Mathematical Communication Ability Reviewed from Student's Self-Esteem on *MiC* Learning Process with Nuance of Jepara Culture

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Article Info

Abstract

Mathematical communication ability is a term for solving problems, and self-esteem is a factor that determine student's success to get achievements. A good mathematical communication ability and self-esteem can help students to solve a problem. The aim of this research are (1) to know the quality of MiC learning process with nuance of Jepara culture to improve student's mathematical communication ability, and (2) to know the student's mathematical communication ability reviewed from self-esteem on MiC learning process with nuance of Jepara culture. The type of this research is mixed methods model concurrent embedded. The population of this research is the students of grade X MIA Pecangaan Senior High School, Jepara. The subject of this research determined based on the low and high self-esteem category. Data collection technique are questionnaire, observation, test, and interview. The result of this research showed that (1) MiC learning process with nuance of Jepara culture has a high quality both qualitative and quantitative, (2) mathematical communication ability on students with low self-esteem can describe mathematic ideas in visual form well. Beside, mathematical communication ability on students with high self-esteem can describe mathematic ideas in visual form well, can state the daily events to language or mathematic symbols, can understand and evaluate the mathematic ideas on solving problems in writing, and they also can communicate the conclusion of an answer problem suitable with the question.

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INTRODUCTION

The development of science and technology caused the competence should be reached by students more increasingappropriate with the development of the progress of the times. Based on the National Council of Teachers of Mathematics (2000), mathematical communication ability is one of standard process that students must have for a capability to think mathematicaly that usefull for their life in the present and in the future. Because of that, mathematical communication is one of the main part in mathematic acitivity (Hidayati et al, 2014). According to Hulukati on Wijaya et al (2016), mathematical communication ability is a term to solving a problem, it means when a student can not do a communication to understanding a problem, student can not solve that problem well.

This research use mathematical communication ability indicators, they are (1) able to describe mathematic ideas in written or visual form, (2) able to state a daily events in language and symbols, (3) able to understand and evaluate mathematic ideas on solving problems in written form, and (4) able to communicate the conclusion answer of a problem appropriate with the question.

Mathematic communication ability as a result of learning process should be improved on senior high school students (Qohar & Sumarmo, 20130). On mathematic learning process found a problem that student's mathematical communication ability were low (Noviyanti et al., 2014; Prayitno, 2014; Permata et al., 2015 & Yanti, 2016). That problemappropriate with the research of Kaselin et al. (2013) that so many student can not associate the problem being faced with the real life context. This matter also supported by the research of Paridjo and Waluya (2017), stated that student's weakness on mathematic communication is the student can not think of evaluation mathmeatically and the students can

not use mathematical language to express ideas on making variable analogy yet.

As a social creature it should be for us to do communication and care with ourselves and the environment. This is the matter that make a student need to have a proper feeling, worthy, valuable, capable and usefull for other people. These feeling called as self-esteem (Fauzan and Herman, 2016). Formal learning is not only emphasize students to be clever on sciense but also formed a personalitycharacter attitude (Rizki et al., 2014 & Ambarwati et al., 2015).

Students with a low self-esteem tend to be pessimistic. They can not see a dare as aan opportunity, but see it as a obstacle, they will be easy to give up before they try (Fadillah, 2012). Lawrence on Wardani and Yuniarti (2015) stated that student with high self-esteem tend to more confidence on social situation also problem being faced and being confidence to do tasks given by teacher. So that student with high self-esteem felt has a good capability to compete and can follow the development of science and technology which is growing rapidly.

Learning approach chosen should support student to reach mathematical communication indicators. Learning process with Mathematic in Context approach can support student to understanding mathematic on living context in real life. Appropriate with the research done by Chan on Fasha (2017) on 2005 showed that learning process with discussion model using Mathematic In Context better than other learning methode.

Learning mathematic is not only learning mathematic itself but also learning about culture and nationality which are owned. Jepara district has so many culture, among them are perang obor, pesta lomban, carv, benteng portugis, Sunan Hadirin, and others (Farda et al., 2017). One of the ways to conserve local cultures is by including local cultures especially Jepara culture on mathematic learning process at school. Including culture on mathematic learning process make students more understanding

mathematic because students apply mathematic directly in real life context.

Based on the observation result in grade X MIA Pecangaan Senior high school, researcher found that on learning process take place, teacher didn't pay attention on student's self-esteem level. Whereas self-esteem is one factor that influence achievement. Researcher also found that a few students can solve mathematic problem but have a less mathematic communication ability. Furthermore, learning media that used not yet able to make students bring up mathematical communication ability. Mathematical learning process all this time not yet able to help students to apply mathematical material on daily life context related to local culture.

