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Research Article

The Effectiveness of Demonstration Methods Assisting Multiplication Board Tools for Understanding Mathematical Concept in Bandar Lampung

Andi THAHIR[1], Anisa MAWARNI[2] & Ratna PALUPI[3]

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Abstract
The reduced interest of students in learning mathematics and consider mathematics to be a difficult subject to become a serious problem in Indonesia, especially in one of the provinces in Indonesia, namely in Lampung. The purpose of this study was to determine the effectiveness of the demonstration method assisted by Multiplication Board props to the understanding of the third grade mathematical concept of Bandar Lampung. This type of research is quantitative research with the type of Quasy Experimental Design. The design used is the Pretest-Postest Control Group Design. The population of this study was class III Bandar Lampung students. The sample in this study is class III A as the experimental class with the demonstration method, class III B as the control class using conventional methods. Data analysis techniques used the normality test with Lilifors test and homogeneity test with Bartlett test. Followed by testing the hypothesis that is using independent tests. Based on the results of the analysis and discussion of the research data obtained the results of hypothesis testing manually with t_{count} = 4.265 and t (0.025; 38) = 1.960, so that t_{count}> t (0.025; 38) then HO is rejected. Based on these results, there is an understanding of the concept of mathematical multiplication between students who are taught using the demonstration method compared to using conventional methods.

Keywords:
demonstration methods, multiplication board props, mathematical concept

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[1] Assoc. Prof, State Islamic University of Raden Intan-Indonesia, Indonesia. E-mail: andithahir@radenintan.ac.id
[2] Lecturer, State Islamic University of Raden Intan-Indonesia, Indonesia. E-mail: andithahir@radenintan.ac.id
[3] Counselor, Indonesia.

Introduction

Mathematics Learning is a process that is intentionally designed with the aim of creating an environmental atmosphere allowing one to carry out mathematics learning activities, and the process is centered on educators teaching mathematics by involving the active participation of students in it (Waywood, Adrew,1992; Esmonde, 2017). Mathematics is a human activity and must be associated with reality (Packenham, Patricia S.; Westensko, & Arla, 2013). The nature of mathematics is a science that discusses numbers and calculations, discusses numerical problems, regarding quantity and quantity, studies the relationship of patterns, shapes and structures, means of thinking, collection of systems, structures and tools (Raffaella BorasiBarbara J. Rose, 2000; Kimberly Raghubar, Marcia A Barnes, & Steven A.Hecht, 2010).

The process of learning and teaching mathematics in schools must provide opportunities for students to try to find experiences about mathematics, so that mathematics is not only a memorization lesson or just a formula but understands how to apply it in everyday life. Mathematics learning activities, both educators and students together become the perpetrators of learning objectives. This learning goal will achieve maximum results if the learning runs effectively.

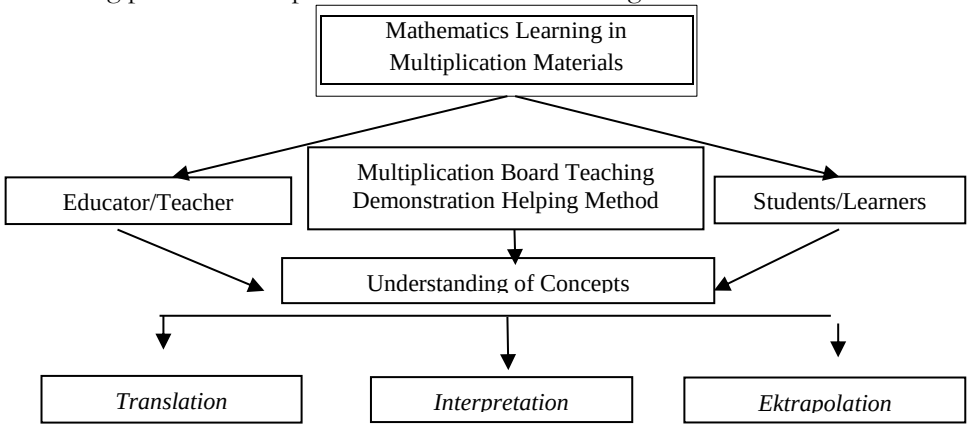
The purpose of the demonstration method is to imitate the model that can be done. In order for children to emulate examples of actions demonstrated by educators, there are several important things that educators must pay attention to. First, what the educator shows and does must be clearly observed by the child being taught. Second, in giving a sound explanation the educator must be clearly in denar. Third, the demonstration must be followed by children's activities to mimic what has been designated and done by educators (Anitah, 2014, p. 25). Steps for implementing the demonstration method: a) Start with activities that stimulate students to think, for example through questions that contain puzzles so as to encourage students to be interested in paying attention to demonstrations; b) create a cool atmosphere by avoiding a tense atmosphere; c) ensure that all students follow the demonstration line by interpreting the reactions of all students; d) provide opportunities for students to actively think further according to what is seen from the demonstration process (M. C Passolunghi, B Vercelloni, & H Schadee, 2007; Djamara, 2013, p. 152; Mansyur, 2013, p.23; Ramayulis, 2014, p. 165).

