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Students' mathematical communication skill in co-op co-op type of cooperative learning model reviewed by productive disposition

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Abstract

The purpose of this study are examine the effectiveness of co-op co-op type of cooperative learning model on the mathematical communication skill of 8th grade students, determine the effect of productive disposition on students' 'mathematical communication skill in co-op co-op type of cooperative learning model, and describe students' mathematical communication skill reviewed by productive disposition in co-op co-op type of cooperative learning model. The research method used is mixed method. The results showed that: 1) the mathematical communication skill of 8th grade students in co-op co-op type of cooperative learning model achieved classical completeness criteria, 2) the average of mathematical communication skill of 8th grade students in the co-op co-op type of cooperative learning model achieved minimum completeness criteria, 3) there is an effect of productive disposition on mathematical communication skill in the co-op type of cooperative learning model, 4) subjects with high productive disposition are able to achieve one indicator well and five indicators are achieved imperfectly. Subjects with medium productive disposition are able to achieve all indicators of mathematical communication skill imperfectly. Subjects with low productive disposition are able to achieve four indicators of mathematical communication skill imperfectly.

1. Introduction

Education of a country influence on the development of a country. According to the Regulation of the Minister of Education and Culture of the Republic Indonesia Number 21 Year 2016 Concerning Basic and Secondary Education Content Standards (2016), one of the competencies expected for the basic education level (Class I-IX) and secondary education level (Class X-XII) in content mathematics is having the ability to communicate mathematical ideas clearly and effectively. The National Council of Mathematics Teachers (NCTM, 2000) establishes five process skills that students must master through learning mathematics, one of which is communication. Mathematical communication is an important ability because students' mathematical communication skill can illustrate the understanding and location of students' concept errors (NCTM, 2000). In addition, Hukukati in Qohar (2011) states that communication skills are a prerequisite for problem solving. According to Baroody in Asikin & Junaedi (2013: 204), at least there are 2 important reasons that make communication in mathematics learning need to be the focus of attention, there are: (1) mathematics as language; mathematics is not just a tool for thinking (a tool to aid thinking), a tool for finding patterns, or solving problems but mathematics is also an invaluable tool for communicating a variety of ideas clearly, precisely, and succinctly, and (2) mathematics learning as social activity; as a social activity, in mathematics learning, interaction between students, as well as teacher-student communication is an important part of "nurturing children's mathematical potential". According to Huggist in Qohar (2011), to improve mathematical conceptual understanding is express mathematical ideas to others. When

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expressing mathematical ideas to others, students can add and build knowledge and thoughts, express ideas, strategies, accuracy, and logic.

Although students' mathematical communication skill is an important ability possessed by students, Indonesian students' mathematical communication skill are still not optimal. Mathematical communication skill are one of the seven basic abilities used at PISA 2015. But in the PISA 2015 test in mathematics, it ranked 63 out of 70 countries. PISA 2015 Indonesia has an average score of 386, still far from the average score of all countries, which is 490. This unsatisfactory result also occurs in TIMSS 2011. In the cognitive domain TIMSS, mathematical communication is one part of the domain of application covered on TIMSS question. However, Indonesia only got an average of 386 for 8th grade, where the average TIMSS ranged from a score of 500, and Indonesia occupied the position of 38 out of 42 countries.

Students' Mathematical communication skill which have not been optimal also occur in 8th grade from one of junior high school in Blora. Based on the result of an interview with one of the 8th grade mathematics teachers from one of junior high school in Blora, some students of 8th grade still have difficulty drawings correctly and in accordance with existing problems. Some students also still have difficulty using mathematical symbols. In addition, some students are often wrong or do not even include the unit in making conclusions on the answers to existing problems. Some students are also not right to use mathematical ideas to answer existing problems, such as use inadequate formulas to solve existing problems. Students' mathematical communication abilities that are still low are also illustrated by the situation where only a few students are active in learning mathematics, as in the case of asking when learning so as to cause the teacher to lure students to ask questions but only a few students respond by asking.

Some of the weaknesses of students' mathematical communication are in line with the Mathematics Midterm Assessment for 8th grade students, most of which have not yet reached completeness. With minimum completeness criteria of mathematics subject 8th grade is 70, only 47% of students achieve completeness. In line with the importance of students' mathematical communication, the educator must certainly endeavor so that students achieve optimal results in developing mathematical communication skill. One effort that can be done is to provide an effective learning model in the development of students' mathematical communication.

