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Improving Communication Skills and Mathematical Disposition by Inquiry Model Alberta Method

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ABSTRAK

Penelitian ini bertujuan untuk meningkatkan kemampuan komunikasi dan disposisi matematik dalam pembelajaran matematik dengan menggunakan metode inkuiri model Alberta serta assosiasi diantara keduanya. Subjek dari penelitian ini adalah siswa SMP kelas VII sebanyak dua kelas, satu kelas sebagai kelas eksperimen dan kelas yang lain sebagai kelas kontrol dengan jumlah 64 siswa. Instrumen yang digunakan dalam pengumpulan data adalah tes komunikasi dan skala disposisi matematik. Motode penelitian yang digunakan penelitian ini adalah menggunakan kuasi eksperimen. Hasil penelitian menunjukkan bahwa: (1) Peningkatan kemampuan komunikasi siswa yang pembelajarannya menggunakan metode Inkuiri Model Alberta lebih baik dibandingkan dengan metode biasa; (2) Disposisi matematik siswa yang pembelajarannya menggunakan metode Inkuiri Model Alberta lebih baik dibandingkan dengan metode biasa; (3) Terdapat assosiasi antara kemampuan komunikasi dengan disposisi matematik siswa yang pembelajarannya menggunakan metode Inkuiri Model Alberta.

Kata Kunci: Komunikasi, Disposisi Matematik, Metode Inkuiri Model Alberta.

ABSTRACT

This study aims to improve communication skills and mathematical disposition in mathematical learning using inquiry method of alberta model and assosiation between the two. The The subjects of this study are students of SMP class VII as many as two classes with a total of 64 students. The instrument used in data collection is a written test for communication and mathematical disposition. The research method used in this research is using quasi experiment. Communication data and mathematical dispositions were analyzed using Mann Whitney nonparametric tests. The results obtained from this study were obtained: (1) Improvement of students' communication skills whose learning method using Inquiry Model Alberta is better than the usual method; (2) The mathematical disposition of students whose learning method using the Inquiry Model Alberta is better than the usual method; (3) There is a assosiation between communication ability with mathematical disposition of students whose learning method using Inquiry Model Alberta.

Keywords: Communication, Mathematical Disposition, Alberta Model Inquiry Method.

INTRODUCTION

In the early stages of mathematics is formed from human experience in the empirical world. Then the experience is processed and processed by analysis with reasoning in the cognitive structure so that it comes to a conclusion of mathematical concepts. In order for mathematical concepts that have been formed to be understood by

everyone, and can be easily manipulated precisely, careful notation and terminology are made through a global agreement, which became known as the mathematical language (Suherman, 2001).

Ruseffendi (Suherman, 2001) suggests that mathematics is a structured science organized. That's because learning mathematics starts from an element that is not defined, then continues on defined elements, axioms or postulates and ends in the theorem. Meanwhile, according to Johnson and Rising (Suherman, 2001) mathematics is a pattern of thinking, organizing patterns, and logical proof. Still, according to Johnson and Rising, mathematics is a language that uses precisely defined, clear, accurate, and symbolic representations, and emphasizes the symbolic language of ideas rather than sounds.

Based on the mathematical characteristics as stated above, then the mathematical learning in the school should prepare the condition of the students to be able to master the concepts that will be studied from the simplest to the more complex. The purpose of mathematics learning in schools according to MoNE (2007) is to understand the concept of mathematics, explaining the interrelationship between concepts, using reasoning on patterns of nature, solving problems, communicating ideas, and having an attitude of appreciating the usefulness of mathematics in life.

In relation to the desired learning objectives in mathematics, Sumarmo (Hulukati, 2005) suggests that mathematical learning in essence has two directions of development that is to meet the needs of the present and the future. The present need in question is that mathematical learning leads to an understanding of the concepts necessary to solve other mathematical and scientific problems. That is, the need in the future is a mathematical learning that provides logical, systematic, critical, and careful logical and objective thinking and open-minded thinking. In this case the ability is very necessary in everyday life as well as to face the ever-changing future.

Wood et al. (Laswadi, 2015) also stated that the potential of mathematics as a science has the opportunity to raise awareness of social problems and change society for the better. Thus, mathematical skills are potential human resources that must be developed in order to advance the nation. The mathematical skills developed by Kilpatrick et al. (2001), namely: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition.

Based on the above explanation of the objectives of mathematics learning and the potential of mathematical skills, in this case the author intends to focus on research on mathematical communication is the essential mathematical skills listed in the secondary

school mathematics curriculum (NCTM, 1999, KTSP, 2006) Component of learning objectives The mathematics include: can communicate ideas with symbols, tables, diagrams or mathematical expressions to clarify circumstances or problems and have an appreciative attitude to mathematical usability in life, curiosity, attention and interest in learning mathematics and resilience and confidence in problem solving.

The ability of mathematical communication according to the Ministry of National Education which states that many problems or information delivered in the mathematical language, for example presents the problem into the mathematical model in the form of diagrams, mathematical equations, graphs or in tabular form. Communicating ideas in a mathematical language is more practical, systematic, and efficient.

