

APPLICATION OF METHAPORICAL THINKING METHOD TO IMPROVE THE ABILITY OF MATHEMATICAL CONNECTIONS, CREATIVE THINKING AND SELF CONFIDENCE OF VOCATIONAL SCHOOL STUDENTS

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Abstract

This study aims to examine the improvement of mathematical connection skills and creative thinking as well as students' self confidence. This is in line with the problems in this study, namely the low ability of mathematical connections and the ability to think creatively as well as the self-confidence of SMK students. This quasi-experimental study took a population of all students of SMK Negeri 1 Campaka, Cianjur Regency, with a sample of class XI, the class was given a pretest and posttest for mathematical connection skills and students' creative thinking abilities. The results of the quantitative data analysis research using the SPSS.19 for windows application program, show that based on the learning model and the cognitive stage, the level of achievement and increased mathematical connection skills and mathematical creative thinking of students who use the method of methaporical thinking is better than students who use conventional learning.

Keywords: Mathematical Connection Ability, Creative Thinking Ability, Self Confidence, Metaphorical Thinking

Abstrak

Penelitian ini bertujuan untuk menelaah peningkatan kemampuan koneksi matematik dan berpikir kreatif serta *self confidence* siswa. Hal ini sejalan dengan adanya permasalahan dalam penelitian ini yaitu masih rendahnya kemampuan koneksi matematik dan kemampuan berpikir kreatif serta self confidence siswa SMK. Penelitian kuasi eksperimen ini mengambil populasi seluruh siswa SMK Negeri 1 Campaka Kabupaten Cianjur, dengan sampel kelas XI, Kelas tersebut diberikan pretes dan postes untuk kemampuan koneksi matematik dan kemampuan berpikir kreatif siswa. Hasil penelitian analisis data kuantitatif yang menggunakan program aplikasi *SPSS.19 for windows*, menunjukkan bahwa berdasarkan model pembelajaran dan tahap kognitif tingkat pencapaian dan peningkatan kemampuan koneksi matematik dan berpikir kreatif matematik siswa yang menggunakan metode *methaporical thinking* lebih baik daripada siswa yang menggunakan pembelajaran konvensional.

Kata Kunci: Kemampuan Koneksi Matematis, Kemampuan Berpikir Kreatif, Self Confidence, Metaphorical Thinking

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INTRODUCTION

Learning is a two-way communication process, teaching is carried out by the teacher, and learning is carried out by students. In this case, the role of the teacher is not merely providing

information, but also directing and providing learning facilities so that the learning process is more adequate. One of the subjects that requires students to always focus their attention in the learning process is mathematics. Mathematics is a subject that prioritizes the means of thinking to study something logically and systematically.

According to Sumarmo (2003) the difficulties that occur in the learning process of mathematics are students to use and assess the relationship between mathematics topics and linkages outside mathematics. This is because the learning situation is less supportive and other factors are because the means of thinking in learning mathematics must be structured, meaning that if students do not master the basic mathematics material strongly, students will find it difficult to follow the next math material. So that when students find it difficult to digest the material, students will feel bored and when students enter a test situation students will find it difficult to work on math problems because students do not have a solid foundation in mathematics, this results in mathematics being labeled as a subject. the hard one.

Among the many ways to carry out the learning process, namely by choosing a learning method / model, one of which can choose a learning model. Methaporical thinking, this learning model links various knowledge / concepts that students have to gain new knowledge, which consists of the topic term which is the main topic, namely the main concept to be discussed, and the vehicle term, namely the support, which is a parable to be used. so that a meaning will be obtained. Metaphor allows the relationship between information about a concept that is similar to other concepts, which then leads to new knowledge where the comparison process between two concepts works as a new meaning generator.

Mathematical connection is one of the mathematical abilities that need to be possessed and developed in high school students. Several reasons for the importance of having mathematical connection abilities by students include; Mathematical connections are contained in mathematics learning objectives (Curriculum Mathematics, 2013), including: understanding mathematical concepts and their relationships and applying them in solving problems accurately and thoroughly. The ability to think creatively is a mathematical ability that needs to be mastered and developed in students who are learning mathematics. Some of the rationale underlying these statements include; First, creative mathematical thinking is included in the mathematics curriculum and is in accordance with the vision of mathematics, which is to train logical, systematic, critical, creative and careful thinking and to think objectively and openly to face problems in everyday life.

Self Confidence, Regarding Self Confidence, some researchers / experts argue as follows; Lauster (Fasikhah, 1994) argues that self-confidence is an attitude or feeling of confidence in one's own abilities so that people who continue to be less anxious in their actions, can feel free to do things they like and be responsible for their actions, warm and polite in their interactions. with other people can accept and respect others, have the drive to achieve and recognize their strengths and weaknesses.

METHOD

This study uses a quantitative descriptive approach as an experimental method. The research design used in this study is a pre-experimental design with a type of one-shot case study. In this design the experimental model can be read as follows: there is a group given treatment / treatment, and then the results are observed (treatment is an independent variable, and the result is a dependent variable) (Sugiyono, 2011: 112)

The treatment in this study is the learning model of methaporical thinking as an independent variable in the study. Meanwhile, the results observed in this study were the students' mathematical connection ability in multiple choice questions which was the dependent variable in the study. The research paradigm is described as follows

X O

Information:

X = Methaporical Thinking

O = Mathematical connection skills, creative thinking skills, self confidence

(Sugiyono, 2011: 112)

RESULTS AND DISCUSSION

Results

This chapter will discuss the data analysis from the research results, namely the pretest and posttest data. Quantitative data processing is done by using special data processing software, the software used is SPSS 19 software for statistical hypothesis testing. Quantitative data in this study were obtained through tests of creative thinking skills, mathematical connections, and filling in the scale of students' attitudes towards mathematics. The data were obtained from 70 students, consisting of 35 students who received learning using a methaporical thinking technique approach called the experimental class and 35 students who received conventional learning only as the control class.