The advantages of demonstration methods can make teaching clearer and more concrete, so avoiding verbalism namely understanding in words or sentences (Djamara, 2013), learners better understand what is learned and more interesting teaching process learners are designed to be active, observe adjust between theory and reality, and try to do it yourself (Djamara, 2013, p. 159; Mansyur, 2013). The demonstration method can also reduce errors when compared to just reading a

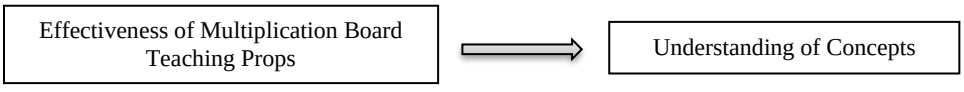
book, because students have obtained a clear picture of the results of their observations (Mansyur, 2013; Ramayulis, 2014, p. 165).

Learning in general can be interpreted as a business process carried out by a person to obtain a change in new behavior as a whole, as a result of his own experience in interactions with the environment that gives rise to behavioral changes that are relatively permanent in one's knowledge and behavior due to experience. (Slameto, 2013, p. 2; Amriyah & Mahmudi, 2015, p. 52; Indarto & Nurfalitasari, 2017, p. 46). From the learning process each individual has the skills, knowledge, attitudes and values involved in complex internal processes and those involved in internal processes are all mentalities that cover cognitive, affective, and psychomotor domains (Dimyati & Mudjiono, 2013). Understanding of concepts is advanced learning from planting concepts, which aims to make students better understand a mathematical concept (Lucy Cragg, C Gilmore, 2014; Heruman, 2014, p. 3; Fiteriani, 2017, p. 30).

The orientation of this study emphasizes on students to use their thinking skills in gaining knowledge and solving existing problems, especially in multiplication material. In the process of learning this mathematical multiplication material, educators use the demonstration method in this learning to have stages of activities such as planning, implementation, and reflection. During the learning process taking place using the demonstration method, students will be observed by educators to see indicators of understanding concepts, namely remembering, understanding, applying, analyzing, evaluating, and creating, which appears to students during the learning process, and to assess the deficiencies found in learning process for improvement at the next meeting.



The learning method can be used to improve understanding of concepts. To find out clearly the effectiveness of the demonstration method is assisted by a multiplication board props tool towards understanding the concept as follows.



The research used was quantitative research, with the research method Quasi Experimental Design. This type of research is Pretest-Postest Control Group Design, which is a design that has a control group, but cannot function fully to control external variables that affect the implementation of experiments (Segiono, 2016, p.77).

Tabel 1
Pretest-Postest Control Group Design

Group	Class	Pretest	Treatment	Posttest
Experiment	I	Q_1	X_1	Q_2
Control	II	Q_1	X_2	Q_2

Pretest-posttest control group design process class 1 is a experiment class, and class II is control class, Q1 is pretest, Q2 is posttest, X1 is learning with demonstration methods assisted by multiplication board props, and X2 is a conventional learning. The research sample was selected by cluster random sampling, this sampling technique was given such a name because in the sampling, the researcher "mixed" the subjects in the population so that all subjects were considered the same.

