

## **Teaching Mathematics through Integrated Brain Gym in Pair Checks of Cooperative Learning**

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**Abstract:** *The successful of Mathematics' learning is influenced by many factors such as learning's model, learning's strategy, learning's media which commonly used by teacher. Brain Gym is a movement which can do in order to help students' equalize their left brain and right brain. This research was aimed at examining integrated brain gym in pair checks toward students' achievement of Mathematics in Islamic High School Kulliyatul Muballighien Muhammadiyah Padang Panjang. The test was used as instrument and the findings revealed that the students' achievement of Mathematics were better 78,50% passed by applying integrated brain gym in pair checks.*

**Keyword:** *Mathematics Learning, Brain Gym, Cooperative Learning Model, Pair Check Type.*

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### **I. Introduction**

Education has big role to create character, bring the children to become an adult and do interaction with environment, whether individual or social. According to National Constitution of Republic Indonesia Number 20/2003 about education system that education is a consciously effort to realize formation and process of study to make the students develop their ability actively and have strength of religious, selfcontrol, personality, good behavior, and skill which needed for his/herself, state and nation.

Mathematics is one of the primary science which has purpose to supply students to think logical, analysis, systematic, critical, creative and cooperation. The students must have the ability to get, manage, exploit information for living on situation which always change and competitive (Ministerial Regulation of National Education Republic of Indonesia Number 22/2006).

There were many efforts to increase the quality of teaching mathematics in school. The math teachers in Islamic High School Kulliyatul Muballighien Muhammadiyah Padangpanjang did many efforts such as had print books, extra class and having many media but the efforts did not give satisfying result. There were many students still got the low score in the first semester examination.

Based on the researcher' observation and interview with the Mathematics teacher of Islamic High School Kulliyatul Muballighien Muhamadiyah. The researcher knew that the students got the low score because they did still not understand about primary concept of mathematics and it made them difficult to do some exercises. Furthermore, there were many students dislike mathematics subject.

Based on the reality above, the researcher tried to solve the problem by doing an integration of brain gym in teaching. The researcher did teaching mathematics through integrated brain gym in pair checks of cooperative learning. Kagan (1989) states that pair technique asks the students to work in pairs and involve more students in the review of materials covered in a lesson and to check their understanding of a lesson's content (Ibrahim, 2001).

The work of brain gym can be divided into 3 dimensions, laterality, focus, and centralization. Every dimensions has different duty while doing brain gym and the gym will have many variations. The example of movement in dimension of laterality is look like an elephant movement. In dimension of focus, the movement practice is look like an owl movement. While the example of movement in dimension of centralization are balance knob, earth knob, and positif dot.

Based on the explanation above this research was purposed at finding out students' achievement after applying this integration. The hypothesis of this research was "the students' achievement will be better by applying integrated brain gym in pair checks.

### **II. Teaching Mathematics**

According to Hamdani (2010) the learning is the process to change behavior totally as a result of self experience from interaction with the environment. Teaching and learning are cannot be separated. Teaching is an effort to create a condition for the student to study. The relationship with mathematics, Muliardi (2001) explained that teaching Mathematics is an effort to help the students to form concepts and principles of Mathematics with their skills. So, in teaching Mathematics, the students are asked to develop their knowledges by themselves.

### **III. Cooperative Model**

Cooperative learning is one of the learning models which emphasize on cooperative principle. Cooperative between students in a group to get the purpose of teaching. Felder, Brent & Mabrouk (2007) state that the term cooperative learning (CL) refers to students working in teams on an assignment or project under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project.

According to Hamdani (2001) the cooperative learning is a set of learning process in a group to get the purpose of learning. In this model, the students are divided into small groups that consist of students' different skill. In doing exercises, every students must cooperate and help each other to comprehend the materials. While according to Lie (2008) the cooperative model is a teaching system that give a chance to the students to cooperate with their friends in doing structure tasks, and the teacher as a facilitator (Wena, 2011). According to Kristiawan (2013) the cooperative learning model has a contribution that can be given to the development of social skills of students, working with other students. This also helps students to develop their empathic abilities, and trying to find a solution to a problem in the group; also develops skills such as the need to accommodate the views of others. The students are also in trained how to work in groups and help each other and the students also get training about traditional group values.