According to Cai, Lane and Jakabcsin in Masrukan (2008) stated that the ability of mathematical communication can be expressed through discussion and work on problems, both multiple choice and essay. In addition, according to NCTM (2000: 272) that working in pairs provides opportunities for communication. The approach of working in pairs is often effective for students in the middle grade because they can try to explain their ideas to small groups before explaining them to each individual in the class. One way to measure students' mathematical communication skills is to use open ended assignments, because according to Cai et al. (1996) the use of open ended assignments gives students the opportunity to show mathematical thinking and their reasoning. In addition with open ended assignments, teacher can ask students to show their solution processes and explain their reasons. The same thing is also stated in NCTM (2000: 271) that communication must be focused on useful mathematical tasks. One of them, the teacher must identify and provide assignments that allow more than one solution, allowing more than one representation.

Cooperative learning is learning where students work in small groups that emphasizes interaction and cooperation between members in groups. In cooperative learning, students are actively involved in the learning process so as to have a positive impact on the quality of interaction and quality communication, can motivate students to improve their learning achievement (Isjoni, 2013: 16). One of the cooperative learning models based on task specialization is the co-op co-op learning model. According to Slavin (2005), co-op co-op places groups in cooperation with one another and in classroom activities that prioritize group discussions and between groups to develop their understanding through various activities and experiences of students. Co-op co-op type of cooperative learning begins with the giving of problems or questions from the teacher, while subsequent learning activities tend to be open, meaning that they are not strictly structured by the teacher. So that in the co-op co-op type of cooperative learning model, students are given the opportunity to discuss and work on problems where it is expected to be able to improve and express student communication skill. The steps of co-op co-op type of cooperative learning are (1) class discussion, (2) forming groups, (3) selecting team topics, (4) choosing small topics, (5) preparing small topics, (6) presentations small topics, (7) preparing team presentations, (8) team presentations, (9) evaluation.

Dewi in Yeshy et al. (2017) stated that there are advantages of the co-op co-op model as follows.

1. Teach students to be more confident in their own abilities to think, seek information from other sources, and learn from other students;
2. Encourage students to verbally express their ideas and compare with their friends' ideas;
3. Encourage weak students to keep doing and help smart students identify gaps in understanding;

4. Improve the ability to think creatively;
5. Students become more active in expressing their ideas.

The positive effect co-op co-op type of cooperative learning models in improving mathematical skills has been proved in several previous studies. In a study conducted by Mahmuda in 2017, revealed that co-op co-op type of cooperative learning with open ended approach can improve the mathematical problem solving ability of high school students. A good effect is also proved in a study of Dewi, et al in 2013, which showed that the implementation co-op co-op type of cooperative learning model can increase the activity and results of students' mathematics learning.

Based on the explanation above, researchers are interested in using co-op co-op type of cooperative learning models by giving open ended assignments in improving students' mathematical communication skill. The indicator of mathematical communication ability used in this study is an indicator of mathematical communication skill according to NCTM. Indicators of mathematical communication ability according to NCTM in Zetriuslita (2013) are as follows.

1. The ability to express mathematical ideas through oral, written, and demonstrate and visualize them;
2. The ability to understand, interpret, and evaluate mathematical ideas both verbally, in writing, and in other visual forms;
3. The ability to use terms, mathematical notations and structures to present ideas, describe relationships with situation models.

Another thing that affects mathematical communication skill is productive disposition which is one of mathematical skills according to Kilpatrick. Productive disposition is habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy. Mathematical problem-solving ability, mathematical communication skill, and beliefs in mathematics learning are closely related to the five components of mathematical skills namely conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (Widjajanti, 2011). In addition, according to Heider in Sidik et al. (2017) states that communication skill are not only determined by physical problems and skills, but also influenced by self-confidence. Confidence is one of the things that can affect success and failure in learning mathematics (Anggraini et al., 2015). According to Aritonang in Ricardo & Rini (2017), to improve learning outcomes, teachers can pay attention to learning interests and motivation as factors that also influence student learning outcomes. Where mathematical communication skill is one of the results of student learning. Indicators of productive disposition used in this study are indicators of productive disposition used in Rochyani's thesis (2015) entitled "Improving Strategic Competence, Adaptive Reasoning, and Productive Disposition of High School Students Through Concept-Rich Instruction", including: (1) not easily giving up; (2) confidence in ability; (3) has a high curiosity; (4) enthusiasm in learning; (5) want to share experiences with other friends; (6) see mathematics as something useful in life.