While mathematical disposition is a tendency to view mathematics as plausible, to regard mathematics as something useful and valuable, to believe that a persistent effort in learning mathematics is not a waste, and to see oneself as an effective mathematical learner as well mathematician (Kilpatrick, et al., 2001).

However, based on a preliminary study in one junior high school still low mathematical communication. It is proven when the author doing observation of learning in the class, students tend to memorize mathematical formulas that have been given, so that when teachers give different problems with the same concept, the students have difficulty. The authors suspect that the mathematical communication possessed by students is still low. This is because when learning in the classroom students accept only mathematical concepts, not by finding out themselves about the concept of mathematics. Then the authors also found the low of mathematical significance for students. At the time of learning in the classroom some students there are complaining, bored, drowsy, so they do not pay attention to learning. Observing this condition, the authors suspect that students do not have a positive attitude towards mathematics or mathematical productive disposition. Though mathematics has a very close relationship with everyday life, such as shopping, trading, designing buildings, and banking activities.

In the cognitive development of students, there are two factors that affect the internal and external factors Ruseffendi (in Tamalene, 2010). One of them is teacher activity in creating learning process which can give opportunity to student to actively participate in teaching and learning process, so that there is motivation in student to learn. This is supported by NCTM (in Aisah, 2015) who argue that the practice of mathematical learning is shifting from teacher centered learning to student centered learning, and transforming students who were formerly passive learners into learner learners active

(active learners). This is as Wahyudin (1999) argued that the ability of mathematicians to use various methods or approaches appropriately and correctly in teaching can influence the level of mastery of students in the mathematics itself. One effort to improve the ability to think creatively is through quality education. Quality education can be improved through to train thinking using the right learning model (Maskur et al., 2020).

Communication

The ability of mathematical communication is the ability to express mathematical ideas and understandings verbally and in writing using numbers, symbols, images, graphs, diagrams, or words. The ability of mathematical communication can also be interpreted as a student's ability to convey something he knows through dialogue events or interrelationships that occur in the classroom environment, where there is a transfer of messages. Displaced messages contain mathematical materials that students learn, for example in the form of concepts, formulas, or problem solving strategies. Parties involved in communication events in the classroom are teachers and students, Sumarmo (2007), indicators indicating mathematical communication skills are:

1. Connecting real objects, images, and diagrams to mathematical ideas;
2. Describe ideas, situations and mathematical relationships orally or in writing with real objects, drawings, graphs and algebra;
3. Declare everyday events in a language or mathematical symbol;
4. Listening, discussing, and writing about mathematics;
5. Reading with written comprehension or written presentation;

Mathematical Disposition

Mathematical dispositions show: 1) Confidence in using mathematics, solving problems, giving reasons and communicating ideas; 2) flexibility in investigating mathematical ideas and trying to find alternative methods of problem solving; 3) diligently doing mathematical tasks; 4) interest, curiosity and inventiveness in performing mathematical tasks; 5) closely monitor, reflect on their own performances and reasoning 6) assess mathematical applications of other situations in mathematics and daily experience; 7) appreciation of mathematical roles in culture and values, mathematics as a tool and as a language, Polking (1998)

The scale of mathematical disposition used is by adapting the scale developed by Kesumawati (2010). The scale is chosen because the subject Kesumawati research has the

same characteristics with this study, namely junior high school students. The mathematical disposition scale developed by Kesumawati includes the following indicators:

1. Confident in solving mathematical problems, communicating ideas and giving reasons.
2. Flexible in exploring mathematical ideas and trying different methods to solve problems.
3. Determined to complete mathematical tasks.
4. Interest and curiosity to find something new in doing mathematics.
5. The tendency to monitor and reflect on thinking and performance processes.
6. Apply mathematics in other fields and in everyday life.
7. Award of mathematical roles in culture and values, both mathematics as a tool, and mathematics as a language.

Alberta Model Inquiry Method

There are various problems that arise in the process of learning mathematics, both problems originating from the use of learning models, learning strategies, learning methods, as well as those originating from the weak mathematical abilities possessed by students (Septian & Rizkiandi, 2017). One of the student-centered learning methods is the Inuit Model Alberta method. According to Donham (in Alberta Learning, 2004), the Inquiry Model Alberta method is a learning method that involves students actively in the process of investigation or problem solving through several stages of planning, retrieving, completing (processing), creating (creating), giving and receiving (sharing), and evaluating (evaluating).

Learning by the Inuit Model Alberta method provides students the opportunity to develop the skills they will need throughout their lives, learn to deal with problems that may not have clear solutions, changes and challenges of the times, and guide investigations to find solutions at this time and in the future (Alberta Learning, 2004). Then Kuhlthau (in Alberta Learning, 2002) argues that learning by inquiry methods can develop students' cognitive and affective abilities. This is related to the findings of the author based on preliminary studies in the field that is about communication and disposition of mathematical.

