EM 9 (1) (2020) 75-81

Educational Management

http://journal.unnes.ac.id/sju/index.php/eduman

Mathematics Communication Skills Reviewed by Emotional Quotient of Primary School Students on *Circ* Typed Cooperative Learning

Safitri✉, Dwijanto, Amin Yusuf

[1.] SDN 03 Ngaliyan Semarang, Indonesia
[2.] Universitas Negeri Semarang, Indonesia

Info Artikel

Article History:
Recived 10th October 2019
Accepted 13th February 2020
Published 15th June 2020

Keywords:
Mathematics communication skill, Emotional Quotient, CIRC typed cooperative learning

Abstract

Improving communication skill through mathematics learning should be owned by students in their daily lives. Such effort should be done to reach mathematics learning purpose. This research aims to create review effectiveness of CIRC typed cooperative learning to students' mathematics communication skills, and obtain the existence of mathematics communication skill differences reviewed by student emotional quotient. This mixed method research used triangulation concurrent method. The subjects were fifth graders of 03 Public Primary School Ngaliyan Semarang. The findings showed that CIRC typed cooperative learning reached classical accomplishment with only 68.57%. It meant it had not reached classical accomplishment criteria 70%. The average of mathematics communication skill test by using CIRC was 71.54, better than those taught by discovery learning with 54.43. There was improvement of the students' mathematics communication. And the emotional quotients of the students did not influence their mathematics communication skill improvement. Thus, it could be concluded that CIRC typed cooperative learning could effectively improve mathematics communication skills of the students. Based on the findings, it is suggested to create questions emphasizing on indicators and implementing emotional quotients as efforts to improve mathematics communication skills.

✉ Correspondence Address:
Jl. Wismasari Utara No.04, Ngaliyan, Kec. Ngaliyan, Kota Semarang, Jawa Tengah 50181, Indonesia
Email: safitri.maryani.ngatini@gmail.com

p-ISSN 2252-7001
e-ISSN 2502-454X

INTRODUCTION

Indonesia educational problems, one of them, are to produce qualified human resources. The problem is Indonesia is in 64th rank out of 72 countries affiliating in *Program for International Student Assessment* (PISA) according to *Organization for Economic Cooperation and Development* (OECD, 2016). To improve the quality of the resources, one of them could be done through improving communication skill.

Mathematics communication skill in mathematics lesson covers skill to understand mathematics symbols and language as well as to express mathematics ideas and skill to express notion based on facts and rationales plus to persuade other people to gain collective understanding. Communicating involves inter-student interaction which is trained through mathematics lesson and is expected to be a habit. It is the greatest contribution of mathematics communication.

Fetus (2012) stated that emotional quotient plays important role in improving academic achievement besides high cognitive quotient of students. Azuka & Kurumeh (2015) found the effects of emotional quotient on students' achievements of geometry material at senior high school. They found that emotional quotient could be improved. They also stated that by using emotional quotient in learning geometry, it could improve learning outcomes.

Mathematics communication skill is strongly correlated to inter-student or student - teacher interactions. Those interaction require supportive factor, such as emotional quotient. When an individual's emotional quotient is properly controlled, then he could utilize his cognitive skill to correspond with his owned potency maximally. Therefore, there is a need of using emotional quotient and implementing student-centered learning.

Learning strategy which is believed to be able in guiding students' skills within 2013 curriculum context is such as scientific process based learning which should be accommodated by cooperative learning. *Cooperative Integrated Reading and Composition* or *CIRC* typed cooperative learning suits to be implemented on learning which integrates language skills (seeking, processing, and communicating information quickly and accurately). Akhsani et al. (2012) stated that CIRC typed cooperative learning model could improve learning outcome on rectangular material. According to Kusumawati et al. (2012) CIRC learning could improve mathematics communication skill learning outcome. Triastuti et al. (2014) stated that implementation of CIRC learning model based on *Joyful learning* was effective to improve mathematics reasoning. Hartati et al. (2015) stated that mathematics communication skill results by using CIRC model could reach accomplishment. Bien (2016) stated that mathematics communication skill of students achieved better accomplishement than those taught by contextual model. Therefore CIRC typed cooperative model is chosen to develop students' competences in communicating and collaborating to solve various faced problems.

