THE EFFECT OF USING NUMBER LINE TO STUDENTS' UNDERSTANDING ON THE CONCEPT OF ADDITION AND SUBSTRACTION OF INTEGERS

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Abstract: The topic of addition and subtraction of integers should be masterd by grade IV students (9-10 year old) as a prerequiste for learning next topics, such as multipicatioon and division of integers. However, most of teacher are still using conventional media. Therefore, in this study we propose a revised version of number line as learning media. So this study aims to investigate the effect of this media toward student understanding on topic of addition and subtraction. This study used qualitative method namely quasi experimental method. The result shows that using the number line media has an effect on the students' understanding of the addition and subtraction of integers. This is based on the posttest and pretest results obtained from both experimental group consisting of 28 students who used the number line and the control group consisting of 28 students who used conventional media. The students' learning result shows that group of experiments (n = 75,20) get score higher than control group (n = 78,80) with medium effect size.

Keywords: number line , result of mathematic learning, addition and subtraction of integers

1. Introduction

In mathematics learning, understanding the concept of integer is the basic understanding that students have to master as a prerequisite in order to grasp other mathematic concepts. Addition and subtraction which are taught in elementary school are often delivered without using concrete learning media that students can manipulate so that the lesson become monotonous and less fun.

According to Sujana & Rivai (2010:7) the main function of learning media is as teaching aid, i.e. as a support for teaching method implementation in the classroom. Therefore the use of learning media is very helpful for students to understand a concept during learning, based on Thorndike (in Arifin, 2009) teaching learning process is successful if the respond from students is immediately followed by happiness or satisfaction. The use of media also makes the learning process more fun.

One of the learning media which is interesting for elementary school students is game, because through game there will be fun interaction between one students and the others. The inclusion of game in learning process has two positive aspects which are interest and education aspects. (Komariyah : 2013). In game media, students are expected to complete a game by following a certain set of rules in order to meet a certain objective. In cognitive theory by Jean Piaget the activity of play and game passed through several changes from motoric sensory stage, imagination game, up to social game with rules (Tedjasaputra, 2005:8). Cognitive stage of elementary school students (8-11 years old) is in social play games with rules where in every stage of the game students are mostly controlled by the game rules.

In mathematics learning game media which can be manipulated by students are tools which are used to present a material in order to create entertaining atmosphere to support the achievement of the learning objective.

In reality, based on the observation on initial process of mathematics learning is always dominated by teachers for which students only master the given material without realizing and knowing how to apply the knowledge or the lesson in their everyday life. Based on the result of the interview grade IV teachers, teachers only rely on lecturing and question and answer method in delivering mathematics learning, because of the condition and lack of mathematics learning media availability. Therefore the researcher present the learning media which is easy to make and can be manipulated by the students which is number line media that is called traffic number line.

Research by Fredy and Soenarto (2013) stated that the use of multimedia can help students to understand mathematics better especially in integer material in grade IV. The use of other media also have been implemented by Rahmatin and Khabibah, (2016) who develop Umath (Uno Mathematics) card game in mathematics learning about operation of integers, it was found out that the use of interesting media can improve the output of students learning. It is also supported by a research conducted by Hikmah (2006) who conduct an action research about the use number ruler as teaching media to improve students understanding about addition and subtraction of integers, it was revealed that there were improvements of students learning results in every cycle. The media in the research which was called number line ruler still have weakness because it is abstract while elementary school students are still in the concrete thinking stage.

This research tries to apply media which is closely related to the students' daily life, thus it used a learning media in the form of traffic number line (lalulintas garis bilangan). Line number media is depicted as road that they pass by every day, and when they operated it they used toy cars or dolls which were expected to improve their learning spirit with fun mathematics learning. Therefore the learning process that use learning media can help the students to improve their mathematics learning output in integer material especially in elementary school level.

For these reasons the researcher use the traffic number line learning media to find out to what extent can the use of the media affect the learning result of grade IV students of elementary school in Cipanas sub district in terms of addition and subtraction of integer.

2. Material & Methodology

This research is a quantitative research with Quasi Experimental method that will compare the influence of number line learning media in addition and subtraction of integer with and or without the use of number line. In this research the subject that will be researched are grade IV students with the age around 10-11 years old. As the opinion of Ruseffendi (2005) "in quasi experiment, subjects are not grouped randomly, but the researcher just accept the condition of the subject as it is" In this research, quasi experiment is used which consist of two experiment groups namely grade IV A who use number line learning media and grade IV B who use direct learning.

The research design used in this research is "Control Group Pretest-Posttest Design" (Arikunto, S. 1998) the design can be illustrated as follows:

Table 1

Table research design

Grup	Pretest	Treatment	Postest
Exsperiment	O1	T	O2
Control	O1		O2

O1 = Pretest
O2 = Postest
T = Treatment

In this research , the experiment group got treatment in the form of learning by using numbers line media and the control group were given direct learning approach. For the control group there was no special treatment given. The data analysis used in this research was independent simple t-test using SPSS 20 for Windows. Before conducting hypothesis test data spread normality test was conducted by using Shapiro-wilk and variant homogeneity test between groups by using lavene's test.

This research was conducted in one of Public Elementary School in Cipanas subdistrict Cianjur regency. The subject in this research is all students of grade IV A as control group and grade IV B as the experiment group. The research was conducted on 18th -19th of April 2018.