From the explanation above we can conclude that cooperative learning model is a learning model that teach students to help each other and cooperate between the member of group to comprehend material and do tasks are given by the teacher. To prevent some mistakes while applying this model, Ibrahim (2000) states that there are some steps to apply this model, a) the teacher tells all the purposes of learning and give motivation for students; b) the teacher demonstrates some informations for the students; c) the teacher explains how to create some groups and help the group to do transition efficiently; d) the teacher guides the groups while they do their tasks; e) the teacher evaluates the students' result about the material or asks the students to present their result; f) the teacher tries to find some ways to appreciate the students' result whether it is individual or group.

According to Ibrahim (2000) cooperative model has many advantages, are:

- a. increase time for doing exercise;
- b. improve the self esteem;
- c. improve the attitude for science and school;
- d. improve the attendance;
- e. appreciate the differences;
- f. decrease the bad attitude;
- g. decrease the conflict;
- h. decrease the apathetic; and
- i. Improve the good attitude, sensitivity and tolerance.

We can conclude that the cooperative learning gives some benefits for the students such as help students comprehend the materials, give attention to social environment and increase students' motivation to study.

### **IV. Cooperative Model's Pair Check Type**

In applying cooperative model the students must have many skills, one of them is sharing skill. Sometimes in a group there is a student who dominate the tasks while the other students ignore and not responsible with their group. It causes the failure to get the purposes of cooperative model. One of models to solve the problem is cooperative model's pair check type. This type was introduced by Spencer Kagan in 1993 with some following steps:

- a. cooperation;
- b. the teacher does correction;
- c. the teacher gives compliment;
- d. exchanged roles;
- e. the pairs do correction (all the group member compares the answer); and
- f. the group tells their experience; (if all the group member agree with the answer they will do hand shaking or do something to show their togetherness).

### **V. Brain Gym**

Stine (2002) states that brain gym is a set of simple movement that enjoyable and used to increase students' skill by using brain totally. These movements make the students more easy to comprehend the lesson, especially it has big benefit for academic ability.

Brain gym is a set of exercise based on simple body movement. Brain gym is an exercise of body movement to get the balance of the two side brain activity concurrently. The brain gym helps brain to work more efficient, the brain will need just a little energy while working. It also make the brain works easily and difficult to be tired.

### VI. Integrated Brain Gym In Cooperative Model's Pair Check Type

Teacher's activity	Student's activity
<p><b>The first activity</b></p> <ul style="list-style-type: none"> <li>The teacher starts the class with greeting and asks the students to pray</li> <li>The teacher checks the students' attendance</li> <li>The teacher guides the students for doing brain gym The correct movements is laterality dimension such as cross crawl</li> <li>The teacher tells the learning indicators</li> <li>The teacher tells the learning purpose</li> </ul> <p><b>The second activity</b></p> <ul style="list-style-type: none"> <li>The teacher explains the materials</li> <li>The teacher asks the students to do the second brain gym, it focuses on dimension with the owl movement etc.</li> <li>The teacher asks the the students' comprehension about the material</li> <li>The teacher divides the students in pairs</li> <li>The teacher explains the procedure how to apply the cooperative model's pair check type</li> <li>The teacher gives the exercise/work sheet to every group member</li> <li>The teacher asks the students to start doing the exercise</li> <li>The teacher guides the students while doing the exercise</li> </ul> <p><b>The third step / closing</b></p> <ul style="list-style-type: none"> <li>The teacher checks the group's result</li> <li>The teacher gives reward to each member group</li> </ul>	<ul style="list-style-type: none"> <li>The students reply the teacher's greeting and pray together</li> <li>The student raises his/ her hand</li> <li>The students do the Brain Gym ( see the teacher's movements)</li> <li>The students hear the teacher's explanation</li> <li>The students give attention and read the material which was written by the teacher</li> <li>The students do the brain gym</li> <li>The students make some groups</li> <li>The students listen the teacher's explanation</li> <li>Every group member gets the work sheet</li> <li>The group member cooperate each other to solve the problem that found in the work sheet based on the steps of pair checks type.</li> <li>The group member listen the group's result</li> <li>The students satisfy with the teacher's compliment</li> </ul>

### VII. Research Method

This research was experimental research. According to Arikunto (2006), the experimental research is a way to find relationship of cause and effect between two factors. It was supported by Gay (2009) states that experimental research is the only type of research that can test hypotheses to establish cause-effect relations. In this research, the researcher applied quasi experimental design.

