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Implementation of the Whole Brain Teaching Method in Mathematics Learning in Primary School Students in DKI Jakarta

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Abstract

Mathematics is still a scourge for elementary school students, this can be seen from several schools in East Jakarta, where many mathematics learning outcomes are still below the KKM. Many factors cause low mathematics learning outcomes in elementary schools, both internally for the children themselves and the teacher's ability to manage their learning. The method factors used by teachers contribute to the achievement of elementary school children's mathematics learning outcomes. How much influence the Whole Brain Teaching method has on mathematics learning outcomes needs empirical proof through scientific research. This research aims to empirically prove the influence of the Whole Brain Teaching method on mathematics learning outcomes in elementary school. The research was conducted in elementary schools in the East Jakarta area, DKI Jakarta province. The sampling technique is simple random sampling. The sample in this research was SDN Pondok Bambu 11, East Jakarta. This research uses experimental research methods. This approach was chosen to analyse the magnitude of the influence of the independent (exogenous) variable on the dependent (endogenous) variable. The research results show that there is a very significant influence of the Brain Whole Teaching method on Mathematics Learning Outcomes in Elementary Schools.

Keywords: *Whole Brain Teaching; Mathematics Learning Outcomes*

Introduction

Mathematics is one of the branches of science that has an important role in the development of science and technology, both as a tool for the application of other fields of science and in the development of mathematics itself. Mathematics is a language that symbolizes a series of meanings of statements to be conveyed (Dimyati et al, 2009). Sulis describes mathematics as a science that serves to develop the ability to calculate and measure using mathematical formulas and their derivatives through measurement and geometry, algebra, and trigonometry materials (Sulis, 2005). Ariesandi revealed that mathematics is one of the most important sciences in and for human life (Ariesandi, 2010). Mathematics

serves as a measuring tool to solve problems, a tool to communicate, a tool for logical and rational thinking, and a tool to facilitate relationships between individuals (Martin, 2009).

Entering the 21st century, the issue of improving the education sector in Indonesia has risen to the surface, not only in general education, but all levels of education. It is realized that educational achievement in Indonesia lags far behind other Asian countries, such as Singapore, Japan, and Malaysia. Based on the results of research conducted by Trends in International Mathematics and Science Studies (TIMSS) 2011, the average mathematics score of grade VIII students (this time Indonesia did not include grade IV students) was only 386 and ranked 38th out of 42 countries. Below Indonesia were Syria, Morocco, Oman, and Ghana. Neighboring countries, such as Malaysia, Thailand and Singapore are above Indonesia. Singapore even came second with an average score of 611. This score is not statistically significantly different from Korea's average score of 613 in first place and Taiwan's average score of 609 in third place (http://nasional.kompas.com/read/2012/12/14/02344589/twitter.com, downloaded on Tuesday, 13September 2016, at 20.00).

Based on the information above, learning outcomes can be used as an indicator of the high and low quality of education, because the learning outcomes obtained by students can show their ability to master and understand learning materials. The low quality of education is a fundamental and concerning problem for Indonesia, given the role of mathematics which is very important for the development of science and technology.

Factors to achieve an optimal learning outcome from a student's learning process are influenced by internal and external factors. Internal factors can include interest, motivation, habits, and the level of intelligence that students have. External factors include the environment, teachers, the education system at school, and parents.

Teachers are one of the external factors that greatly influence whether learning activities are meaningful. According to Permendiknas Number 74 of 2008, teachers are professional educators with the tasks of educating, teaching, guiding, training, and assessing (Nazib, 2010). Teachers who have good teaching competence will be able to carry out communicative, interactive, and effective learning, otherwise incompetent teachers will definitely carry out learning that does not develop the potential in students.

To create interactive, inspiring, fun, and challenging learning, teachers need to have methods or ways to support the process. Biffle (2007) developed a brain-based learning strategy that involves seeing, hearing, doing, speaking, and feeling. This learning is called Whole Brain Teaching (WBT). In Whole Brain Teaching (WBT) learning, students are required to be interactive and disciplined, and teachers are required to present a learning that is fun, challenging and motivates students.