In this study, the application of the co-op co-op type of cooperative learning model by giving open ended assignments is used in mathematics learning in the material of flat side space. Researchers are interested in conducting research on the material of flat side space because based on the results of the national exam SMP/MTs in the academic year 2017/2018, the percentage of mastery of geometry and measurement of the research school was 69.05. Even in Blora the percentage of mastery of geometry and measurement material was only 41.83, at the level of Central Java Province 43.07, and at the National level 41.40. From the background described above, researchers are interested in analyzing "students' mathematical communication skill in co-op co-op type of cooperative learning model reviewed by productive disposition".

Based on the background, the formulation of the problem in this study were (1) is the mathematical communication skill of 8^{th} grade students in co-op co-op type of cooperative learning model achieve classical completeness? (2) is the average mathematical communication skill of 8^{th} grade students in the co-op type cooperative learning model achieve minimum completeness criteria (3) is there any effect of productive disposition on the mathematical communication skill of 8^{th} grade students on the co-op type of cooperative learning model? (4) how students' mathematical communication skill reviewed by productive disposition in co-op co-op type of cooperative learning model?

2. Methods

The type of research used in this study is mixed method research. The mixed method research design used in this study is Sequential Explanatory Design which combines quantitative and qualitative research methods sequentially, where in the first stage the research is conducted using quantitative method and in

the second stage is carried out with qualitative method. The population in this study is all students of 8th grade in one of junior high school in Blora even semester academic year 2018/2019. Sampling in this study used a random sampling technique and the class chosen to be the sample of the study was class 8th J from one of junior high school in Blora. To describe mathematical communication skill reviewed by productive disposition, a research subject was chosen by purposive sampling. Subject of the study consisted of 6 students of class 8th J consisting of 2 high disposition productive subjects, 2 medium productive disposition subjects, and 2 low productive disposition subjects.

The instruments used in this study included written and oral mathematical communication skill tests, productive disposition questionnaire, interview guideline, observation sheets of teacher and student activities, and researchers. The written and verbal mathematical communication skills test were used to obtain data about students' mathematical communication. The test was done after the students get the learning material of flat side space with co-op co-op learning model. Before the test, the mathematical communication test are first tested on a trial class. This trial was conducted with the aim to determine the level of validity and legality of the test which includes validity, reliability, level of difficulty, and distinguishing features in each item. The written mathematical communication test was followed by all students of class 8th J, while the oral mathematical communication test was only followed by 6 students consisting of 2 students with high productive dispositions, 2 students with medium productive dispositions, and 2 students with low productive dispositions. The productive disposition questionnaire was used to determine the productive disposition of students in the experimental class. The productive disposition questionnaire was tested before being used in the experimental class. There are two interview sessions in this research. The first session interview in this study was used for a preliminary study by conducting interviews with the mathematics teacher who teaches at research school related to students' mathematical communication skill. While the second session interview in this study was conducted on 6 subjects chosen based on the results of the productive disposition questionnaire and discussion with teachers consisting of 2 subjects with high productive dispositions, 2 subjects with medium productive dispositions, and 2 subjects with low productive dispositions. The second session interview was used to find out things about students' mathematical communication skill in more depth. Teacher and student activity observation sheets were used to collect data about student and teacher activities when learning is carried out with the co-op co-op type of cooperative learning model.

3. Results & Discussions

In this study there are three hypotheses, namely (1) the mathematical communication skill of 8th grade students in the the co-op type of cooperative learning model achieving classical completeness, (2) the average mathematical communication skill of 8th grade students in co-op co-op type of cooperative learning models reaches minimum completeness criteria, (3) there is the effect of productive disposition on the mathematical communication skill of 8th grade students in the co-op co-op type of cooperative learning model.