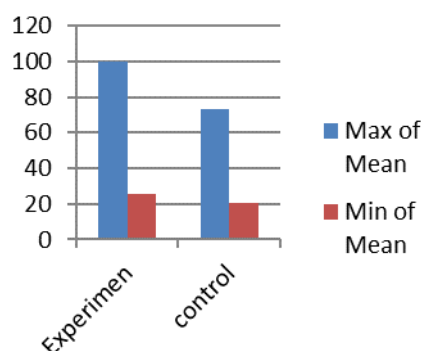
According to Gay (2009) quasi experimental design allows the researcher takes the sample in group. In this research, the researcher used two classes by using randomized control group only design. The population were the students at Grade X Islamic High School Kulliyatul Muballighien Muhammadiyah Padang Panjang in the academic year 2014/2015. The researcher analyzed the result of the students' examination by using homogeneity test. The purpose of this test was to know whether the data had homogeneous variation or not. The instrument of this research was test, the researcher used Barlett test (Sudjana, 2005). According to Arikunto (2006) instrument is a tool which is used by the researcher with a certain method. To analyze the students' score, this research used hypothesis testing by using SPSS version 15.

### VIII. Finding And Discussion

#### a. The Data of Learning Cognitive Result in The Two Classes as follow:

Class	N	$\bar{x}$	$X_{maks}$	$X_{min}$	Passed
Experiment	20	72,22	100	25,87	57,94%
Control	21	50,94	73,21	20,68	18,55%

The comparative data above could be seen also from graphic below.



### b. Hypothesis Testing

After the reseacher got the normality and the homogenous, the researcher used T test to do Hypothesis testing. From data analysis with degree of freedom 95% got value  $t_{count} = 1,86$  and  $t_{(0,95;39)} = 1,68$ . and  $t_{(0,95; 39)}$ .  $t_{count} > t_{(0,95;39)}$  so  $H_1$  is accepted. It means that the students' achievement which applied cooperative model's pair check type with brain gym was better than control class.

According to the test analysis the average score in experimental class was 72,22 and control class was 50,95. The passing grade in Islamic High School Kulliyatul Muballighien Muhammadiyah Padang Panjang was 75, so there were 78,50% students in the experimental class were passed and there was 30,25% students in control class were passed in the test.

Hannaford (1990) incorporated Brain Gym in the classroom with 19 fifth graders in Special Education. Pretest and posttests were completed using the Brigance Inventory of Basic Skills. Posttests showed a one to two year growth for all students on the reading and comprehension testing, and growth of one or more years for more than 50% of the students on math scores greater results than might have been expected for Special Education students, and behavior patterns also improved.

Sewell (1993) conducted two preexperimental pilot studies to investigate Brain Gym's efficacy in subjects learning to match pitch. The studies were implemented at Taylorville High School in Salt Lake City, Utah, with the cooperation of the chorus teacher, Norm Wendel, and the permission of Dr. Ellis C. Worthen, Associate Director for Fine Arts for Granite School District in Salt Lake City. Participating students ranged in age from 15 to 17 years and had already been singing in a school setting for 10 years. Study Group 1 had already received two months of excellent vocal training, yet a few were still unable to sing on pitch. Study Group 2 was untrained and most could not initially match pitch. Both groups received the same Brain Gym training. The average improvement of Group 1 was 34% at the time of the study and 41% a year later. Group 2 improved by an average of 64% at the time of the study and this percentage increased to 83% at the end of a month.

Donovan (2001) did the research the Brain Gym movements, experienced Dennison Laterality Repatterning, and explored the applications of these processes to specific aspects of the selling process. The results suggest that the Switched On Selling (SOS) seminar salespeople made a significant change in their performance. The SOS group increased the number of applications received for insurance policies by 39%, as compared to no increase for the control group. Similarly, the premiums earned by the SOS group went up 101%, as compared to only a 30% increase for the non-SOS group

Stewart (1999) found that Brain Gym activities would affect students' abilities to relax, coordinate, and cross the body midline in three dimensions. Ms. Stewart noted that the students' coordination improved, and that some students' oral reading, eye-tracking, and social skills improved as well

## IX. Conclusion

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