

The Effect of Learning Media and Types of Personality on Elementary Student's Mathematic Performance

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Abstract The Purpose of this research is to understand the effect of learning media and type of personality on mathematics performance. The learning media consists of interactive learning multimedia and magnetic board media. Type of personality covers introvert and extrovert. The method used in this research is experimental studies. The design of this research is treatment by level 2 x 2. The hypothesis of this research is tested by using two-way of variance analysis (ANOVA). The results of this research indicated that: (1) Mathematics performance of the group of student use interactive learning multimedia is higher than magnetic board, (2) there is effect of learning media and type of personality on mathematics performance, (3) Particularly for the introvert students use interactive learning multimedia produced higher mathematics performance than those use magnetic board media, (4) for the extrovert students, use magnetic board media produced higher mathematics performance than those use interactive learning multimedia.

Keywords: *learning media, type of personality, mathematics learning performance*

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1. Introduction

Mathematics is a process of skills that help students with life or the environment around them, students naturally acquire these abilities gradually even years to build their base knowledge. Each student has a development and different stages according to its level before rising to advanced level; even among those is the best problem solver. (Douglas Clement, 2002).

Students learn elementary mathematics in natural way. Early elementary grade students discover, test and apply mathematical concepts in their daily things they do naturally. Simple mathematics learning activities occur in the student's daily life, it relates to the development of mathematical skills and it could stimulate student's motive of learning math (Rosalind, Karen Charlesworth and Lind K.1999).

In fact, mathematics is placed as one of the required subjects and was introduced at the beginning of elementary class. Learning math more emphasize on the arithmetical and counting. First, students are introduced to the natural numbers and counting, then the summation of the number less than ten, the subtraction that positive in differentiate, and so forth. Learning mathematics emphasize the memorizing than the understanding, how things are calculated, not why things are calculated in that way. According Calder (2012) that important to considers the ways children's mathematical thinking was influenced by their interpretations through various pedagogical

discourses and how understanding emerged through those various filters. Current research in to using digital technologies in mathematics education is predominantly positioned with in two the orient cal perspectives, semiotic mediation and the instrumental approach.

As the important of mathematics, it is used as one of determinant in school's exam. In spite of it is inevitable that mathematics, one of the subjects, is unattractive to students. Learning mathematics is still dominated by the teacher in schools. The method of media using is still conventional, so that students are not active enough, and the process of student's skill is bad, even learning performances is low.

Lewin's opinion (2008), the benefits of mathematics is incomparable with predicate or bad stigma. Studying mathematics can develop the ability to think analytic, critical, memory, reason and logic. Mathematics can also balance the ability of two hemispheres. The left brain that regulates analytical thinking, logical and memory storage, should work simultaneous with the right brain that regulates thinking of imaginative, creative and holistic.

Arsyad, Azhar (2009) describes the using of the media is an integral part of learning which should be planned systematically by focusing on the needs and characteristics of students. Seels and Richey (1994) confirm that the media is an intermediate messenger from the source to the receiver of the message so as to stimulate the receiver to learn. Any appropriate medium for learning depends only on the content of messages will be delivered and how it will be designed in its use.

Media is one of facilities to improve the learning activities. Because of the variety of media, it has different characteristics (Smaldino, Sharon E. et.al 2008). It should be selected carefully and precisely for the effective using. In addition, the selection of media should be developed in accordance with the objectives, conditions and limitations by considering the capabilities and characteristics of the media specifically.

Considering the importance of the media's role in assisting process of Mathematic learning, students individual factors it selves are internal factors that affect the learning process. The individual factor that should be considered is student's personality (Papalia, Diane E. et al, 2008).

Related to the compatibility between the media and the characteristics of the students' learning, this study will be assessed two learning media, which are interactive learning multimedia and magnetic board media. The selections of both learning media are done by considering the type of personality that is introvert and extrovert. Burger (2011) mention that personality can be defined as consistent behaviour patterns and intrapersonal processes originating within the individual. The main characteristics according Sujanto (2006) on the introverted type is reserved, careful, cautious in making decisions, and less courageous in making decisions, while the extrovert type is high socialization to interact, active, willing to take risks. Introverts engage in introverted behaviors (are quiet and seek low-stimulation settings, such as libraries) because they need to keep already hightened level of arousal in check. Conversely, extravert engage in extraverted behaviors because they need to increased to increase their level of arousal (Larsen & Buss, 2010).