Based on these, very necessary to do a research about mathematical communication ability in terms of student's self-esteem in MiC learning process with Jepara Culture Nuance. The aim of this research are (1) know the quality of MiC learning process with Jepara culture nuance to improve student's mathematical communication ability of grade X MIA Pecangaan high school, and (2) know the mathematical communication ability in terms of self-esteem on learning process with Jepara culture nuance grade X MIA Pecangaan senior high school.

METHODS

The type of research that used in this research is mixed methode with concurrent embedded model, which quantitative research is more dominant that qualitative research. The population of this research is students grade X MIA Pecangaan senior high school, Jepara even semester school year 20017/2018. Sampling of this research use simple random sampling technique, so that it is obtained randomly two classes from population. By using the technique obtained class X MIA 3 as experiment class that taught using MiC learning process with Jepara culture nuance and class X MIA 2 as control class taught using convensional learning process.

Data collection instrument used on this research are test of mathematical communication ability which used to get data about student's mathematical communication ability, self-esteem questionnaire to get data about student'd self-esteem level, observation sheet about the implemetation of learning process to get the data about learning process quality. Documentation technique in this research used to get data of mathematical communication ability test, while complementary data is learning activity photos and interview recording.

Learning media and research instrument used in this research covers, syllabus, lesson plan, teaching materials, student work sheet, TMCA, and self-esteem questionnaire. Research result from validator to learning media and research instrument showed presented in the following table 1.

Table 1. Research result of learning media and research instrument.

No.	Data Type	Average Validator Score		Average	Criteria
		V1	V2		
1.	Perangkat pembelajaran				
	Syllabus	4.6	4.4	4.5	Very Good
	Lesson plan	4.4	4.2	4.3	Very Good
	Teaching materials	4.1	4.2	4.15	Good
	Student Work Sheet	4.5	4.3	4.4	Very Good
2.	Research Instrument				

Test of Methamatical Communication Ability	4.4	4.5	4.45	Very Good

Based on the result of validation of learning media covers to syllabus, lesson plan, and student work sheet included in very good criteria, while teaching materials included in good criteria. The result of validation of research instrument that is test of mathematical communication ability included in very good criteria. From those validation result, can concluded that learning media and research instrument are valid and can be used for the research. For self-esteem questionnaire in this research use Rosenberg Self-Esteem Scale (RSES) so that no need validation.

Test instrument used in this research in the form of a question to measure student's mathematical communication ability. From 7 item descriptionwhich has been tested obtained good criteria for all item. Based on the reliability test obtained the test items of mathematical communication ability which has been tested are reliable. Analysis result of distinguishing power obtained that item number 4 has an enough criteria, item number 2, 3, and 5 has a good criteria, and item number 1, 6, and 7 has a very good criteria. So that all of items can be used, but item number 4 need repairs. Analysis result of difficulty level obtained that item number 2 and 7 have an easy criteria, item number 1, 3, and 6 have a medium criteria, and item number 4 and 5 have a difficult criteria. It can be conclude the items fulfill validity, reliability, distinguish power, and difficulty level from 7 items obtained 6 items of TMCA that appropriate the criteria.

Quantitative research result consist of initial ability of mathematical communication ability analysis and student's mathematical communication ability analysis. Based on the initial ability of mathematical communication ability analysis result, obtained that experiment and control class have a normal distribution, have a homogen varians, and no differences between initial ability of both experiment and

control class. While analysis of mathematical communication ability do after the MiC learning process with Jepara culture nuance. The analysis of qualitative research result in this research use the opinion of Miles and Huberman on Sugiyono (2015), that is reduce data, data presentation, and draw conclusion or verify.

RESULT AND DISCUSSION

The quality of MiC learning process with Jepara culture nuance to improve student's mathematical communication ability determined based on the result of average test, proportion test, average difference test, proportion differerence test and normalized gain test. First of all, we do a prerquisite test of mathematical communication ability data, they are normality and homogenity test. The result of normality test showed that the data come from population that has a normal distribution, while hmogenity test showed that there is no varians differences between both class.

Average test used to know if the average of student's mathematical communication ability on taught class that use MiC learning process with Jepara culture nunace achieve minimum exhaustiveness criteria, 71. Proportion test intend to know if students's proportion that achieve minimum exhaustiveness criteria (71) at least 75% from all of students in the class

Average difference test intend to know if student'd mathematical communication ability that use MiC learning process with Jepara culture nuance is better than students who use conventional learning process. Proportion differerence test intend to know if exhaustiveness proportion of student's mathematical communication ability on class use MiC learning process with Jepara culture nuance is better than the exhaustiveness

proportion of students on class taught with conventional learning process.

