

The Effect of Brain Based Learning Model and Creative Thinking about the Ability of Mathematics Concept of Elementary Students

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Abstract This study aims to determine the Brain Based Learning Model and Creative Thinking on the Ability of Understanding the Concept of Mathematics of Primary School Students. The research was conducted in Class IV SDN Rada Bolo Subdistrict, Bima District, NTB. Number of students is 32 students. The research design used experimental method with treatment design by level 2 x 2. Data analysis is the analysis of two-lane variance (ANOVA). The results of this study indicate that 1) There is a difference in the ability of students to understand the concept of mathematics between groups given Brain Based Learning Model and Discussion Learning Model, 2) There is an interaction between Brain Base Learning Model and the ability to think creatively with the ability to understand students' mathematical concepts, 3) Brain Based Model Learning is higher in value than Discussion Learning Model of a group of students who have high creative thinking ability towards the ability to comprehend the concept of learning mathematics of students, and 4) Brain Based Learning Model is lower value than Learning Model Diskusipada group of students who have low creative thinking ability to the ability of understanding the concept of learning mathematics students.

Keywords: *brain based learning, discussion, Understanding Mathematical Concepts*

Cite This Article: Adi Apriadi Adiansha, Mohamad Syarif Sumantri, Makmuri and Asriyadin, "The Effect of Brain Based Learning Model and Creative Thinking about the Ability of Mathematics Concept of Elementary Students." *American Journal of Educational Research*, vol. 5, no. 12 (2017): 1195-1199. doi: 10.12691/education-5-12-4.

1. Introduction

Education is a powerful weapon in improving the quality of Human Resources (HR). Especially in today's globalization needs human resources that have high reasoning ability, creative thinking, quality and have the ability to process information for the development of Science and Technology (Science and Technology). According to John Dewey said that education is a process of experience. From this definition John Dewey emphasizes to apply education as an experience. He believes that by providing experience in education can make students understand things in learning. [1] So Education is a basic requirement in human life, because with education, human beings can process their minds with a directional pattern. Through thinking one can live life and how to survive.

In every learning is required to make various efforts towards improvements that can improve students' skills and skills. Learning not only memorizes the general facts and concepts of the subject matter as it did in the industrial era, the learning process must be efficient and effective. According to Mohamad Syarif Sumantri efficient and effective learning process is done

continuously, will certainly optimize the learning process both simultaneously and continuously. [2] This is very basic because when the learning process is done with a variety of good models and optimization of modern media and innovation but irrelevant to what is learned certainly just a waste of time.

Learning Mathematics science is very important in the world of life that makes mathematics as one of compulsory matapelajaran at every level of education, ranging from elementary school, junior high school, high school and college. According to George Polya in Herman Syafitri mentions that the mathematical functions as know-how. [3] Meanwhile, according to William Byers in Herman Syafitri declared the function of mathematics as a way of knowing. [3] Both experts say that mathematics serves to help humans in solving problem with using realistic thinking process. Mathematics by itself is not a goal, but a number of rational ways of thinking that human beings must have to help mankind solve problems.

In learning mathematics in Indonesia is still far from reality and there is no data or facts that can make proof that the best mathematics lesson in Indonesia first. Based on the report of PISA (Program for International Student Assessment) from 2000 until 2015 then it can be seen below:

Table 1. PISA results (Program for International Student Assessment) from 2000 to 2015

Year of Study	Subjects	Indonesia Average Score	International Average Score	Rating Indonesia	Number of States Parties to Study
2000	Read	371	500	39	41
	Mathematics	367	500	39	
	science	393	500	38	
2003	Read	382	500	39	40
	Mathematics	360	500	38	
	science	395	500	39	
2006	Read	393	500	48	56
	Mathematics	391	500	50	57
	science	393	500	50	
2009	Read	402	500	57	65
	Mathematics	371	500	61	
	science	383	500	60	
2012	Read	396	500	64	65
	Mathematics	375	500	64	
	science	382	500	64	
2015	Read	393	500	62	70
	Mathematics	386	500	62	
	science	403	500	62	

Source: OECD (Organisation for Economic Cooperation and Development) 2016.[4]

From [Table 1](#), above shows that the country of Indonesia from 2000 to 2015 is not able to achieve the standard result of the provisions of the international average of <500. Hal shows that of the three competencies the average value obtained by Indonesia's smallest country that is on learning mathematics. In addition, Indonesia also occupies a low rank and far from other countries.