Data from the mathematical communication test results performed normality test, obtained data with normal distribution. The selection of subjects to describe mathematical communication skill reviewed by productive disposition was selected based on the results of the productive disposition questionnaire. Where after knowing productive disposition of each student, then do grouping productive disposition into three groups: high productive disposition, medium productive disposition, and low productive disposition. Criteria for grouping productive disposition according to the following Table 1.

Table 1. Criteria for Grouping Productive Disposition

Score (x)	Productive Disposition
$x \geq 128.33$	High
$81.667 \leq x < 128.333$	Medium
$x < 81.667$	Low

From the results of the productive disposition questionnaire, there were 8 students with high productive disposition, 10 students with medium productive disposition, and 3 students with low productive disposition. From the results of productive disposition questionnaire, selected 6 students to be the subject

of study that consisting of 2 students with high productive disposition, 2 students with medium productive disposition, and 2 students with low productive disposition. The following is a list of students who are subject to research.

Table 2. List of Students Who Become Research Subjects

Productive Disposition	Research Subjects
High	S-12
	S-20
Medium	S-14
	S-21
Low	S-15
	S-17

3.1. Effectiveness of Co-op Co-op Type of Cooperative Learning Model Against Mathematical Communication Capabilities of Students

Classical Completeness Test, the first hypothesis test uses a left-side proportion test. Based on calculations with a significance level of 5% obtained $z_{count} = 0.1259$, $z_{table} = 1.64$. Then, $z_{count} = 0.1259 > -z_{table} = -1.64$. So, H_0 is accepted, it means mathematical communication skill of students in co-op co-op type of cooperative learning model reach classical completeness. The average completeness test for minimum completeness criteria, the second hypothesis uses the left-side t test. Based on calculations with a significance level of 5%, dk = 20 obtained $t_{count} = 1.444988$, $t_{table} = 1.72$. Then, $t_{count} = 1.444988 > -t_{table} = -1.72$. So H_0 accepted, meaning that on average students' mathematical communication skill in co-op co-op type of cooperative learning model is more than or equal to the minimum completeness criteria. Based on these two tests, it can be concluded that the co-op co-op type of cooperative learning model is effective for developing students' mathematical communication skill, this is in line with the results of the research of Suci & Adi (2019) which stubs co-op co-op learning experiments on mathematical communication skill in terms of studets learning interest. In addition, cooperative learning type co-op co-op can develop students' abilities on cube and cuboid material, this is in line with research conducted by Yeshy et al. (2017) which stubs the effect of co-op co-op type of cooperative learning models on students' mathematical problem solving abilities on cube and cuboid material.

3.2. The Effect of Productive Disposition on Students' Mathematical Communication Skill in the Co-op Co-op Type of Cooperative Learning Model

In addition to hypothesis testing, an influence test was also conducted to determine the effect of productive disposition on students' mathematical communication skill. The effect test used a regression test. On the ANOVA output results obtained $F_{count} = 7.2925 >$ F table $= 4.38$, so there is the effect of productive disposition on students' mathematical communication skill. Because there is a linear relationship or influence between productive disposition variables on mathematical communication skill variables, the linear regression model can be used. Coefficients output results obtained on the value of the P-value (Intercept) $= 0.000 < \alpha = 0.05$ and P-value (Productive Disposition) $= 0.014 < \alpha = 0.05$. It can be concluded that the regression coefficient is significant. Then the regression equation for the two variables can be stated in the following model.

$$\hat{Y} = 47.317 + 0.305X$$

Based on the Summary Model output, the value of the correlation coefficient between productive disposition and mathematical communication skills variables is 0.527, which shows the strong relationship between productive disposition variable and mathematical communication skill variable. The coefficient of determination of productive disposition towards mathematical communication skills is 0.277. This means that productive disposition has an effect on mathematical communication skill by 27.7%, the rest is influenced by other factors.

3.3. Description of Mathematical Communication Skill in Co-op Co-op Type of Cooperative Learning Model Reviewed by Productive Disposition

The results of analyzing mathematical communication skills of students in high productive disposition groups, students can reach all indicators of mathematical communication, where one indicator is achieved well and five indicators are achieved imperfectly. One indicator of mathematical communication skills that

is achieved well is the ability to express mathematical ideas. While indicators of mathematical communication skills that are achieved but not yet perfect include the ability to demonstrate mathematical ideas, the ability to describe mathematical ideas visually, the ability to interpret mathematical ideas, the ability to evaluate mathematical ideas, and the ability to use terms, mathematical notations, and their structures for presenting ideas.