Normalized gain test used to know the improvement of student's mathematical communication ability. Data used in this research is initial ability test value and final ability of student's mathematical communication on class taught use MiC learning process with Jepara culture nuance.

The calculation result and the conclusion from the average test, proportion test, average difference test, proportion differerence test and normalized gain test can be seen in the following table 2.

Table 2. The calculation result of the Average Test, Proportion Test, Average Difference Test, Proportion Difference Test and Normalized Gain Test

No	Testing	Result	Conclusion
1.	Average Test	$t = 5.942$ with $dk = 33$ dan $\alpha = 5\%$, obtained $t_{(1-\alpha)} = 1,692$ so that $t > t_{(1-\alpha)}$	The average of student's mathematic communication ability taught use MiC learning process with Jepara culture nuance is more than 71
2.	Proportion Test	$z = 1.782$ while value of $z_{(0,5-\alpha)} = 1,64$ with $\alpha = 5\%$ so that $z > z_{(0,5-\alpha)}$	The proportion of student's exhaustiveness learning classically on class taught use MiC learning process with Jepara culture nuance more than 75%
3.	Average Difference Test	$t = 4.302$ with $dk = 68$ and $\alpha = 5\%$ obtained $t_{(1-\alpha)} = 1,67$ so that $t > t_{(1-\alpha)}$	The average of student's mathematical communication ability on class taght use MiC learning process with Jepara culture nuance is better than student's mathematical communication ability on class taught with conventional learning process.
4.	Proportion Difference Test	$z = 3.858$ while $z_{(0,5-\alpha)} = 1.64$ with value of $\alpha = 5\%$ so that $z > z_{(0,5-\alpha)}$	Exhaustiveness proportion of student's mathematic communication ability on class taght use MiC learning process with Jepara culture nuance is better than exhaustiveness proportion of student's mathematical communication ability on class taught with conventional learning process.
5.	Normalized Gain Test	Average (g) on experiment classis 0.47. Avegrage (g) is 0,47 included in the category gain with medium normalisation	The improvement of mathematical communication ability on experiment class taught use MiC learning process with Jepara culture nuance is significant.

Based on these result can be conclude that the implementation of MiC learning process with Jepara culture nuance have been done by researcher has a certain quality to mathematical communication ability. This is appropriate with the research result of Fasha (2017) that there is a significant enhancement to student's learning outcomeson mathematical learning process by using Mathematic in

Context (MiC) approach. Because MiC learning process more associate mathematics especially that found in the environment in daily social

life. In this case reasearcher associate the MiC learning process with studet'd daily life, that is the culture of student residence, Jepara. This matter also appropriate with the theory of Vygotsky in Rosnawati (2016) that stated very emphasize the importance of social interaction

role to the development of one's learning. This can be conclude that in learning process someone can not escape of environmental socio-cultural interaction. As well as the Mathematic in Context learning process with culture nuance that explain that mathematics comes from real problem.

The students grouping based on the result of Rosenberg Self-Esteem Scale (RSES) can be seen in the following table 3.

Table 3. The Students Grouping in Experiment Class Based on Self-Esteem

Self-Esteem Category	Number of Students	Percentage
High	16	47.06
Low	17	50
Not High and not low	1	2.94
Numbers	34	100

From 34 students in experiment class that fill the Rosenberg Self-Esteem questionnaire (RSES) obtained 16 students in a high self-esteem category, 17 students in a low self-esteem category and 1 students not included in the category because between low and high self esteem category.

Each self-esteem category taken 2 representative students to analyze the mathematical communication ability deeply. Student's election on high low and high self-esteem category selected randomly based class teacher's advice which is used as a reference in student election. Research subject list can be seen in the following table 4.

Table 4. Research Subject List

No	Ubject code	Self-Esteem Category	Self-Esteem Code	Mathematical Communication Ability Value
1	E-32	Low	SR1	71
2	E-35	Low	SR2	61
3	E-12	High	ST1	95
4	E-28	High	ST2	92

Based on the research resul showed that student with low self-esteem SR1 and SR2 difficulty in completing problem of mathematical communication ability. Mathematical communication ability pattern of student with low self-esteem SR1 and SR2 is as follows (1) Student with low self-esteem SR1 and SR2 are able to describe mathematical ideas in visual form well appropriate with information known from mathematical

communication ability item; (2) Student with low self-esteem SR1 and SR2 are able to state daily events in language or mathematical symbols but not yet complete based on the information in mathematical

communication ability item; (3) Student with low self-esteem SR1 and SR2 not yet able to understand and evaluate problems in writing correctly and valid, and (4) Student with low self-esteem SR1 and SR2 stated that they not

always communicate the conclusion answer of a problem according to the question.