Based on the context of global problems, that the ability in learning mathematics in Indonesia has not shown good results and satisfactory, therefore researchers see that the problem is the ability to learn math is still very weak. According Hotmaria Menanti S, et al understanding concept is very important because to understand the new concept required prerequisite understanding of previous concepts. So in the learning process students are required to master the concept. [5] The teaching of mathematics is done by considering the sequence of concepts starting from the simplest to the most complex concepts. Permendiknas Number 22 of 2006 on Content Standards, mathematics lessons for all levels of basic education aims to learners have the ability, as follows: 1) Understanding the concept mathematical, 2) using reasoning, 3) Solving problems, 4) Communicating ideas, and 5) Having an attitude of appreciating the usefulness of mathematics in life. [6] From the purpose of the mathematics lesson the aspect of understanding the concept of mathematics is a capability that must be possessed by students as a standard that must be developed by students.

This is experienced by fourth grade students of SDN Rada Bolo Sub-district of Bima Regency in West Nusa Tenggara at the time of observation. Based on observations made on April 3, 2017 shows that the ability of students in learning mathematics is still very low as a result of achieving the average value of mathematics learning remedies are still relatively low only reached 72. While the Minimum Criteria for mathematics lesson is 75.

In accordance with the results of PISA and observations of researchers that the ability of mathematics in Indonesia is still not yet achieved satisfactory results. Therefore

based on the recommendation of permendiknas number 22 of 2006 that so important in improving the ability of mathematics. The need for a model of learning as an alternative that researchers want to apply in learning that is by using the Brain Based Learning Model.

Jensen suggests that Brain Based Learning is a learning that suits the way the brain works naturally designed to learn. Furthermore, according to Jensen, a teacher who is learning with this principle will think about how to be able to discover the students' natural difficulties and build motivation so that the desired behavior emerges as a natural consequence. This learning involves a positive emotional. The ability to think is highly dependent on mood (mood) and emotional state. [7] It is therefore important to keep students comfortable feeling in the classroom to elicit student learning motivation.

Yulvinamaesari in his research said Brain Based Learning offers a concept to create learning with oriented efforts to empower students' brain potential. [8] Three main strategies that can be developed in the implementation of brain based learning. According to Widiani in his research said Brain Based Learning students are required to be able to be active in learning and learning is not only sourced from teachers so that these stages can provide a variation on learning. [9] Brain Based Learning model, also directs students to carry out learning activities in accordance with existing rules. Here it is directed to rethink the initial material that is still related to the material being discussed.

I Gd. Parwata Setiawan et al. Revealed in his research that the model of Brain Based Learning siswa required to be able to be active in learning and learning not only comes from teachers so that these stages can provide variations on learning. The Brain Based Learning model also directs students to carry out learning activities in accordance with existing rules. [9]

Chaiwat Warea said that Brain Based Learning, it can be seen that brain can store knowledge and memory in long-term when existing knowledge. is reviewed and

connected with new knowledge enabling learners to have broader learning. Brain Based Learning, [10] it can be seen that the brain can store knowledge and memory in the long run when existing knowledge is reviewed and connected to the knowledge that allows new learners to have a wider learning.