In this study two variables were used as the object of research, namely the independent variable (demonstration method assisted by multiplication board props) and the dependent variable (concept understanding). In this study acted as an educator, using two classes as a sample namely one experimental class and one control class. Class III A as an experimental class with 20 students, class III B as a control class, totaling 20 students. After the determination of the research sample was carried out the pretest and posttest, the problem was that the test of the pretest and posttest instruments could be used as data to find out the effectiveness of the demonstration method assisted by the multiplication board props on concept understanding.

The research instrument in this study is a test question in the form of an objective test in the form of essay with a number of questions 15. The question is only used to measure the cognitive domain by using Bloom's taxonomy measurement indicators namely, translator, interpretation, and extrapolation.

The validity used in this study is construct validity and content validity. To test construct validity, the opinions of experts can be used. In this case, after the instrument is constructed about aspects that will be measured based on certain theories, then the experts will consult with them (Novalia, 2013). Test the validity of the instrument can be calculated by correlation coefficient using Product Moment by finding the correlation number "r" product moment (rxy) as follows:

$$r_{xy} = \frac{N\sum XY - (\sum X) - (\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2]}\sqrt{[N\sum Y^2 - (\sum Y)^2]}}$$

The calculated is compared with r table with a significance level of 5%. If the calculated > r table, the item tested tested has valid criteria.

Test reliability of the instrument in this study was to use the Cronbach Alpha Coefficient:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum s_i^2}{s_i^2}\right)$$

Tabel 2.

Mean of Values of Cronbach Alpha Coefficient

Reliability Criteria	
Reliabilitas (R11)	**Criteria**
0,81-1,00	Very high
0,71-0,90	High
0,41-0,70	Medium
0,21-0,40	Low
0,00-0,20	Very Low

Results and Discussion

Hypothesis testing is done to find out the presence or absence of influence in learning Demonstration methods are assisted by multiplication board props in learning to understand understanding of mathematical concepts. The researcher used the t test in the hypothesis test which included two similarity tests on the average in the experimental class, with the research hypothesis as follows:

Tabel 3

T Test Results

No.	Class	T_{count}	t_{tabel}	Decision
1	Experiments and Controls	4.265	1.960	H_0 rejected

Based on the table above after t-test calculations with a significant level of 5%, tcount = 4.265 and t (0.025; 38), = 1.960, then tcount> t (0.025; 38), so HO is rejected. It can be concluded that the demonstration method is aided by an effective Multiplication Board proposition on understanding the class III mathematical multiplication concept.

Table 4
Results of N-Gain Pretest-Posttest in Experiment and Control Classes

	Eksperimen			**Kontrol**		
	Pretest	*posttest*	N-Gain	*Pretest*	*Posttest*	N-Gain
$\sum$	1077	1723	14,219	1054	1516	9,611
$\bar{x}$	53,85	86,15	0,710	52,7	75,8	0,480

Based on the data above, it can be analyzed that the difference between the value of the pretest and posttest results in the value of N-Gain. For the experimental class the average pretest is 53.85 and the average posttest value is 86.15 with the acquisition of an average N-Gain of 0.710 and in the high category. Then for the control class the average pretest value was 52.7 and the average posttest value was 75.8 with N-Gain gain of 0.480 and in the medium category. The experimental class has increased understanding of the concept so that the demonstration method assisted by Multiplication board props is effective against understanding the concept.

Based on the research, the researcher gave a post-test to find out the understanding of the concept of class III students. Learning that was conveyed in the experimental class was also conveyed to the control class. But in the control class researchers used learning using conventional methods. As educators usually do learning in class. The conventional method starts with educators explaining where students only listen to what has been conveyed by the educator, then the educator gives a question to the students, then the students work on the problems that have been given by the educator with the time that the educator has determined. After the discussion time is over, the educator asks the students to collect the questions that have been done by the students.