The data obtained from this study were the pretest and posttest scores. The pretest score is used to determine the ability of the initial mathematical connection and thinking of students before being given action, while the posttest score is used to determine the ability of students to connect and think creatively after being given action and to see achievement, an increase in the use of the methaporical thinking approach to students' self-confidence. As for the classification of the scores used are as follows:

Score 0-3 = Concrete

Score 4-5 = Initial Formal

Score 6-10 = Final Formal

The following is the data presented in the table 1

Table 1. Data results

Ability test	Cognitive	Learning approaches						Total		
		Methaporical Thinking			Saintific			\bar{x}	Sd	N
		\bar{x}	Sd	N	\bar{x}	Sd	N			
Pretest mathematical connection ability Problem	Concrete	20,47	1,982	19	11,52	2,06	31	16,49	2,02	50
	Initial Formal	30,56	2,780	16	27,50	0,58	4	29,03	1,68	20
	Total	25,01	2,381	35	19,51	1,320	35	22,76	1,85	70

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Creative Thinking Skills Pretest	Concrete	15,6 3	2,891	19	13,8 8	1,90 0	2 5	14,75	4,98	4 4
	Initial	21,8	2,029	16	17,9	1,19	1	19,89	1,61	2
	Formal	8			0	7	0		3	6
	Total	18,7 5	2,460	35	15,8 9	1,54 8	3 5	17,32	3,29 7	7 0
Postes Mathematikal Connection capabilities	Concrete	21,0 6	1,600		22,0 3	2,18 9	3 0	21,54	1,89	4 7
	Initial	29,9	3,190		27,4	0,54	5	28,67	1,87	2
	Formal	4		18	0	8				3
	Total	25,5 0	2,395	35	24,7 1	1,36 8	3 5	25,10	1,88 1	7 0
Postes creative thinking skills	Concrete	19,3 3	0,485		18,6 4	0,80 9	1 1	18,98	0,64	2 9
	Initial	35,3	6,499		31,5	2,41	2	33,44	4,45	4
	Formal	5		17	4	3	4		6	1
	Total	27,3 4	3,492	35	25,0 9	1,61 1	3 5	26,21	2,55 1	7 0
Self Confidence	Concrete	96,0 7	1,439		92,9 0	1,16 5	2 0	94,48	1,30	3 4
	Initial	98,8	0,854		95,9	0,88	1	97,30	0,86	3
	Formal	6		21	3	4	5		9	6
	Total	97,4 6	1,146	35	94,4 1	1,02 4	3 5	95,89	1,08 5	7 0

Based on the student test results, there are two types of ability levels, namely the initial level of concrete and formal abilities both in classes with methaporical thinking learning techniques and with ordinary learning. The number of students in the class with methaporical thinking learning consists of 20 students with concrete abilities and 15 students who have an initial formal ability level, while in a class with ordinary learning happens to have the same number as the number of students who have a concrete ability level of 20 and early formal as many as 15 students

Discussion

Learning difficulties are certain conditions or conditions that are marked by the existence of certain obstacles in an activity to achieve a goal so that it requires a more active effort, in order to overcome teaching and learning difficulties. Learning difficulties are marked by the existence of obstacles in achieving a learning goal. One of the constraints in question is the difficulty of students in understanding the subject matter which is indicated by students' mistakes in answering questions related to the teaching material. To find out the difficulties of students in the process of solving mathematical connection problems and mathematical

creative thinking, an analysis of students' answers was carried out, especially students whose answers were still wrong, incorrect, or incomplete from the post-test results.

CONCLUSION

Based on the results of data analysis and discussion, it is concluded that: The improvement of the mathematical connection ability of vocational school students whose learners use the Methaphorical Thinking Technique method is better than conventional learning in terms of overall. Increasing the mathematical creative thinking skills of vocational high school students whose learners use the method of methaphorical thinking techniques is better than ordinary learning in terms of overall. There is no difference in the mathematical self-confidence of SMK students whose learning uses the method of methaphorical thinking techniques with ordinary learning reviewed on an overall basis.

Interaction: There is no interaction between learning methaphorical thinking techniques and the level of students' ability levels to improve mathematical connection skills. There is no interaction between learning methaphorical thinking techniques and the level of student ability levels to increase student self-confidence. Association: There is no association between mathematical connection ability and mathematical creative thinking, There is no association between mathematical connection skills, creative thinking, and self-confidence. The description of the performance of student learning activities is in accordance with the steps that have been determined in Methaphorical Thinking learning and can improve the ability of mathematical connections and mathematical creative thinking.

Students who get learning with the methaphorical thinking technique with those who get conventional learning still have difficulty solving problems of mathematical connection ability on indicators of identifying data sufficiency, making mathematical models and implementing strategies to solve mathematical problems and checking the correctness of results or answers

Students who get learning with the methaphorical thinking technique with those who get conventional learning still have difficulty solving problems of mathematical creative thinking skills on indicators of making interpretations of trigonometric material to clarify problems and facilitate their solutions. And indicators state the situation in tabular form, compose a mathematical model and solve it.

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