Therefore student with low self-esteem SR1 and SR2 only able to describe mathematical ideas in visual form well. But for other three mathematical communication ability indicators student with low self-esteem SR1 and SR2 have not been able to fulfill it properly. This mean that student with low self-esteem Sr1 and SR2 have not been able to finish problem in writing. This matter is appropriate with the research result from Pamungkas and Setiani (2017) student with low self-esteem will shpow a non-confident behavior, feel frustated, and disappointed when doing something that not as expected so it can influence learning achievement.this matter is also supported by Maslow theory on Jerume (2013) that stated self-esteem is one important factor in supporting student's achievement. Student with low self-esteem will feeling inferior, weak, helpless and worthless.

Based on research result, student with high self-esteem ST1 and ST2 can solve mathematical communication ability question well and fulfill all indicators of mathematical communication ability. Belows are mathematical communication ability pattern of student with high self-esteem ST1 and ST2 (1) Student with high self-esteem ST 1 and ST2 are able to describe mathematical ideas in visual formwell according to known information of mathematical communication ability; (2) Student with high self-esteem ST1 and ST2 are able to state daily events in language and mathematical symbols completely according to the information of mathjematical communication ability question; (3) Student

with high self-esteem ST1 and ST2 are able to understand and evaluate mathematical ideas on solving problems in writing; and (4) Student with high self-esteem are able and always communicate the conclusion answer according to the question.

From the description, student with high self-esteem ST1 and ST2 are able to fulfill all indicators of mathematical communication ability. This is appropriate with the researh conducted by Irawati and Hajat (2012) which states that there is a possitive correlation and significant between self-concept (self-esteem) with student's learning achievements, the higher student's self-concept (self-esteem), the higher student's learning achievements. Research result of Wardani and Yuniarti (2015) states that student with high self-esteem tend to be confident on social situation faced and feel confident on doing tasks given by teacher. This is also supported by Piaget theory in Rifa'I and Anni (2011) states that students can learning actively by doing social interaction with discussion in groups means that students have a good communication ability and self-esteem.

Based on the discussion about mathematical communication ability pattern of student with low and high self-esteem obtained information that student with low self-esteem SR1 and SR2 are only able to describe mathematical ideas in visual form, while high self-esteem St1 and ST2 are ablo to fulfill all indicators of mathematical communication ability. The ratio between student with low and high self-esteem on solve the problem of mathematical communication ability can be seen in the following table 5.

Table 5. Comparison between Student with Low and High Self-Esteem on Mathematical Communication Ability

Indicators of Mathematical Communication Ability	Self-Esteem Category	
	Low	High
Able to describe mathematical ideas in writing or visual form	Student with low self-esteem are able to describe mathematical ideas in visual form well	Student with high self-esteem are able to describe mathematical ideas in visual form well
Able to state daily events in	Student with low self-esteem state the	Student with high self-esteem are

language or mathematical symbols	daily events in language or mathematical symbols incomplete according to the question	able to state the daily events in language or mathematical symbols well
Able to understand and evaluate mathematical ideas to solve problems in writing	Student with low self-esteem are not able to understand and evaluate mathematical ideas in solving problems in writing correctly	Student with high self-esteem are able to understand and evaluate mathematical ideas in solving problems in writing well
Able to communicate conclusion answer of a problem according to the question	Student with low self-esteem not always communicate the conclusion answer of a aproblem according to the question	Student with high self-esteem are able and always communicate conclusion answer of a problem according to the question

CONCLUSION

Based on the research result and discussion conclusion obtained (1) the quality of MiC learning process with Jepara culture nuance with mathematical communication ability of students grade X MIA qualitatively included in a good categoryand quantitatively can be said of quality, and (2) Mathematical communication ability of student with low self-esteem are able to describe mathematical ideas in visual form well. Mathematical communication ability of student with high self-esteem are able to describe mathematical ideas in visual form well, able to state daily events in language or mathematical symbols, able to understand and evaluate mathematical ideas in solving problems in writing, and able to communicate the conclusion answer of a aproblem according to the question.

By knowing student's self-esteem teacher can choose and determine the learning strategy that appropriate with student's condition. Student with low self-esteem need more guidance in order to complete question of mathematical communication ability. Student with high self-esteem still need to get direction and motivation so that it can stay maximal in completing question of mathematical communication ability. The present of MiC learning process with Jepara culture nuance can improve student's mathematical communication ability. Furthermore, it is need to be explored about MiC learning process with Jepara culture nuance in a way more explore Jepara culture and mathematicslearning material appropriate and support MiC learning process.

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