Considering to the characteristics of the introvert student, interactive learning multimedia is an option. In the media according to Reigeluth (1999), students can determine their own decisions based on the specific plan, which involves logic. The elements of the challenges interactive learning multimedia in this study is formed in educative games software. This interactive media can encourage students improvising, learning from mistakes, and can taking the best conclusion on motivation and initiative dynamically develop in the educative games software.

For the extroverted students, the teacher needs to use instructional media magnetic board, the intention of media using is to deliver the substance of subject as good as possible by the students. By using the learning program in the form of figures and pictures, learning games designed by grouping games so that the students are interested in playing and modeling. This media may reduce boredom in learning because by using a magnetic board, the attractiveness of magnetic itself is pleasant for the students. Thus, students will be motivated to learn more about mathematics.

Based on the above, this study aims to determine the effect of learning media and type of personality on mathematics learning performances of early elementary students.

Furthermore, the problem can be formulated as follows:

- 1.1. Are there any differences in mathematics learning performances between the students use interactive learning multimedia and the students use magnetic media board?

- 1.2. Is there any interaction effect between the learning media and type of personality on students' mathematics learning performance?
- 1.3. In the group of introvert students, are there any differences in mathematics learning performance between the students use interactive learning multimedia and the students use magnetic media board?
- 1.4. In the group of extrovert students, are there any differences in mathematics learning performances between the students use interactive learning multimedia and the students use magnetic media board?

2. Methods

This study was conducted in 03 Benda Pondok Elementary School, South Tangerang, and Province of Banten. This study lasted for twelve sessions in the second semester of year academic of 2013/2014.

This research design is a quasi-experimental method. The variables in this study consist of a dependent variable, which is mathematic learning performance, and the independent variables consist of active variables and attribute variable. The active variable is learning media, they are interactive learning multimedia (A₁) and magnetic board (A₂), while the attribute variable is the type of personality that consists of introvert (B₁) and extrovert (B₂).

Table 1. Design Treatment by Level

Type of personality (B)	Learning media (A)	
	Interactive multimedia (A ₁)	Magnetic board (A ₂)
Introvert (B ₁)	A ₁ B ₁	A ₂ B ₁
Extrovert (B ₂)	A ₁ B ₂	A ₂ B ₂

The population of study was all nine years old students in third grade nine years old elementary students of 03 Pondok Benda, Pamulang, Tangerang Selatan, 2013/2014 of year academic. The sampling of this study is multistage random sampling technique which is based on the sample collection of population area that has been established. Sampling technique is used in two stages, which are determining the sample and the respondents in the sampling area. The number of research subject were used as experimental class are 41 students consisting of 23 girls and 18 boys.

The data was collected using two instruments, which are: (1) mathematics achievement test, and (2) the observation instruments of child's personality type. The instruments of Mathematics achievement test uses multiple choice questions to measure the extent of mathematic learning performances that students accomplish after learning. Moreover the observation instrument of students' personality is in systematic observation formed, that include a set of aspect that will be assessed by the teacher. Number of respondents for instrument trial is 29 students and r table is used the criteria is 0.36. Reliability of personality instruments with Cronbach alpha test.

The validity of mathematics learning performance by using point biserial correlation testing and reliability by using KR 20. Test results showed 31 items or 77.5% is

valid for α 0:05, results of a reliability coefficient calculation of performance learning mathematics is $r = 0.856$. The validity of personality tests with product moment correlation and reliability with Cronbach alpha. Test results indicate 29 items or 72.5% stated valid for 0:05 α , coefficient instruments reliability of personality instrument is 0.822.

The hypothesis testing by two-path of variance analysis (ANOVA) in order to test the main effects and interaction effect (main effect of A and the effect of interaction between A and B). If there are significant interactions between A and B, the next test is performed by the Tukey test, which is a simple test, that is intended to examine the differences of mathematic learning performance between the group of introvert students use interactive learning multimedia and the group of students uses magnetic board media. Also the differences of mathematic learning performance between the group of extrovert students use interactive learning multimedia and the group use magnetic board media.

