The Effect of Concept Mapping and Microsoft Visioassisted Cooperative Learning Modeltowards Mathematical Conceptsunderstanding and Emotional Intelligence of Junior High School Students

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Abstract: *The purpose of this research is to investigate the influence of Concept Mapping and Microsoft Visio assisted Cooperative Learning model (CMCL)towards the ability of mathematical concepts understanding (MCU) and emotional intelligence (EI) of the students at Junior High School (JHS) grade 8, as well as to investigate the interaction between the learning model and mathematical initial ability (MIA) of the students towards MCU and EI of students. This type of research is quasi experiment. The population is the whole JHS students at full day school Al-Ulum. The sample in this research is 34 students as experiment class that is taught by CMCL and 35 students as control class that is taught by conventional learning model. Data was analyzed using two-way Analysis of variance. Research results are: (1) there is the effect of learning model (CMCL & conventional model)towards mathematical concepts understanding and emotional intelligence of the students; (2) there is no interaction between learning model and mathematical initial ability towards mathematical concepts understanding and emotional intelligence of the students; (3) mathematical concepts understanding and emotional intelligence of the students at experiment class is better compared to students in conventional class.*

Keywords: *Mathematical Concepts Understanding Ability, Emotional Intelligence, Cooperative Learning assisted Concept Mapping and Microsoft Visio*

I. Background

Studying mathematics can train the ability to think logically, critically and systematically. Mathematical science also helps a person in solving problems in everyday life. Therefore, educational institutions are given the task to conduct self-reform in order to produce adequate human resources in accordance with the demands of the times.

In the Law No.20 of 2003 on National Education System, it is stipulated that the purpose of national education is to developed the students to become human beings who believe, piety to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. Syahputra and Surya (2017) stated that learning mathematics requires innovation and creativity of the teachers and students. One way to do this is to use Concept Mapping and Microsoft Visio assisted Cooperative LearningModel. Putri, Mukhni and Irwan (2012) stated that the aim of the mathematics lesson is that students are able to understand mathematical concepts, explaining the interconnection between concepts and applying concepts or algorithms, flexibly, accurately, efficiently, and appropriately in problem solving.

Zevika, Yarman and Yerizon, (2012) say that there is a topic or concept of prerequisite as a basis for understanding the next topic or conceptin the process of learning mathematics. Saricah (2015) says that the concepts in mathematics have aninter correlation; between one concept and another, so that each student should be given more opportunity to see the connection among the concepts. Understanding mathematical concepts aims to understand the material math intact because it is a very important skills in achieving the goals of learning mathematics.

In addition, to comprehend mathematical concepts, the emotional bonds of students also greatly affect the memory of students. Minarni and Napitupulu (2017) state that the brain will work more effectively while creating a representational pattern for coding (internalization) and decoding (externalizing) information. Dewi and Indrawati (2014) say that individuals who do not take advantage of memory use in the brain, will increase the possibility of loss of one by one information stored. Without emotional involvement, the brain's nerves will be reduced from what is required to attach a lesson in memory so that the relationship between emotion and

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long-term memory with learning is not well maintained. Andriani (2014) states that emotional intelligence is the ability of a person to recognize his or her own feelings and others, the ability to adapt to different situations and conditions and the ability to control his own emotions and others in certain situations and conditions and be able to control his reaction and behavior.

On the other side, Juliarti, Rambe, Sutanti and Estellita (2012) say that concept mapping are a strategy used by teachers to assist students in organizing learning concepts that have been learned based on the meaning and relationship between the components of existing concepts.

According to Kristiana (2016), concept mapping is a schematic chart to illustrate a conceptual concept of a person in a series of statements. On the mapping concept, there is interrelationship between concepts and principles that are represented as a network.

In fact, low of conceptual understanding of the students or comprehension ability of the students can be seen from the complaints of teachers in the field of study at school and the results of initial studies that researchers have done by asking some questions.

One way to solve the above problem is to use the learning model of the mapping concept and Microsoft Visio assisted Cooperative Learning.

In fact, the implementation of learning model in the classroom todayis to use conventional learning with expository approach. This learning model made the students listen, record, ask questions, and work on individual and group questions based on the example proposed by the teacher. And this process could not improve understanding towards mathematical concepts. So, we need a model of learning that can train and improve the ability of understanding mathematical concepts. The author sees this can be realized by using the Concept mappingand Microsoft Visio assisted Cooperative Learning (CMCL) since cooperative learning is a learning model that give opportunity to students to build understanding in group discussion (Widodo, 2004).

A study conducted by Sumartono and Normalina (2015) found that cooperative type of scramble model on the first evaluation of student learning outcomes were belong to sufficient criteria, in the second evaluation belongto very good criteria.