In America, they use this Whole Brain Teaching concept for classroom learning. "Portage Township Schools continue to be on the cutting-edge of the learning process, and the results for our students are evident. The learning methods used in Whole Brain Teaching create active learners and effective long-term learning. Portage Township Schools continues to provide professional development for teachers interested in the Whole Brain Teaching strategies. Teachers are using these concepts to teach new concepts and review previously taught material. Students are required to interact with content knowledge through meaningful dialogue and active participation that engages all parts of the brain while having fun", (Arnold, 2015).

Portage Township School, an American school, is a leader in learning and student outcomes. The learning methods used in Whole Brain Teaching make learners active and effective learners in the long term. Portage Township School continues to provide professional development for teachers interested in Whole Brain Teaching strategies. Teachers use these concepts to teach new concepts and review previously

taught material. Students are asked to interact with content knowledge through meaningful dialogue and active participation that engages all parts of the brain while having fun.

Power Teaching, also known as Whole Brain Teaching, is a learning method developed by Chris Biffle, a professor at Crafton Hills College in California. It has been widely used by teachers and lecturers around the world. Some examples are Sue Brown, principal of Fairfax Elementary School San Bernardino, California, and Cindy Fife 9th & 10th Grades Los Osos High School. Both said that the Power Teaching Method is very helpful in the learning process and provides a big change in the world of education, especially the learning process. Alexis Kelso a teacher at Fifth Grade Intern Park Forest Elementary Louisiana said that "The Strategies of Power Teaching have improved student response and have also made it more engaging for students". Power Teaching strategies can improve student response and make it more engaging for students. In addition, many lecturers and teachers use Power Teaching in various countries. Examples are Liann Nurtini and Canada (Canadian Teacher Magazine, 2012), Josie Woon from New Zealand etc. This method is less developed in Indonesia.

According to Chris Biffle (2015), the original initiator of Whole Brain Teaching, Whole Brain Teaching is a learning method introduced in North America in 1999. The concept teaches learning methods by recognizing the learning principles of students who are divided into three parts: visual, verbal and body/kinesthetic. The core strategy of Whole Brain Teaching is how to attract the attention of the audience, in this case students, so that they are more focused on the material provided by the teacher. There must be interaction because existing learning methods tend to cause boredom in students. Based on the inventor of this method, Whole Brain Teaching emphasizes the interaction aspect between students and teachers by using the principle of three different learning styles.

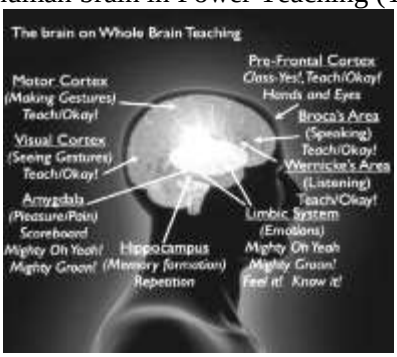
According to Khasan (2015) "Whole Brain Teaching learning is characterized by the teacher's ability to create creative and innovative learning by designing movements that are in accordance with the teaching material, so as to create conducive and enjoyable learning. So, in this Whole Brain Teaching learning, students will imitate the movements demonstrated by the teacher in accordance with the material to be taught". The teacher has an important role in the teaching process using this method, namely by creating unique movements that can increase student motivation in learning the material being taught.

Meanwhile, according to Wahyudin (2015), brain-based learning is learning that is aligned with the way the brain works which is scientifically designed for learning, not focused on sequencing, but priorities students' pleasure and love of learning so that students can easily absorb the material being studied. It considers what comes naturally to the brain and how the brain is influenced by the environment and experience. It also does not require or instruct students to learn, but rather stimulates and motivates students to learn on their own."