In indicators demonstrating mathematical ideas, students sometimes demonstrate mathematical ideas but the mathematical ideas expressed are not appropriate, and sometimes students make mistakes in calculating operations, but these errors are very rare in subjects with high productive disposition. In the indicator of the ability to describe mathematical ideas visually, sometimes students forget to make drawings that illustrate the problem situation or make drawings but are less representative. In the ability to interpret mathematical ideas, students sometimes do not write the formulas used, directly perform calculations in written communication tests. In the ability to evaluate mathematical ideas, students sometimes forget to write conclusions on written communication tests. In the ability to use terms, mathematical notations, and structures to present ideas, students sometimes use different notations to represent the same thing and sometimes do not use notations to represent an object.

Subjects with medium productive disposition are able to achieve all indicators of mathematical communication skill according to NCTM but have been achieved imperfectly. Indicators of mathematical communication skill according to NCTM that have been achieved imperfectly include the ability to express mathematical ideas, the ability to demonstrate mathematical ideas, the ability to describe mathematical ideas visually, the ability to interpret mathematical ideas, the ability to evaluate ideas mathematical, and the ability to use terms, mathematical notations, and structures to present ideas.

On the indicator of the ability to express mathematical ideas, students sometimes write and express mathematical ideas leading to completion but not yet right. In the indicator of the ability to demonstrate mathematical ideas, students sometimes demonstrate ideas but the ideas put forward are still not right, sometimes still not right in demonstrating the distributive nature of multiplication to the sum. In the indicator of the ability to describe mathematical ideas visually, students with medium productive disposition are able to describe the situation of the problem visually but sometimes it is still incomplete, both pictures and captions in the picture. In the indicator of the ability to interpret mathematical ideas, students sometimes have not been able to write formulas for problem solving, where students directly make calculations on written communication tests, and sometimes write and express formulas but are still not appropriate. In the indicator of the ability to evaluate mathematical ideas, students sometimes have not been able to evaluate problems in accordance with mathematical concepts such as inaccurate in using formulas or inadequate in making calculations, and sometimes forget to write conclusions. In the ability to use terms, mathematical notations, and structures to present ideas, sometimes students are still not right in using units, and sometimes not right in writing notations to represent an object on a written communication test.

Subjects with low productive disposition are able to achieve four indicators of mathematical communication skill according to NCTM but are not yet perfect, namely the ability to demonstrate mathematical ideas, the ability to describe mathematical ideas visually, the ability to interpret mathematical ideas, and the ability to use terms, mathematical notations, and their structures for presenting ideas. Whereas two indicators of mathematical communication skill according to NCTM that have not been achieved by subjects with low productive disposition are the ability to express mathematical ideas and the ability to evaluate mathematical ideas.

In the indicator of the ability to demonstrate mathematical ideas, students sometimes demonstrate but are not in accordance with the formula that is written and expressed or demonstrate mathematical ideas but the mathematical ideas used are wrong. In the indicator of the ability to describe mathematical ideas visually, students sometimes describe the situation visually but do not provide information and drawings are still lacking so it is less helpful to students in solving problems. On the indicator of the ability to interpret mathematical ideas, students often only write what is known and asked, have not been able to write the formulas used in written communication test, and often have not been able to express mathematical ideas correctly on oral communication test. On indicators of the ability to use terms, mathematical notations, and structures to present ideas, students can use notations such as units, notations to represent an object but are often incorrect. Students with low productive disposition have not yet reached the indicator of the ability to express mathematical ideas, where students very often write mathematical ideas but do not lead to completion or even write mathematical ideas to answer problems on written communication tests. Students with low productive disposition also have not reached the indicator of the ability to evaluate mathematical ideas, where students are still struggling in evaluating existing problems so students often use formulas that

are not logical according to mathematical concepts or even unable to provide any ideas and unable to answer problems, and students often convey conclusions but are not right.