Based on the opinion of the experts above, the researchers can take the conclusion that the model of Brain Based Learning is a model of learning that can improve the ability of students through the ability to maximize brain function that has to produce learning by way of thinking, new ideas and ideas. With the model of brain-based learning students are required to be able to be active in learning and learning is not only sourced from teachers so that these stages can provide a variety of learning. Brain-based learning model, also directs students to carry out learning activities in accordance with existing rules. Here it is directed to rethink the initial material that is still related to the material being discussed. Thus, it is believed that with model brain-based learning able to overcome the problems faced by grade 4 students of SDN Rada Bolo Sub-district of Bima Regency in West Nusa Tenggara.

Given the ability of students' mathematical concepts to be influenced by the creative thinking that students have. Creative thinking as the ability to reflect smoothness, flexibility and originality of thinking as well as elaboration ability (developing, enriching, detailing) an idea. Creative thinking is the key to success in solving problems. It is creativity that bridges between the stage of cognitive management and the stage of execution in order for one to have convincing accomplishments and results.

Kamplis & Berki states that creative thinking is a thought that allows students to apply their imagination to generate ideas, questions and hypotheses, experiment with alternatives, and to evaluate their own and their peers ideas, end products and processes. [11] Also defined are creative thinking connecting or creating things or ideas that were previously unrelated. [11] Based on some of the opinions discussed above, creative thinking is an organized force of abstract, courageous, disciplined, unstoppable, fluid, there is flexibility, novelty, and unusual arising from environmental conditions and a driving force for something to do. Creative thinking refers, among other things, to the ability to produce possibilities, new ideas, original, reflective thoughts, curiosities, and the ability to identify relationships between concepts and ideas.

Based on the above description, the researcher conducted the research entitled "The Influence of Brain Based Learning Model and Creative Thinking to the Ability of Student Mathematics Concept IV SDN Rada Bolo Subdistrict Bima District in West Nusa Tenggara"

2. Methods

The method used is experimental method with Treatment by level 2x2. This study aims to determine the effect of independent variables and moderator variables on the dependent variable. The independent variable is a learning model consisting of Brain Based Learning Model (A_1) and discussion learning model (A_2). Meanwhile, the

moderator variable is creative thinking ability consisting of high thinking ability (B_1) and low creative thinking ability (B_2). For the dependent variable is the ability to learn math.

Table 2. Experimental Research Method Design

Creative Thinking (B)	Learning model (A)	
	Brain Based Learning (A1)	Discussion (A2)
High Creative Thinking (B1)	A1B1	A2B1
Creative Thinking Low (B2)	A1B2	A2B2

Oliver puts the sample sense simply as part of the total population drawn from the population in such a way as to represent all members of the population. [12] Sampling technique in this study using simple random sampling cluster that is how sampling of members of the population in a random manner without regard to strata (level) in members of the population.

Furthermore, on the test of creative thinking ability determined by upper and lower groups. Students are categorized into high creative thinking groups if the score is within the highest 27% score range. Then the students are categorized into low low thinking groups if the score is in the lowest 27% range score. Then get $27\% \times 32 = 8$ samples for each group.

3. Results and Discussion

3.1. Differences in Understanding Ability of Student Learning Concept between Students Learning with Brain Based Learning Model and Learning Model Discussion

Based on result of variance analysis (ANAVA) at significant level $\alpha = 0,05$, got $F_{hitung} = 4,93 > F_{tabel} = 4,15$. Thus $F_o > F_t$, so H_0 is rejected, so it can be concluded that overall there are significant differences of influence between groups of students who are given Brain Based Learning Model with Learning Model Discussion on the ability to understand the concept of learning mathematics students. Therefore, the ability to comprehend the concept of mathematics learning given by Brain Based Learning Model ($\bar{X} = 81$ and $s = 8,453$) is significantly better than that given by Discussion Learning Model ($\bar{X} = 75$ and $s = 7,659$).