Communication is started by understanding material or concept. Understanding of a material or concept is rational thinking product which is part of cognitive or intellectual quotient (IQ). Motivation to communicate and adapt to surrounding environment is included as emotional quotient (EQ). The correlation of those two, cognitive or intellectual quotient (IQ) with affective skill, is emotional quotient (EQ). Banat and Omar (2017) found that when students were in positive mood, they would be able to create new ideas. From the correlation, there is possibility to have different learning outcomes.

Susiaty et al. (2016) in her research about *cooperative integrated reading and composition* (CIRC) typed cooperative learning and *problem posing* in the form of *within-solution posing* on comparison degree material reviewed by interpersonal quotient of junior high school students showed learning outcomes of the students taught by CIRC were equal to classic learning. The students' emotional quotient categories were low, moderate, and high also showed equal mathematics scores.

One of learning strategies believed to be able in developing communicating and collaborating competences in solving various problems is *CIRC* typed cooperative model. The success of this learning depends on each individual's success in group in which the success is really important to achieve positive purpose in group learning. The positive purpose is - each individual in group cooperates to solve the given task orderly and in written manner so they would have equal understanding. It is expected the students' minimum passing grade reach accomplishment criteria so learning could be claimed effective. Therefore, by implementing this CIRC typed cooperative learning model, it is expected to provide more meaningful teaching and learning process and also gain learning outcome improvements. Based on the background, it could be formulated that: (1) can CIRC typed cooperative learning improve mathematics communication skill of the fifth graders effectively? (2) how is the mathematics communication skill of the students as reviewed by emotional quotient after being intervened by CIRC typed cooperative learning model?

This research is the first research involving emotional quotient into cooperative learning of CIRC type to improve students mathematical communication skills. This research aims to produce reviews about CIRC typed cooperative learning effectiveness toward student mathematics communication skill. To obtain the differences on mathematics communication skill of the students as reviewed by emotional quotient after being intervened by CIRC typed cooperative learning model. This research is expected to provide theoretical and practical benefit.

METHOD

The research methodology was mixed method. *Mixed Method* has several terms, such as multi-method, convergent method, integrated method, and combined method which has its own procedure. *Mixed method* according to Sugiyono (2016: 404) research methodology combining quantitative and qualitative methods to be used together in a research activity so the obtained data will be more comprehensive, valid, reliable, and objective.

The used research model in this research is concurrent triangulation model. In this research, the quantitative data collection was done by collecting quantitative data after the students intervened by CIRC. The test results were taken after the learning where the students could express mathematics ideas orally and in written manners coherently and clearly. They described the mathematics ideas in visual forms, such as geometry and the others and used mathematics terms, structures, and notations to present mathematics ideas.

The independent variable is CIRC typed cooperative learning. The dependent variable was the students' mathematics communication skills. The population was taken from all fifth graders of Pubic Primary School 03 Ngaliyan in academic year 2017/2018. The research data source was taken from written mathematics communication skill test, spoken mathematics communication skill through observation, and emotional quotient obtained from emotional quotient scale. Before promoting the sampling, requirement test was conducted by normality and homogeneity tests. On quantitative data, the sample was obtained by cluster random sampling. It was then selected two classes with one class as experimental group (5B) and the other class as control group (5A). The learning was effective if the individual passing grade reached higher than 64 and at lest equal to 70% of classical passing grade accomplishment. Plus, the result of CIRC typed cooperative learning was better than *discovery learning.*