3. Results

The hypothesis test by two-path of variance analysis (ANOVA) and followed by Tukey test. Summary of calculation results of data analysis of two-path ANOVA can be seen in Table 2 below:

Table 2. Data analysis of two-path ANOVA

Varians	JK	Df	RJK	Fcount	F _{table (p)}	
					$\alpha = 0,05$	$\alpha = 0,01$
Column (A)	9,02	1	9,02	7,98	4,11	7,40
Line (B)	2,02	1	2,02	1,79		
Interaction (AB)	46,22	1	46,22	40,89		
Error	40,7	36	1,13			
Total	97,97	39				

Based on the results of two-paths of ANOVA calculation in Table 2 above, the hypothesis can be tested as follows:

3.1. The differences of mathematic learning performance between the groups of students use interactive learning multimedia and the group of students use magnetic board.

The null hypotheses test if there are any differences of the mathematic learning performance between the groups of students use interactive learning multimedia and the groups of students use magnetic board media. The result of two-path of Anova test by using Microsoft Excel 2007 program obtained F count = 7.98 > F table on α 0,05 = 4.11, then H_0 is rejected. It can be concluded that there are significant differences of the averages of mathematic learning performance between the groups of students use interactive learning multimedia (A1) and the groups of students use magnetic media board (A2).

The testing of the differences outcome uses Tukey test. The Tukey test results obtained count A1-A2 $Q = 3.99 > 0.05$ Q table at $\alpha = 2.95$. The average score of the groups of students use interactive learning multimedia (A1) and the groups of students use magnetic media board (A2) is $\bar{x}_{A1} = 21$ and $\bar{x}_{A2} = 20,05$. It can be stated that the average of mathematics learning performances of the groups of students use interactive learning multimedia (A1) is higher than the groups of students use magnetic media board (A2).

3.2. There is an interaction effect between learning media and type of personality on the mathematic learning performance.

Based on the variance analysis (ANOVA) above it obtained interaction effect AB calculated $F = 41.62 > F$ at $\alpha = 4.11$ and α 0.05 0.01 = 7.40, then H_0 is rejected. Thus it can be said that there is a significant interaction effect between learning media and type of personality on mathematic learning performances.

The form of the interaction between learning media and type of personality can be described as follows.

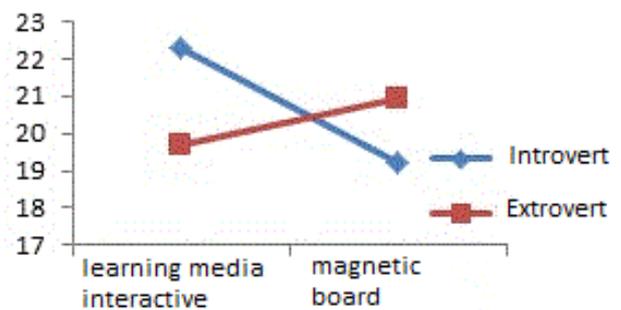


Figure 1. The effect of interaction between learning media and type of personality on mathematics learning performances

Figure 1 above shows the intersection of the line at one point formed by two linear lines which are the average of the math learning performance of the group of introvert students use interactive learning multimedia (A1B1) form a linear line to the average of mathematic learning performance of the group of introvert students use magnetic board (A2B1) and the other line shows the average of mathematic learning performance of the group of extrovert students use interactive learning multimedia (A1B2) form a linear line to the average of mathematic learning performance of the group of extrovert students use magnetic board (A2B2).

The intersection of the two lines above indicates that there is interaction between the two independent variables on the dependent variable. In other words, the interaction can be interpreted that the influence of media on mathematics learning performances depends on the type of the child's personality. As a consequence of the significant interactions, it is necessary to do Tukey's test.

3.3. The difference of mathematic learning performance between the group of introvert students that use interactive learning multimedia and the group use magnetic board.