According to Gunawan (2013), "students with visual learning types are good at remembering what they see, such as photographs, diagrams, flow charts, timelines, films and demonstrations. Verbal learners get more information and knowledge from words and explanations, both written and spoken. Everyone learns more when information is presented both visually and verbally. Visual learners get bored very quickly if they only listen to lectures, read books or journals. Verbal learners get bored very quickly when presented with pictures, charts, graphs, or other physical forms. In schools or colleges, lectures, assignments, reading and the like are very common. But most students are visual people. This means that most students don't get as much out of it as they would if visual presentations were used more in the classroom. Good students can process information presented, both visually and verbally".

The characteristic of the Whole Brain Teaching method is that the teacher only teaches the material followed by interesting movements then the students re-express the material with their classmates by following the movements made by the teacher. This method can increase students' activeness in learning and can recognize students' own learning principles which consist of three parts, namely visual, verbal and body / kinesthetic.

Ficture 1.The human brain in Power Teaching (TheBigSeven)



Source: Biffle, C (2013)

There are six elements that are important in Power Teaching. Table 6 shows the function of the elements to the human brain.

Table 1. Six Elements of Power Teaching and Their Relationship to the Brain

Element	**Brain Parts**	**Function**
Class -Yes	Activate Pre -Frontal Cortex	Center giver brain. Place This like switch light Which must opened, by repeating _ *Class-yes* , For part brain Which other For processing information.
Five rule class	Pre -Frontal Cortex	Puller attention
	Region Broca	Hear
	Region Wenicke	Speak
	Visual Cortex	Look
	Motorcycle Cortex	System motorcycle hand
	The Limbic system	Make signal
	Hippocampus	Memory long-term
Teach-Okay	Same as fiveclass rules	One class activity capable involve all student in class
Scoreboard Keys	Limbic System's Emotions	Make signal
	Amygdala (*Mighty Oh Yeah , Mighty Groan !)*	Give rise to feeling happy (*rewards*) And No happy (*punishment*)
Hands and Eyes	Pre -Frontal Cortex	Focus all mental activity by seeing and hearing explanation Teacher.
Switches	Region Broca	Allows studen to buil Listianing skills
	Region Wernicke	Allows students to build speaking skills

Source: Gunawan, Adi W, Born to Be a Genius, (2013)

Whole Brain Teaching creates learning conditions that are fun, joyful and make students comfortable in the classroom.

"When a person is happy, calm, and relaxed, the neo cortex of the brain can be active and used for thinking. This explains why people who are tense when taking exams usually have a blank mind and cannot remember what was previously learnt (Gunawan, 2013)"

Based on the explanation of the Whole Brain Teaching method variables, it can be concludedthat Whole Brain Teaching is a learning method based on verbal, visual and kinesthetic learning styles by attracting the center of attention, so that students are focused on the material provided by the teacher and do not experience boredom in learning.

Math's Learning Outcomes

Learning outcomes are inseparable from learning activities because learning activities are a process, while learning outcomes are the result of the learning process. Learning outcomes can be explained by understanding the two words that make up it, namely "results" and "learning". The definition of result (product) refers to an acquisition because of an activity or process that results in a functional change in input.

According to Nawawi and Brahim, learning outcomes are defined as the level of student success in learning school subject matter expressed in scores obtained from test results on a certain amount of material (Ahmad Susanto, 2015). Learning outcomes are the level of student success in learning subject matter expressed in the form of grades. The value is given by the teacher after students take part in a series of teaching and learning activities. From the opinions of Nawawi and Brahim, it can be defined that learning outcomes are expressed by scores. The score is obtained from the test results which previously carried out a series of teaching and learning activities.

In line with Nawawi and Brahim, Gagne in uno, argues that learning outcomes are a person's mastery of certain subject matter that has been obtained through learning outcome tests expressed by numbers (Lisa Maarce, 2014). Based on this opinion, the learning outcomes test is an embodiment of the assessment of the final series of teaching and learning processes such as daily tests, end-of- semester tests and national exams.