Data analysis is an important step to take conclusion of the research findings. The data analysis technique covered instrument pilot test data analysis and learning effectiveness data analysis. In this research, qualitative data analysis used Miles and Huberman model. Miles and Huberman (Sugiyono, 2015:334) stated that activity in analyzing qualitative data is done interactively and lasting continuously until it is completed or saturated. Data reduction focuses on oral mathematics communication skill while

having interview with indicator: student could use mathematics terms, notations, and structures to present mathematics ideas. The data display was done by narrating. The students' verifications were expected to answer the questions of the interview accurately and smoothly with no doubt. The referred activities in the data are: *Data reduction, data display, and data conclusion.*

FINDINGS AND DISCUSSION

The influences of emotional quotient to mathematics communication skill test, if it is seen from the score outcome, it could not be described. From the calculation, it was obtained information that CIRC typed cooperative learning was classically completed by only 68.57%. It had not reached 70%. The average test of mathematics communication skill between CIRC class (71.54) was better than *discovery learning* class (54.43). It indicates there was improvement of the students mathematics communication skills. There were also differences of emotional quotients students did not influence mathematics communication skill improvements.

Table 1. Summary of Learning Instrument Validation Results

No	The Assessed Instruments	Average Score
1	Lesson Plan	4.7
2	Syllabus	4.27
3	EQ Test	4.6
4	MCSOS	5.75
5	MCST	3.2
Average Score		4.5

From the explanation Table 1 above, it was obtained results that on stage (1) learning plan of syllabus (4,27) , lesson plan (4,7), EQ test (4,6), Mathematics communication skill observational sheet (MCSOS) (5,75), and mathematics communication skill test (MCST) (3,2) were valid. On stage (2) promoting lesson, teacher's activity during learning were excellent, on stage (3) learning outcome evaluation obtained from CIRC typed cooperative learning was less effective because it had not reached classical accomplishment. Learning outcome was measured by hypothesis tests, consisting of average test, classical accomplishment test, proportional difference test, and variance test. Ensuring the homogeneity and normality of the data. The significant score of normality test was done by using *software Statistical Package for the Social Science* (SPSS). It is obtained $sig. = 0{,}200 > 0{,}05$ and is stated to be normal. The homogeneity score obtains $\text{sig.} = 0{,}945 > 0{,}05$ and is homogeneous.

On average variance test, *one sample t-test* and minimum passing grade criterion 65 were used. The results are presented in Table 2.

Table 2. Average Score Test

	Score Test = 65		
	t	df	Sig. (2-tailed)
Scores	2.038	34	.049

The test is obtained score $\text{sig.} = 0{,}049 >$ 5%, then CIRC learning model obtained score higher than the passing grade 65. The classical accomplishment test could be seen from proportion of the students passing the MPG whether it surpassed 70% or not. It was obtained that the students reached the passing grade (higher than 65) were 25 from 35 experimental group students. It was obtained $z_{count} = -0{,}18$ and $z_{table} = 1{,}64$ because $z_{count} < z_{table} = -0{,}18 < 1{,}64$, then the accomplishment of the students taught by CIRC typed cooperative learning whose scores were higher than 65 were not higher than or equal to 70%.

The test was used to find out the differences of the students' mathematics communication skills between those taught by CIRC and discovery learning. The test used *independent sample t-test* as seen on Table 3.

Table 3. Average Comparison Test Result

		Average Comparison Test Result		
		t	df	Sig. (2-tailed)
Scores	Equal variances assumed	-3.781	63	.000
	Equal variances not assumed	-3.811	62.795	.000

On the table the score is sig. = 0,000 < 5%, then H_0 is denied. It meant that the CIRC class average was different to discovery learning class. Then, it could be seen on Table 4 that the output of group statistics was obtained average for CIRC class 71.56 higher than control group with 54.43.

Table 4. Average Comparison Test of both Groups

	Class	N =	Mean
Scores	*Discovery Learning* Class	30	54.43
	CIRC Class	35	71.54

It could be concluded that mathematics communication skill of CIRC group was better than discovery learning group. The implementation of CIRC typed cooperative learning had not been qualified to improve mathematics communication skill.