Minarni (2013) found that the PBL approach had a better effect on student's mathematical understanding achievement than in conventional learning. Further, there was no interaction between learning factors and mathematical prior knowledge towards student understanding ability, and as a whole the students social skills who got the PBL approach was better than social skills of the students in conventional classroom. As known, such as emotional intelligence, social skills is part of affective aspect of Bloom's taxonomy which is important to be acquired by the students. The two affective aspect are very important for the students to be acquired in order to be a good person and a good citizen.

Such as cognitive aspect, affective aspect such as emotional intelligence can be developed through learning process in the classroom, especially through MCML.

Research Methods

This study is categorized into quasi experimental research. The research design used is pretest posttest control group design. There are group of sample in this research that is Experiment group and control group, each isgiven mathematical initial ability (MIA) and mathematical conceptual understanding posttest. In this study there are three types of variables, they are: independent variable, dependent variable and intermediate variable. The independent variable is the learning model, the dependent variable is the ability to understand mathematical concepts and students' emotional intelligence. The control variable is mathematical initial ability.

Concept mapping is created by the students in their group discussion under teacher's guidance as well as operating Microsoft Visio in completing the task at hand.

The population in this study is all students of JHS students at Al-Ulum Medan, Academic Year 2017-2018 that consist of 279 students. This sample choose by using purposive sampling technique from all students grade VIII; that is VIII-6 as experimental class which is concept mapping and Microsoft Visio integrated toCooperative learning model implemented, and class VIII-5 as control class where conventional learning model is implemented.

Data of this research is obtained through test of MIA, MCU test, and questionnaires of students' emotional intelligence. Data is analyzedthrough two-way ANAVA. All statistical calculations aids by SPSS 22. Statistical hypotheses proposed here is adapted from Syahputra (2016):

$H_0: \beta_1 = \beta_2$
$H_1: \beta_1 \neq \beta_2$

Note:

β_j = The effect of learning model towards
understanding of mathematical concept
j=1, 2,
where1 = Concept mapping and Microsoft Visio assisted to Cooperative learning model

2 = Conventional learning model

Research Results

Result of the research is analyzed based on the results of statistical test displayed in Table 1 and Table 2. The results of combined effect (interaction) between mathematical initial ability and learning model is displayed in Figure 1 and Figure 2.

Data was analyzed by using SPSS version 22 and interpreted based on the output, resume of observation, and interview. Example of student work also included here.

Based on Table 1, it can be seen that for the learning factor, the calculated F value is 22,598 and the significant value is 0.000. Since the significant value is 0.000 smaller than the 0.05 significance level, then H_0 is rejected and H1 is accepted.

Thus, it can be concluded that there is the effect of learning model towards the students' ability of understanding mathematical concepts.

Table 1. Output of Statistical test of The Effect of Learning Model towards Mathematical Conceptual Ability

Tests of Between-Subjects Effects					
Dependent Variable:Understanding of Mathematical Concepts					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	8065.765[a]	5	1613.153	8.471	.000
Intercept	108817.972	1	108817.972	571.435	.000
PAM	960.312	2	480.156	2.521	.088
Learning Model	4303.321	1	4303.321	22.598	.000
MIA* Learning Model	416.205	2	208.103	1.093	.342
Error	11997.046	63	190.429		
Total	223107.000	69			
Corrected Total	20062.812	68			
a. R Squared = ,402 (Adjusted R Squared = ,355)					

The results of observation, interview, and scaleindicate that there is the effect of Concept Mapping and Microsoft Visio assisted Cooperative learning model to emotional intelligence of junior high school student. Two-way ANOVA for emotional intelligence factoris presented in Table 2.

Based on Table 2. it can be seen that for the learning factor, F value is 6,538 and significant value equal to 0,013. Thus, it can be concluded that there is the effect of Concept mapping and Microsof Visio assisted Cooperative learning model to emotional intelligence of junior high school students.

The effect of interaction between MIA and MCMLto mathematical concepts understanding is presented in Figure 1.The effect of interaction between MIA and MCMLto emotional intelligence presented in Figure 2.

Table 2. Output of Statistical test of The Effect of Learning Model towardsEmotional Intelligence