Therefore, based on these issues, the authors are interested in conducting research on The stages in Alberta's inquiry learning of the Alberta model (Alberta Learning, 2004) consist of planning, retrieving, processing, creating, sharing, and evaluating.

RESEARCH METHODS

This research is a research that uses quasi experimental method because in this study the subject is not grouped randomly, but the researchers accept the subject circumstances as they are (Ruseffendi, 2005). The use of the research design is done with the consideration that the class has been formed before, so no random grouping is done anymore.

This study was conducted on students of two classes who had equivalent mathematical abilities. The first group was given a mathematical lesson using the Inuit Model Alberta method. The first group is an experimental group, while the second group is a control group that obtains mathematical learning with the usual method of expository.

The given treatment is in the form of mathematical learning with the method of Inquiry of Alberta Model to be seen its influence on measured aspect, that is communication and student disposition of mathematics.

Table 1. Research Design Patterns

Class	*Preresponse*	*Treatment*	*Postresponse*
Experiments	Communication Tests	Mathematical learning with the Inquiry Method of Alberta Model	Communication Test
			Questionnaire Mathematical Disposition
Control	Communication Test	Mathematical learning with the usual methods	Communication Tests
			Questionnaire Mathematical Disposition

The design in this study is pretest-postes (Russeffendi, 2005) as follows:

Experiment Class: O X O_1

Control Class : O O_1

Information :
O: Pretes
O_1: Postes
X : Mathematical learning by the Inquiry Method of Alberta Model
-----: Subjects are not randomly groupe

The population of this study is junior high school students in Cimahi City academic year 2017/2018. With the sample subjects are class VII students of two classes as control class and experiment class. The research instrument used in collecting test data. The form of the test is essay or about the form of description with the number 5 communication problem and for the mathematical disposition used attitude scale with the number of 30 questions.

RESULT AND DISCUSSION

Data Communications Analysis

Pretest and postes data were analyzed to find out the mean and gain index. The result of descriptive analysis is presented in the following Table 2.

Table 2. Data Processing Results Comunication Mathematical Ability Test

Variabel		Inquiry Method Alberta model			Ordinary Learning		
		Pretest	Postest	N-Gain	Pretest	Postest	N-Gain
Comunication (SMI 50)	N	32	32	32	32	32	32
	$\overline{x}$	16,08	26,75	0,31	14,22	22,94	0,24
	(%)	32,16	53,50		28,44	45,88	
	S	12,64	8,73	0,19	11,69	8,44	0,18

Based on the data in Table 2, the standard deviation for pretest mathematical comunication in the class that gets learning with Alberta model inquiry method is higher than the one that gets ordinary learning, meaning that in the class that receives Alberta model inquiry method learning, the initial ability of mathematical comunication is more diffuse than the class. who get regular learning. One of the causes of differences in the improvement of mathematical communication skills of the experimental class and the control class is the difference in learning activities and atmosphere (Anggriani & Septian, 2019).

Analysis of Mathematical Productive Disposition Questionnaire

Pretest and postes data were analyzed descriptively to find out mean and gain index, this is done to see the quality of learning. The results of descriptive analysis are presented in the following Table 3.

Table 3. Mathematical Disposition Scale Data Processing Results

Variabel		Inquiry Method Alberta model			Ordinary Learning		
		Pretest	Postest	N-Gain	Pretest	Postest	N-Gain
Disposition Mathematics	N	-	32	-	-	32	-
	$\overline{x}$	-	76,81	-	-	71,19	-
	(%)	-	64,01	-	-	59,33	-
	S	-	10,32	-	-	10,04	-

In Table 3, for the data the average mathematical disposition of students who get learning with the Alberta model inquiry method and the ordinary learning class is relatively the same, with high criteria. This means that the two classes have relatively high mathematical dispositions. For standard deviations of class mathematical dispositions with the Alberta model inquiry method higher than ordinary learning classes. This means that in classes that are learning the Alberta model inquiry method, their mathematical dispositions are more diffuse than those that use ordinary learning.

Assosiation Analysis between Mathematical Comunication and Mathematical Productive Disposition

Post-test results of mathematical comunication and final data on mathematical productive disposition were analyzed to see the assosiation between the two. Based on the Chi Square Test Results obtained in the following table:

Table 4. Chi Square Test Results
Ability of Mathematical Comunication and Disposition Mathematical

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.338	4	0.025
Likelihood Ratio	6.407	4	0.171
Linear-by-Linear Association	0.348	1	0.555
N of Valid Cases	36		

Based on Table 4 with a significance level of 0.05, a sig value of 0.025 < 0.05 was obtained. It can be concluded that there is a significant association between mathematical comunication and mathematical dispositions.

CONCLUSSION

Based on the results of the analysis and discussion that have been described in the previous Chapter, there are some things that the authors conclude, namely improved mathematical communication skills of students who get mathematical learning with the method of Inquiry Model Alberta is better than students who get mathematical learning with the usual method, Improvement of mathematical disposition of students who get mathematical learning with the method of Inquiry Model Alberta is better than students who get mathematical learning with the usual method, There is a assosiation between communication skills and mathematical disposition.

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