Calculation of emotional quotient of CIRC group (VB class) had classification of 6 emotional quotient categorized students with high EQ (score higher or equal to 58.4), 23 moderate EQ categorized students (score less than or equal to 46.37 until 58.42, and 6 low EQ categorized students (score less than 46.37). The results of student emotional quotient questionnaire on experimental group based on the influence toward the test results of the subjects. Here is the table of research subjects with EQ results, final test, and experimental group mathematics communication skill test (MCST).

Table 5. Table of Research subject, Results, EQ, and MCST

Research subject	EQ Categories	MCST Scores	Remark
E-11 V	Low	74	Passed
E-16 N	Low	76	Passed
E-01 I	Moderate	52	Not passed
E-02 D	Moderate	76	Passed
E-03 E	High	63	Not passed
E-06 A	High	80	Passed

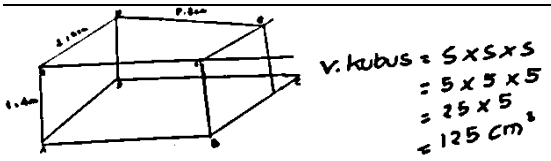
The linear regression test was used to find influence of emotional quotient to mathematics communication skill scores. The result of linear regression test as seen on Table 6.

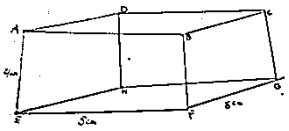
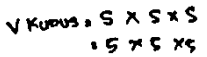
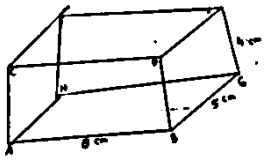
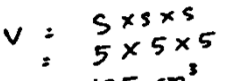
Table 6. Test of Emotional Quotient Influence to Mathematics communication skill

		df	Mean Square	F	Sig.
1	RegressionR	1	980.753	2.869	,100[b]
	esidual	33	341.877		
	Total	34			

Based on the table it is obtainedsig. = 0,100 > 0,05, meaning H_0 is accepted. It meant that emotional quotients of the students did not influence the test result of mathematics communication skill on CIRC group. Table 7 consists of interview results with the students whom were asked to write the answers.

Table 7. Examples of the Students' Works

	
Low EQ, passed MCT score	Correct answer, less accurate pictures, writing symbols and mathematics notations to solve.

 	
Moderate EQ, not passed MCT score	Correct answer, less accurate pictures, writing symbols and mathematics notations to solve.
 	
High EQ, passed MCT score	Correct answer, more accurate pictures, writing symbols and mathematics notations to solve.

Based on the table it states that mathematics communication skill score of the students passed the grade although they had low emotional category. Moderate emotional, in fact, did not pass the score of mathematics skill. Thus, there is no influence of emotional quotient to mathematics communication skill learning outcomes.

Students who became subjects had better mathematics communication skill. They could recognize a problematic situation, screen the required information, and use formula in solving problems. There was no difference among the research subjects. Only students with low and moderate emotional quotients had doubt in delivering their notions both in written and spoken. Students, in delivering written communication, were better than the spoken one. It was because of several weaknesses or mistakes in delivering it orally.

CIRC learning could improve mathematics communication skill of the students. Students were habituated to collectively and gradually find ideas and solve problems mathematically. Then, the solution was interpreted into written modes. The teacher could find out emotional quotient of the students so they could observe them maximally based on their own capabilities, by meeting all students' needs based on their groups capabilities in the class.

Students who became subjects had better mathematics communication skill. They could recognize a problematic situation, screen the required information, and use formula in solving problems. There was no difference among the research subjects. Only students with low and moderate emotional quotients had doubt in delivering their notions both in written and spoken. Students, in delivering written communication, was better than the spoken one. It was because of several weaknesses or mistakes in delivering it orally.

Emotional quotient had positive influence to mathematics communication skill qualitatively. Those influenced skills were expressing mathematics ideas through spoken and written modes coherently and clearly, describing mathematics ideas in the form of visual such as geometry and the others, using terms, mathematics notations, and its structures to present mathematics ideas, emotional awareness, mutual appreciation, independence, problem solving, and optimism. CIRC learning could improve mathematics communication skill of the students.