Learning methods using the demonstration method involve students directly in learning, so that the atmosphere of learning mathematics becomes calming. The creation of a learning atmosphere that pleases students to study hard, learning that is not boring and achieving good learning outcomes. This learning method can be used by educators as a basis for good learning activities and as an alternative tool in an effort to improve the understanding of students' multiplication concepts.

All methods of demonstration are instructions on the process of the occurrence of an event or object to the appearance of behavior exemplified so that it can be known and understood by students in real terms (Sanjaya, 2013, p. 152). All methods of demonstration are instructions on the process of occurrence of an event or object to the appearance of behavior exemplified so that it can be known and understood by students in real (Majid A, 2016, p. 197). Other theories that support that learning using demonstration methods through concrete objects can improve student learning in the ability to understand mathematical concepts in multiplication operating material (Kusumaati, 2013, p.199).

Learning methods using the demonstration method involve students directly in learning, so that the atmosphere of learning mathematics becomes calming. The creation of a learning atmosphere that pleases students to study hard, learning that is not boring and achieving good learning outcomes. This learning method can be used by educators as a basis for good learning activities and as an alternative tool in an effort to improve the understanding of students' multiplication concepts. The demonstration method is one of the learning methods used to overcome the limitations of facilities and can improve understanding of the multiplication concept of students.

Conclusion

Based on the results of research that has been done, that the demonstration method is assisted by effective multiplication board props on understanding the class III mathematical multiplication concept rather than learning using conventional methods based on the analysis of the average comparison test. Accordance with the directions of the theories used in this study.

Based on the research that has been carried out, the researcher can give suggestions as input for students to be able to use teaching aids and use the facilities around them for learning and group discussion to develop understanding concepts. For educators can apply the demonstration learning method assisted by multiplication board props on other mathematical material in order to develop learning innovations in the form of strategies, models, and learning methods used to improve the quality of future students. Educators improve the quality and quality of education at school, each educator should prepare a maximum method of teaching by using learning methods that are in accordance with the characteristics of students and the subject matter itself. For other researchers who will conduct research it is recommended that they truly understand what the demonstration method is so that researchers can continue to apply demonstration methods assisted by teaching aids to the maximum and obtain satisfactory results for understanding concepts in mathematical multiplication methods.

Biodata of the Author

Andi Thahir was born in Bandar Lampung., Indonesia. He is a Doctor of Education, associate professor at State Islamic University of Raden Intan-Indonesia, Tarbiyah and Teaching Faculty, Department of Guidance and Counseling. He completed her undergraduate in the field of Psychology in Darul Ulum University-Indonesia. He master degree Islamic Educational Psychology from Muhammadiyah Yogyakarta University-Indonesia in 2004 and He received doctor's degree at the Jose Rizal University-Philippine in 2013. A. Thahir is interested in educational psychology, multicultural counseling, and creativity psychology.

Affiliation: State Islamic University of Raden Intan, Lampung, Indonesia.

E-mail: andithahir@radenintan.ac.id

Phone: +6281369906130

Anisa Mawarni was born in Bandung., Indonesia. She is a Master of Education, lecterer at State Islamic University of Raden Intan-Indonesia, Tarbiyah and Teaching Faculty, Department of Guidance and Counseling. She completed his undergraduate in the field of Guidance and Counseling in Ahmad Dahlan University-Indonesia and master degree Guidance and Counseling too from Universitas Pendidikan Indonesia (UPI)-Indonesia in 2018. A. Mawarni is interested in educational psychology, education and learning process, and counseling.

Affiliation: State Islamic University of Raden Intan, Lampung, Indonesia.

E-mail: anisamawarni@radenintan.ac.id

Phone: +6285200554399

Ratna Palupi was born in Sukamulya., Indonesia. She is He completed her undergraduate in Islamic State University of Raden Intan-Indonesia, Tarbiyah and Teaching Faculty, Department of Guidance and Counseling. R Palupi is interested in educational, guidance and counseling.

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