| Tests of Between-Subjects Effects					
Dependent Variable:Emotional Intelligence					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2284.988[a]	5	456.998	3.003	.017
Intercept	263385.718	1	263385.718	1730.465	.000
MIA	681.598	2	340.799	2.239	.115
Learning Model	995.192	1	995.192	6.538	.013
MIA* Learning Model	473.166	2	236.583	1.554	.219
Error	9588.925	63	152.205		
Total	524264.000	69			
Corrected Total	11873.913	68			
a. R Squared = .192 (Adjusted R Squared = .128)					
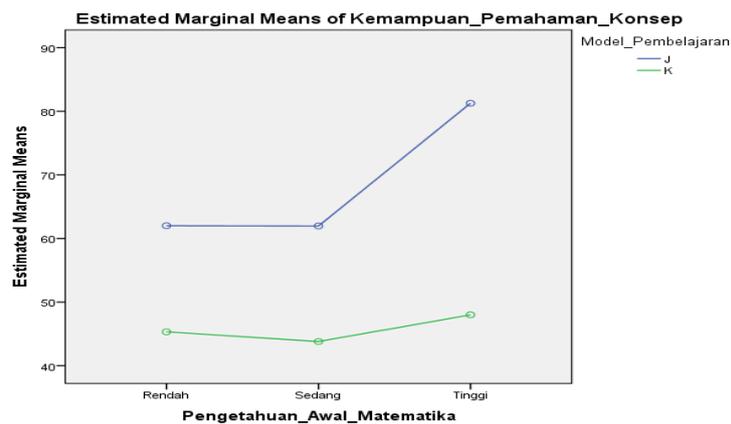
Figure 1. Graph of Interaction between MIA and

Learning Model towards Understanding Mathematical Concepts

From Figure 1, it can be concluded that there is no interaction between mathematical initial ability (MIA) of the students and learning model applied in the classroom. It means, Concept Mapping and Microsoft Visio assisted Cooperative learning model can be applied in all category of MIA. Furthermore, the learning model is powerful in influencing the ability of understanding mathematical concepts of the students with high mathematical initial ability than conventional model.
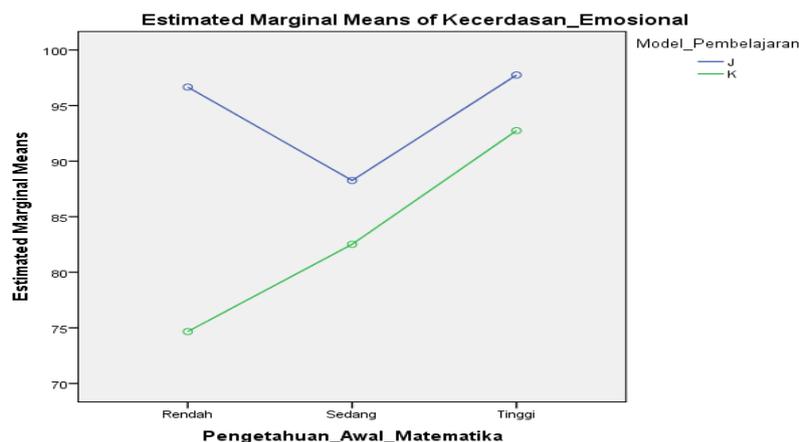
Figure 2. Graph of interaction between MIA and Learning Model towards Emotional Intelligence

Based on Figure 2 can be concluded that MIA and Learning model did not give simultaneous effect towards emotional intelligence. It means concept mapping and Microsoft Visio assisted Cooperative learning model can be applied in all category of MIA. Nevertheless, the learning model is powerful in influencing emotional intelligence of the students with low and highmathematical initial ability than conventional model.

Example of student work in experiment classroom and in conventional one related to test of mathematical conceptual understanding number 3 is presented in Figure 3.

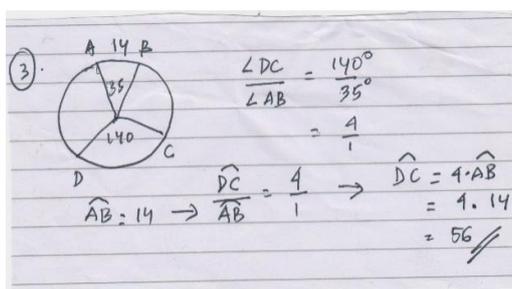**Problem 3**
"Look at the picture below.
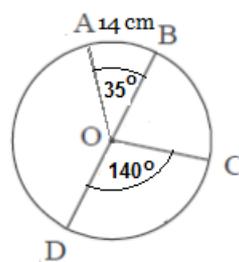
Determine length of arc DC."

Solution:

(a)

(b)

Figure 3. Student work in MCU test:

(a) In conventional class

(b) In experiment class

   The student in experiment class give complete solution and give right answer, it is true that the length of arc CD is 56. Most of the students in experiment classroom do better in solving all problem in the test than the students in conventional classroom. While, in conventional class, even there is no image to make troubleshooting easier, so this student does not get true solution.

II. Conclusion

Based on result of the research, the conclusions are:

1. There is the effect of learning model (Concepts mapping and Microsoft Visio assisted Cooperative Learning, Conventional learning model) towards mathematical understanding and emotional intelligence of junior high school students.

2. There is no interaction (combined influence) between learning model and mathematical initial ability to the students' mathematical conceptsunderstanding and emotional intelligence of junior high school students.

3. Mathematical concepts understanding and emotional intelligence of the students at experiment class is better compared to students in conventional class.

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