Hamalik (2006) states that learning outcomes are the process of changing one's behavior from not knowing to knowing. Changes in the process of successful learning outcomes include knowledge, emotional, understanding, social relationships, habits, ethical skills, character, attitudes and appreciation. The existence of the learning process allows for learning outcomes that include the above things that can be achieved by everyone who carries out the learning process. Sudjana (2010) states that learning outcomes are the abilities that students have after they receive their learning experience. Based on Nana Sudajana's opinion, an understanding can be drawn

that after students experience the learning process, students will get new abilities or strengthen existing abilities in students. These abilities can be in the form of habits, knowledge, understanding, and attitudes or ideals.

Meanwhile Purwanto (2011) argues that learning outcomes are changes in cognitive, affective, and psychomotor abilities depending on the teaching objectives. From this opinion, it can be interpreted that with learning outcomes we can find out whether students can understand and understand what is learned and taught in the teaching and learning process, which is in accordance with the teaching objectives. Teaching objectives are a description of the knowledge, skills and attitudes that students should have as a result or reward of teaching outcomes.

According to Bloom's taxonomy cited by Sagala (2008), learning outcomes into three domains, namely cognitive, affective, and psychomotor. The three domains above determine the achievement of learning outcomes seen from the achievement of forms of behavioral change that tend to settle from the cognitive, affective, and psychomotor domains. This is seen from the learning process in a certain time, but of the three domains the cognitive domain is the earliest domain that functions in forming knowledge and determining a person to gain abilities in other domains.

The learning outcomes to be achieved in this study include mastery of the cognitive domain. This is because learning mathematics is more likely to be about how students think, in the sense of focusing on the cognitive domain they master. Bloom divided the cognitive domain into 6 dimensions of cognitive abilities which were later revised by Anderson and Krathwohl. Anderson and Krathwohl in Siregar and Nara divide cognitive aspects in 6 process dimensions, namely: 1) remember, 2) understand, 3) use, 4)

analyze, 5) assess, and 6) create (Eveline, 2010). The six ranks above are hierarchical so that the first rank must be mastered first before mastering the second rank and the second rank must be mastered before mastering the third rank, and so on.

Based on the description above, it can be synthesized that learning outcomes are a process of changing a person's behavior from not knowing to knowing and can be observed and measured in the form of knowledge, attitudes and skills.

Research Methods

This research uses an experimental method with a two-group posttest design. This approach was chosen to analyze the effect of independent variables (exogenous) on the dependent variable (endogenous).

The research design used is Posttest Only Control Group Design. The use of this model is basedon the assumption that the experimental group and control group are compared and analyzed for hypothesis testing material after treatment. The following is the research design:

The research was conducted in Pondok Bamboo urban village, East Jakarta, DKI Jakarta Province. The research was conducted from June to August 2019 with a total of 16 schools consistingof 10 public schools and 6 private schools. Sampling technique with simple random sampling. The sample of this study was SDN Pondok Bambu 11, grade V school in the East Jakarta area.

Output Results Achieved

A. Data Analysis Requirements Testing Results

1. Normality Test

The normality test used in this study aims to see whether the samples studied are normally distributed or not. The normality test used is by using the Lilliefors formula.

The test results on the data of the experimental group's Math's learning outcomes on 24 respondents resulted in Lcount of 0.1605 and Ltabel of 0.173 with a significant level of 0.05. Thus Lcount

< Ltabel so that the data on mathematics learning outcomes are normally distributed.

2. Homogeneity Test

The Homogeneity Test used in this study uses the F Test. The Homogeneity test or equality of two population variances of two sample groups is carried out using the F test formula at a significant levelof 0.05. Based on this test, Ftable = 2.00 and F count of 1.93 were obtained. Because F count < F table, then Ho is accepted. So the two population distributions have the same variance or homogeneous.

