4. CONCLUSION

Based on the results of research and statistical analysis conducted, it can be given several, conclusions, among others:

1. Improved communication skills students acquire mathematical learning with cooperative learning model Teams tournament games better than students who received conventional approaches in terms of overall and subgroup of students (high, medium, low), except for the subgroup comparisons low in the experimental class and subgroups lower in the control class.
2. Improvement of mathematical reasoning abilities of students who obtain learning with cooperative learning model Teams tournament games better than students who received conventional approaches in terms of overall and subgroup of students (high, medium, low), except for the subgroup comparisons low in the experimental class and subgroups lower in the control class
3. In general, students in the experimental class showed a positive attitude towards learning mathematics favorite approval; approval of the usefulness of mathematics; consent to the use of cooperative learning model TGT; approval of the activity of students in learning mathematics.

REFERENCES

Afgani, D. J. (2019). Materi pokok analisis kurikulum matematika. In *Surakarta: CV Kekata Group*.

Faroh, N. (2011). Pengaruh kemampuan penalaran dan komunikasi matematika terhadap kemampuan menyelesaikan soal cerita materi pokok himpunan pada peserta didik semester 2 kelas VII MTs NU Nurul Huda mangkang semarang tahun pelajaran 2010/2011. *Institut Agama Islam Negeri Walisongo*.

Kurniati, N. S., Ratnaningsih, N., & ... (2019). Implementasi model pembelajaran arias untuk mengeksplor kemamuan komunikasi matematik dan keterampilan Sosial. *... Seminar Nasional &Call ….*

Meltzer, D. E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible “hidden variable” in diagnostic pretest scores. *American Journal of Physics*, *70*(12). https://doi.org/10.1119/1.1514215

Muharom, T. (2014). Pengaruh pembelajaran dengan model kooperatif tipe Student Teams Achievement Division (STAD) terhadap kemampuan penalaran dan komunikasi matematik peserta didik di SMK Negeri Manonjaya Kabupaten Tasikmalaya. *Jurnal Pendidikan Dan Keguruan*, *1*(1), 209691.

Purnamasari, Y. (2014). Pengaruh model pembelajaran kooperatif tipe teams games tournament (TGT) terhadap kemandirian belajar dan peningkatan kemampuan penalaran dan koneksi matematik peserta didik SMPN 1 kota Tasikmalaya. *Jurnal Pendidikan Dan Keguruan*, *1*(1), 209664.

Rahmat, P. S. (2019). Strategi Belajar Mengajar. In *Strategi Belajar Mengajar*.

Slavin, R. E. (1995). *Cooperatif Learning Mempraktikkan Cooperatif learning di Ruang-ruang Kelas*. Boston London: Allyn and Bacon.

Sugiono. (2014). Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif dan R&D. In *Alfabeta Bandung*.

Wahyuni, R. (2020). Efektivitas implementasi lesson study learning community dalam meningkatkan kualitas pembelajaran. *Equity In Education Journal*, *2*(1). https://doi.org/10.37304/eej.v2i1.1681

Wijaya, A. (2012). Pendidikan matematika realistik, suatu alternatif pendekatan pembelajaran matematika. *Jurnal Manajemen Dan Bisnis Indonesia*, *8*(1).