In accordance with the results of the above research, the overall research hypothesis is that there are differences in the ability of understanding the concept of student learning between students who study with Brain Based Learning Model and Learning Model Discussion

3.2. Interaction of Brain Based Learning Model and Creative Thinking Ability to Understanding the Concept of Student Mathematics Learning

The results of ANOVA calculation can be seen that the value of the second hypothesis test results presented in the

ANOVA table in the interaction row AXB shows that H_0 is rejected based on the value $F_{count} = 6.89 > F_{table} (0.05) = 4.15$. Thus it can be taken decision that there is influence a significant interaction between the Brain Based Learning Model and the ability to think creatively about the ability to understand the concept of learning mathematics students.

Data of the research result, got the average score of the ability of understanding the concept of learning mathematics of students between groups of students who have high creative thinking ability given Brain Based Learning Model is equal to 87 and groups of students who have low creative thinking ability given Model Learning Discussion is equal to 74.5. For the average score of ability to comprehend the concept of learning mathematics of students between groups of students who have the ability to think creatifinggi given Brain Based Learning Model is equal to 75 and groups of students who have low creative thinking ability given Learning Discussion Model is equal to 75.5.

3.3. In students who have high creative thinking ability, there is a difference of Understanding Ability of Student Learning Mathematics Concept between students studying with Brain Based Learning Model with Discussion Learning Model

The calculation of advanced-stage variance analysis with Tukey's Test is to compare the groups with high creative thinking abilities given the Brain Based Learning Model and given the Discussion Learning Model. Calculation of Tukey Test $A_1B_1 > A_2B_1 = Q_{count} = 10.10 > Q_{table} 0.05: 4: 8 = 4.07$ or $Q_{count} > Q_{table}$ at significant level $\alpha = 0.05$, thus H_0 is rejected and alternative hypothesis is accepted. So that can be interpreted ability of comprehension concept of learning mathematics of student between group of student which given Model of Brain Based Learning higher than with group of student given Model Learning Discussion.

Therefore, for students who have high creative thinking abilities given Brain Based Learning Model ($\bar{X} = 87$ and $s = 5,952$) are significantly higher than those given Discussion Learning Model ($\bar{X} = 74,5$ and $s = 7,690$).

3.4. In students who have low creative thinking ability, there is a difference of Understanding Ability of Student Learning Mathematics Concept between students who are given Brain Based Learning Model and Discussion Learning Model

The calculation of the analysis of advanced variance with Tukey's test is to compare the group with low creative thinking ability given the Brain Based Learning Model and given the Discussion Learning Model. Test Calculation Tukey $A_1B_2 < A_2B_2 = Q_{count} = -0.40$ is smaller than $Q_{table} 0.05: 4: 8 = 4.07$ or $Q_{count} < Q_{table}$ at significant

level $\alpha = 0.05$, thus H_0 is rejected and alternative hypothesis is accepted. So it can be interpreted the ability of understanding the concept of learning mathematics students between groups of students who are given the Brain Based Learning Model lower than that given of students who discussed Discussion Learning Model.

Therefore, for students with low creative thinking ability given Brain Based Learning Model ($\bar{X} = 75$ and $s = 5,952$) is significantly lower than that given by Discussion Learning Model ($\bar{X} = 75,5$ and $s = 8,124$).

4. Conclusion

This study uses experimental methods involving independent variables, namely Brain Based Learning Model and Discussion Learning Model and creative thinking ability, while the dependent variable is the ability to comprehend the concept of learning mathematics siswakelas IV SDN Rada Bolo District Bima district of West Nusa Tenggara.

Based on the results of data analysis, the results of hypothesis testing and the results of research discussions that have been obtained are explained some conclusions as follows:

1. Brain Based Learning model has a higher value influence than Learning Model Discussion on the ability to understand the concept of learning mathematics students.
2. There is an interaction between Brain Based Learning Model and Discussion Learning Model and the ability to think creatively about the ability to comprehend the concept of learning mathematics students.
3. Brain Based Learning Model is higher in value than Learning Model Discussion in groups of students who have high creative thinking ability on the ability to comprehend the concept of learning mathematics students.
4. Brain Based Learning Model is lower in value than Learning Model Discussion in groups of students who have low creative thinking ability to comprehend the concept of learning mathematics students.

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