B. Hypothesis Testing Results

1. One Way ANOVA Test

Hypothesis testing using ANOVA (Analysis of Variance) one way. Based on the results of the normality test and the homogeneity of variance test coupled with the fulfilment of other assumptionssuch as randomization of the subject group and the use of interval data, it means that to prioritize parametric

tools as statistical analysis, the statistics used to test the null hypothesis (Ho) on the acquisition of learning motivation using ANOVA are adequate.

This research is experimental, because the results of this study will confirm the position of influence between the variables to be studied, the aim lies in the discovery of causal facts and consequent facts about, the effectiveness of the method on the Whole Brain Teaching method in learning mathematics in terms of student learning outcomes. The results of this study will confirm how the influence of the variables to be studied, the independent variable in this study is the Whole Brain Teaching method. The non-independent variable in this study is student learning outcomes.

Table 2. Analysis of Variance of Maths Learning Outcomes

Source of Variance	dk	JK	RJK	F Count	F table α = 0.05
Average	1	68705.33		13.75613	4.30
AK	1	280.34	280.34		
DK	22	448.34	20.37879		
Total	24	69434			

The results of the research on the variable mathematics learning outcomes in the ANOVA table above show the Fcount value of 13.756, while for Ftabel of 4.30 with dk numerator 1 and dk denominator 22 The these results show that Fcount is greater than Ftabel , then Ho is rejected, this indicates that there are differences in mathematics learning outcomes in the experimental group and control group.

And to determine the influence of the independent variable, namely the Whole Brain Teaching method on the dependent variable, namely the learning outcomes of mathematics, calculated using the coefficient of determination which produces a value of 0.64.

2. Dunnet T-Test

After knowing that there is a significant difference, then the t-Dunnet test is conducted. Based on this test, 5.572 Thus, the mathematics learning outcomes of the experimental group were significantly higher than the mathematics learning outcomes of the control group.

Interpretation of Research Results

After testing the data analysis using the normality test, the test results on the data of the mathematics learning outcomes of the experimental group and the control group showed Lcount < Ltabel so that the mathematics learning outcomes data were normally distributed with a significant level of

0.05. So that the homogeneity test using the F test states Fcount < Ftabel , then Ho is accepted. So the two population distributions are of equal variance or homogeneous.

And based on the results of hypothesis testing using Anova One Way that has been done, it concludes that the results of variance analysis produce a difference between the experimental group and the control group where it is indicated by the value of tcount> ttabel . After the hypothesis test is carried out and it is known that there is a difference, it is continued to calculate the Coefficient of Determination to find out how much influence the Whole Brain Teaching method has on mathematics learning outcomes, and the results show a value of 0.64 or 64% Whole Brain Teaching method affects mathematics learning outcomes the rest 0.36 or 36% comes from other factors. The last test is the t-Dunnet test which aims to determine which of the two sample groups is significantly different, after knowing the difference between the two One Way Anova tests. The result of the t-Dunnet test is to > ttabel then the mathematics learning

outcomes of the experimental group given the Whole Brain Teaching method are significantly higher than the mathematics learning outcomes of the control class. So there is a difference in mathematics learning outcomes between theexperimental group using the Whole Brain Teaching method and the control group using theexpository method. With this research, the researcher realizes that there are limitations that cause the accuracy of this research to not be absolute. There are limitations that researchers experience in examining the effect of the Whole Brain Teaching method on mathematics learning outcomes such as the short implementation time of the study, so that the provision of this learning technique is not too deep.

The instrument used in data collection is not the only instrument that can reveal all aspects under study even though it has previously been validated and tested. The research was limited only to cognitive aspects adjusted to the demands of the competency standards.

Methodologically, this research has followed the applicable scientific procedures. However, this research realizes that of course there are still weaknesses contained in it. It could be in enlarging the sample to expand and generalize, then the sampling technique, instruments or other things that escape the control or accuracy of the researcher and the limited ability of the researcher to examine more deeply.