4. Conclusion

Based on the results of data analysis and discussion, the following conclusions are obtained. (1) Mathematical communication skill of 8th grade students of cube and cuboid material using co-op type of cooperative learning reached classical completeness criteria which is more than or equal to 75%, where 76.16% of students achieved completeness. (2) The average of mathematical communication skill of 8th grade students in cube and cuboid material using co-op co-op type of cooperative learning reached a minimum completeness criteria of 70, which obtained an average of 74.52 students' communication skill. (3) There is a positive influence of productive disposition on students' mathematical communication skill on co-op co-op type of cooperative learning material cube and cuboid by 27.7%. Strong relationship productive disposition with students' mathematical communication skill on cooperative learning type of co-op co-op material cube and cuboid by 52.7%. And (4) Subjects with high productive disposition are able to achieve one indicator well and five indicators but are not yet perfect. Subjects with medium productive disposition are able to achieve all indicators of mathematical communication skill imperfectly. Subjects with low productive disposition are able to achieve four indicators of mathematical communication skill imperfectly.

References

Anggraini, D., Kartono, & Veronica, R. B. (2015). Keefektifan Pembelajaran CORE Berbantuan Kartu Kerja Pada Pencapaian Kemampuan Masalah Matematika dan Kepercayaan Diri Siswa Kelas VIII. *Unnes Journal of Mathematics Education*, *4*(2), 1-7.

Cai, J., Lane S., & Jakabcsin M.S. (1996). *The Role of Open Ended Task and Holistic Scoring Rubric: Assessing Students Mathematical Reasoning and Communication in Mathematics, K12 and Beyond*. Reston VA: NCTM.

Isjoni. (2013). *Cooperative Learning: Improving Communication Intelligence Among Students*. Yogyakarta: Learning Library.

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding It Up: Helping Children Learn Mathematics*. Washington DC: National Academy Press.

Masrukan. (2008). Kemampuan Pemecahan Masalah dan Komunikasi Matematika: Pengaruh Penggunaan Model Pembelajaran dan Asesmen Kinerja Terhadap Kemampuan Pemecahan Masalah dan Kemampuan Komunikasi Matematika. (*Disertasi*). Universitas Negeri Jakarta, Jakarta.

NCTM. (2000). *Principle and Standars for School Mathematic*. Virginia: NCTM.

Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 21 Tahun 2016 TENTANG Standar Isi Pendidikan Dasar dan Menengah.

Qohar, A. (2011). Mathematical Communication: What and How to Develop It in Mathematics Learning? .*Proceeding International Seminar and the Fourth National Conference on Mathematics Education 2011 Universitas Negeri Yogyakarta*. Yogyakarta.

Ricardo, & Meilani, R. I. (2017). Impak Minat dan Motivasi Belajar Terhadap Hasil Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *2*(2), 188-201.

Rochyani, S. A. I. (2015). Meningkatkan Kompetensi Strategis, Penalaran Adaptif, dan Disposisi Produktif Siswa SMA Melalui Concept-Rich Instruction. (*Tesis Guru*). Universitas Pendidikan Indonesia, Bandung.

Sidik, A., Ramlah, & Utami, M. R.. (2017). Hubungan Antara *Self-Confid*ence Dengan Kemampuan Komunikasi Matematis Siswa SMP. Dalam *Prodising Seminar Nasional Matematika dan Pendidikan Matematika (SESIOMADIKA)*. Karawang.

Slavin, R. E. (2005). *Cooperative Learning: Teori, Riset dan Praktik*. Bandung: Penerbit Nusa Media.

Widjajanti, D. B. (2011). Mengembangkan Kecakapan Matematis Mahasiswa Calon Guru Matematika Melalui Strategi Perkuliahan Kolaboratif Berbasis Masalah. *Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA Universitas Negeri Yogyakarta*. Yogyakarta.

Yeshy, Nirawati, R., & Husna, N. (2017). Pengaruh Model Pembelajaran Kooperatif Tipe Cooperative in Education (Co-op Co-op) Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Pada Materi Kubus dan Balok. *JPMI (Jurnal Pendidikan Matematika Indonesia), 2*(1), 19-26.

Zetriuslita. (2013). Peranan Pembelajaran Berbasis Masalah Dalam Mengembangkan Kemampuan Komunikasi Matematis Siswa Sekolah Menengah. *Prespektif Pendidikan dan Keguruan*, *4*(8), 127-135.