The testing of the differences of math learning performances between the groups of introvert students use interactive learning multimedia and use the magnetic board media are done by using Tukey test. Tukey test known that the value of Q count $A1B1 - A2B1 = 9,22 > Q$ table at $\alpha = 3.15$ and α 0.05 0.01 = 4.48, mean H_0 is rejected. The average score of a group of introvert students use interactive learning multimedia (A1B1) and a group of introvert students use magnetic board media (A2B1) $\bar{x}_{A1B1} = 22,3$ and $\bar{x}_{A2B1} = 19,2$. It can be concluded that the average mathematic learning performance of particular group of introvert students, uses interactive learning multimedia (A1B1) is higher than of the group of students use magnetic board media (A2B1).

3.4. The differences of mathematic learning performance between the group of extrovert students that use the

interactive learning multimedia and the group use magnetic board.

The testing of the differences math learning performances between the groups of extrovert students use interactive learning multimedia and the groups of extrovert students use the magnetic board media are done by using Tukey test. Tukey test results obtained that the value of Q count $A1B2 - A2B2 = 3.57 > 0.05$ Q table at $\alpha = 3.15$ then H_0 is rejected. The average score of a group of extrovert students use interactive learning multimedia (A1B2) and a group of extrovert students use magnetic board media (A2B2) is $\bar{x}_{A1B2} = 19,7$ and $\bar{x}_{A2B2} = 20,9$. It can be concluded that the average mathematics learning performances of the group of extrovert students, use the media group magnetic board (A2B2) is higher than the group of extrovert students use interactive learning multimedia (A1B2).

4. Discussion

The aim of this research is to get the complete reflection of the effect of learning media and type of personality on mathematic learning performance. The result of hypothesis test based on two path of Varian analysis (ANOVA) found that there are differences between mathematic learning performance of the groups students use interactive learning multimedia and the groups of students use magnetic board media. The test is continued by Tukey test that showed that the mathematic learning performance of the groups of students use interactive learning multimedia is higher than the groups of students use magnetic board media.

It explains that interactive learning multimedia as able analogized to activities that involve students in understanding of math concepts through computer games, so that the mathematical skills of students can be trained to the fullest because students are working on a problem in the form of a game with its own capabilities through trial and error practice, and it simplify the teacher to assess the student's ability and give some additional subject to the one who doesn't understand enough to the subject. According Fiorani (2013) the use of tools media in the mathematical learning process, through the children' social interaction, enhances the mediating activity of the cognitive process, as Vygostky realised (1978).

This interactive learning multimedia research illustrates that by using media, students can work up to the highest level of cognitive tasks, the ability to manipulate in playing computer (such as contradicting the real object, that needs motor skills) physically can provide convenience for students, by learning computer students will develop eyes coordination and train their fingers and raise the motivation of learning. It can increase motivation in learning. This learning is formed of various media such as text, sound, images, numeric, animation and video in digital software on computer that create 3D quality so that the illustration which presented is attractive and lively illustration. This learning emphasizes on trial and error practice, so that students can learn from the mistake by positively approach. When the students make wrong answer, they will not being scolded and individually, so that the students can adapt their own abilities and allowed the teacher assess the students. On computer learning,

teachers should master the using of computer, because they have to guide and handle things when the students done some mistake in process of using computer (Asnah Said, 2006). This is the reason of the mathematics learning performance of the group of students use interactive learning multimedia is higher than magnetic board.

While on the magnetic board media, the presentation of the images and material are two dimensions and monotonous, so that it makes the students uninterested to learn. This learning is a group games that students do with their peers and it makes the individual skill are not trained enough because of the different characteristic of each student. Patorino and Doyle-Portillo (2013) said that personality is the unique collection of attitudes, emotions, thoughts, habits, impulses, and behaviors that define how a person typically behaves across situations. This is the reason of the mathematics learning performance of the group of students use magnetic board is lower than the group of students uses interactive learning multimedia.