Conclusions

Based on the findings of the research results which show that the results of the calculation of Anava one way by showing the value of Fhitung of 13.756, while for Ftabel of 4.30 with dk numerator 1 and dk denominator 22 the results show Fhitung greater than Ftabel , then Ho is rejected, thisindicates that there is a difference in learning outcomes mathematics in the experimental group and control group. After knowing that there is a significant difference, then the t-Dunnet test is next. Based on this test, 5.572 Thus the mathematics learning outcomes of the experimental group were significantly higher than the mathematics learning outcomes of the control group.

Based on the above calculations, it can be concluded that there is an effect of the Whole Brain Teaching Method on the Mathematics Learning Outcomes of High-Grade Elementary Students in East Jakarta.

References

Annette, Arnold. Whole Brain Teaching and Memory Retention. 2015. https://www.nwitimes.com/news/local/porter/portage/whole-brain-teaching-and-memory-retention/article_c88d52bf-0c56-5bfb-a0fa-ac0486a9c45e.html

Biffle, Chriss. Whole Brain Teaching for Challenging kids, (Yucaipa, CA: Whole Brain Teaching,LCC, 2013.

Biffle, Chriss. Whole Brain Teaching for Challenging Kids, Yucaipa, CA: Whole Brain Teaching,LLC, 2013.

Dimyanti and Mudjiono, Learning and Learning. Jakarta: Rineka Cipta, 2009. Gunawan, Adi W, Born to Be a Genius, Jakarta: PT Gramedia Pustaka Utama, 2013.Hamalik, Oemar. Learning and Learning. Jakarta: Bumi Aksara, 2006.

http://download.portalgaruda.org/article.php?article=154654&val=5564&title=Kajian%20Method%20Power%20Teaching%20as%20an%20Alternative%20Method%20of%20Learning%20Science%20in%202 0 Classrooms (Accessed on 19 September 2015 at 11:11).

http://nasional.kompas.com/read/2012/12/14/02344589/twitter.com, downloaded on Tuesday, 13 September 2016, at 20.00.

Jamaris, Martin. learning difficulties: Perspectives, Assessments, and Countermeasures. Jakarta: Penamas Murni Foundation, 2009.

Khasan, Dafik, Hobri, Development of Mathematics Learning Tools Based on Whole Brain Teachingwith Quantum Learning Approach on Triangle Subject Matter for Junior High School Class VII, http://dspace.unej.ac.id/bitstream/handle/123456789/57344/Khasan%20Ali%20Yusuf%20-%20090210101012_1.pdf?sequence=1 (Accessed on 27 July 2015 at 18.47).

Nursulistiyo, Eko. A Study of the Power Teaching Method as an Alternative Science LearningMethod in the Classroom,.

Purwanto, Evaluation of Learning Outcomes. Yogyakarta: Student Library, 2011.Sagala, Syaiful. Concept and Meaning of Learning. Bandung: Alfabeta, 2008.

Sahetapy, Lisa Maarce. Journal of Early Childhood Education Volume 8 Edition 1 April. Jakarta:UNJ Press: 2014.

Setyono, Ariesandi. Mathemagics: The Genius Way to Learn Maths. Jakarta: PT Ikrar Mandiriabadi,2010.

Siregar, Eveline and Hartini Nara, Learning and Learning Theory. Bogor: Ghalia Indonesia, 2010. Sudjana, Nana. Assessment of the Results of the Teaching and Learning Process. Bandung: Teenage.

Workshop, 2010.

Sulhan, Nazib. The Character of Future Teachers for Success and Dignity. Surabaya: PT TemprinaMedia Grafika, 2010.

Sulis Sutrisna, I Want to Be a Mathematician. Jakarta: PT Kawan Pustaka, 2005.

Susanto, Ahmad. Learning and Learning Theory in Primary Schools. Jakarta: Kencana PredanaMedia Group.

Wahyudin, Zarkasyi, Research in Mathematics Education. Bandung: PT Refika Aditama, 2015.

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