CONCLUSION

Effectiveness of CIRC typed cooperative learning on volume of geometry (cubes and bar) was categorized sufficiently excellent. It was shown as follows. On learning outcome evaluation, CIRC typed cooperative learning was effective toward mathematics communication skill) the learning reached minimum passing grade > 65 individually and classically only 68.57% lesser than 70% whom passed the grade,) the average of mathematics communication skill showed that CIRCY group was better (71.54) than discovery learning group (54.43). Students' scores seen from emotional quotient levels did not influence mathematics communication skill test score improvement.

ACKNOWLEDMENTS

This research could be conducted thanks for the help by all assistances of Principals and teachers of Public Primary School 03 Ngaliyan and Public Primary School 01 Ngaliyan. And all fifth graders, especially Primary School 03 Ngaliyan Semarang.

REFERENCE

Aini, N. N. 2015. "Analisis Komunikasi Matematis dan Tanggung Jawab pada Pembelajaran Model Formulate Share Listen Create Berbantuan Komik Materi Segiempat". Tesis. Semarang: Program Pascasarjana Unnes.

Akhsani, L. (2012). Pengembangan Perangkat Pembelajaran Matematika dengan Metode CIRC Berbasis Membaca Berbantuan CD Interaktif Materi Segiempat Kelas VII. Unnes Journal of Mathematics Education Research, 1(1).

Banat, B. Y. I., & Rimawi, O. T. (2017). Sense of university belonging: a case study of Al-Quds University students. Asian Journal of Social Sciences & Humanities Vol, 6, 2.

Bien, Y. I. (2016). Penggunaan Model Kooperatif Tipe CIRC Berbasis Konstruktivisme Untuk Meningkatkan Kemampuan Komunikasi Matematis Siswa. Jurnal Pendidikan Matematika Indonesia, 1(2), 50-56.

Festus, A. B. (2012). The relationship between emotional intelligence and academic achievement of senior secondary school students in the Federal Capital Territory, Abuja. Journal of Education and Practice, 3(10), 13-19.

Azuka, B. F., & Kurumeh, M. S. (2015). Effects of emotional intelligence skills acquisition on students' achievement in senior secondary school geometry in Keffi education zone, Nasarrawa State, Nigeria. Asian Journal of Education and E-Learning (ISSN: 2321-2454), 243-257.

Hartati, T. L., & Suyitno, H. (2015). Studi Komparatif Model Pembelajaran TAI dan CIRC Terhadap Kemampuan Komunikasi Matematis Siswa. Unnes Journal of Mathematics Education, 4(1).

Kusumawati, N., Kartono, K., & Dwijanto, D. (2012). Pembelajaran Program Linear Berkarakteristik Kewirausahaan untuk Meningkatkan Kemampuan Komunikasi Matematik. Unnes Journal of Mathematics Education Research, 1(2).

OECD, P. (2016). Results (Volume I): Excellence and equity in education.

Susiaty, U. D., Mardiyana, M., & Saputro, D. R. S. (2016). Eksperimentasi Model Pembelajaran Kooperatif Tipe Cooperative Integrated Reading and Composition (Circ) Dan Problem Posing Bentuk Within-solution Posing Pada Materi Perbandingan Ditinjau Dari Kecerdasan Interpersonal Siswa SMP Negeri Kota Pontianak. Jurnal Pembelajaran Matematika, 4(8).

Sugiyono. 2016. Metode Penelitian Kombinasi (Mixed Methods). Jakarta: ALFABETA

Triastuti, R., Asikin, M., & Wijayanti, K. (2013). Keefektifan Model CIRC Berbasis Joyful Learning Terhadap Kemampuan Penalaran Matematis Siswa SMP. Kreano, Jurnal Matematika Kreatif-Inovatif, 4(2), 182-188.