The results of hypothesis test based on two path of variance analysis (ANOVA) found that there are learning media and type of personality on mathematics learning performance between learning and media personality types on learning performances of mathematics. Mathematics learning performance of The group of introvert students uses interactive learning multimedia is higher than the group of students uses magnetic board. Mathematics learning performance of the group of extrovert students use magnetic board is lower than the group of students uses interactive learning multimedia. From interactive learning multimedia and magnetic board that related to type of personality of students and it give different effects to the mathematics learning performance. It is related to Kaefer et al that differences in personality can possibly lead individuals to present different reactions to the same stimulus or situation (Kaefer, Chiviacowsky, Meira Jr. & Tani, 2014).

The accuracy of the using media learning that appropriate with the characteristic and students' ability in developing of the understanding of mathematic concept is needed. This should be supported by the teacher's role. Creativity of teachers in developing instructional by considering of students individual characteristics can affect students' understanding in mathematics learning. The selection of the appropriate media in learning and students' potential, which means type of personality that related with problem solving ability, will maximize the process of teaching-learning activities in the classroom to develop the mathematics learning performance.

For the Group of introvert students, it was found that there are significant differences between the mathematic learning performance of the group of students use interactive learning multimedia and the group of students uses magnetic board. This is demonstrated by testing using the Tukey test that means the particular group of introvert students, the mathematics learning performance of the group uses interactive learning multimedia is higher than the group uses magnetic board.

Calvin S, Hall et.al (1998) state that Introvert students are usually quiet, shy, introspective, aloof, afraid of taking risks, pessimistic, likes comfortable and safe things, patient, thorough, likes to think before acting, more likely closed, less likely asking and argue, less gregarious, less likely to work in groups (Campbell, JB & CW Hawley

1982). But they tend to be thoughtful, thorough, independent, disciplined, orderly and consistent and believe in their selves, it is possible for Introvert students use Interactive learning multimedia (Lawrence A. Pervin & Oliver P. J 1887). In this way they are more cautious, more control in problem resolving, educative games software has more complicated rules that match to the level of students' achievement, so it needs the accuracy and persistence to upgrade the ability of concept understanding of grouping, ordering, pattern, numbers, calculation, and subtraction in mathematics.. As a result it can give positive impact to the students' learning performance. Therefore, Interactive learning multimedia is appropriate for the introvert students.

Statistically, the group of extrovert students shows that there are different significant between mathematics learning performance of the group of students uses interactive learning multimedia and the group of students uses magnetic board. It is demonstrated by using the Tukey test shows that the average of mathematics learning performance of extrovert students use magnetic board is higher than the group of students uses interactive learning multimedia.

Munir (2003), Marashi and Dibah, (2013) stated extrovert students are usually like, usually like challenges, courageous taking risks, adapting easily to the environment, have a sense of trying something new. It is not effective using interactive learning multimedia, educative games software, because the extrovert students will lack of interaction with their peers and only concentrated on the computer screen that cause tediousness compared to the using of magnetic board. (Ronald A, 1999). That's why the group of extrovert students use interactive learning multimedia can reach the optimum mathematics learning performance.

According to Eysenck, H.J. and G. Wilson (1980) and Crow, L. D. and Crow (1963) Group of extrovert students are more tend to use magnetic board media, because In a small group, it gives more opportunities for the students to interact doing correction to each other and make group cooperation, so it open a great possibilities for the extrovert students that open, active, and receive information and correct other people, likes to ask, and respond to conversation, humble and friendly, easily adapt to a new group, than to use interactive learning multimedia that tends do individual game (Alwisol, 2009). The magnetic board media that full of cooperation and correction is much possible for the extrovert students to understand of concepts math learning. Eventually it will impact positively on the learning performance. Hence, the magnetic board is suitable for the extrovert students.

5. Conclusion

Based on the results of hypothesis testing, then put forward some conclusions, as follows.

- 5.1 The mathematics performance of the group of students', uses interactive learning multimedia is higher than the group of students uses magnetic board media.
- 5.2 There is a significant interaction effect between learning media and personality types on students' mathematic performance

- 5.3 The mathematic performance of the particular groups, introvert students, uses interactive learning multimedia is higher than the group of introvert students uses magnetic board media.
- 5.4 The mathematic performance of the particular group, extrovert students, and uses magnetic board media is higher than the group of extrovert students uses interactive learning multimedia.

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