3. Results and Discussion

c. Result

The difference of learning result between students who use number line media and students who do not use number line media was obtained through test of hypothesis result, the scores which were used in this hypothesis test were the posttest score. However before conducting this hypothesis test, normality and homogeneity test were conducted as prerequisite test. In this research the normality test used Shapiro-wilk test. If the score of Sig > 5% then the variable can be considered as normal. The normality score was 0.155 so the research data can be considered as normal, homogeneity test was conducted by using independent sample test with significant score of 0.814. Sugiono explained that if sig score > 0.05 then the data are homogenous. Statistical analysis used SPSS 20.

After the result of homogeneity test and normality test are obtained, then the description of pretest and posttest result then the process of research result was continued by hypothesis test using independent sample t-test. The result of hypothesis test can be seen in table 2.

Table 2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
postes	Equal variances assumed	.051	.822	2.991	48	.004	12.228	4.088	4.009	20.446
	Equal variances not assumed			3.002	48.000	.004	12.228	4.073	4.037	20.418

. Table 2 shows the significance score of 0.004 less than 0.05, thus H0 is rejected. It means that there is influence of students understanding between students who were taught by using traffic number line learning media with the students who were not taught by using traffic number line media. The description of students understanding regarding subtraction and addition of integer can be seen in the following table 3

Pretest and Postest Description

N	Pretes		Postes	
	Kontrol	***Eksperimen***	***Kontrol***	***Eksperimen***
	24	**24**	**24**	**24**
Mean	**75,20**	**78,80**	**74,23**	**86,46**
Std. Deviation	**16,233**	**15,226**	**15,015**	**13,790**
Std. Error				

In table 3 it can be seen, that in the pretest, the average score of students who belongs to control and experiment groups are almost similar. While in the posttest the average score of students understanding in control group is lower compared to the experiment group.

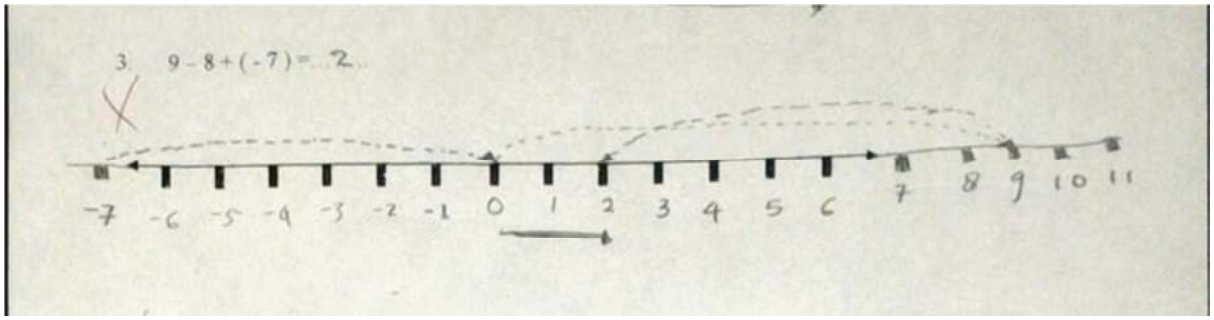
d. Discussion

The research results shows that traffic number line learning media affected the students learning results in terms of solving integer's addition and subtraction problem. This is based on posttest hypothesis test on the understanding of integer's addition and subtraction by using independenr sample t-test. Students who were taught by using number line media obtain better posttest result, because learning by using media enable students to understand what they have learned. This traffic number line also makes mathematics learning that always considered strict and serious become more relax and fun. This fun learning also called recreative learning. (Sukirman, 2004:38) defined "recreative learning is creating a learning atmosphere which is fun so that the students can enjoy but still educative, which is conducted both outside and inside the classroom"

Example of the implementation of number line media.

When conducting learning by using traffic line number the difference in the obtained learning result can be seen.

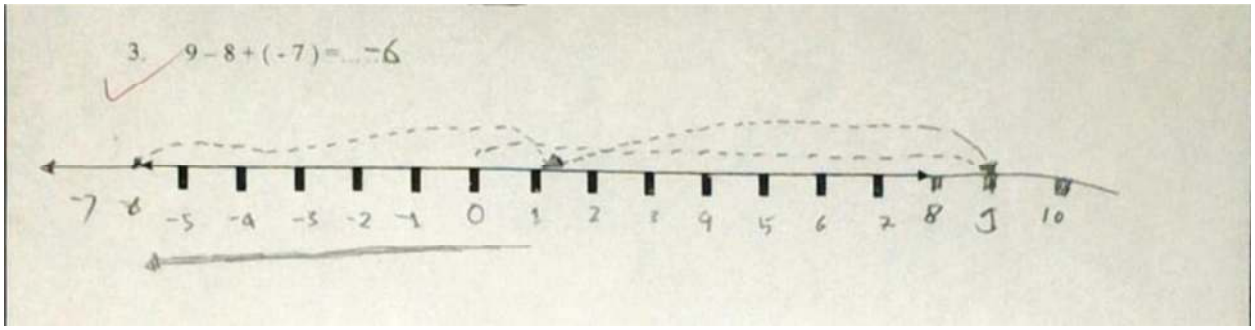
Pretest



Picture of Fauzan pretest work

At the pretest, Fauzan was still confused in placing the -7 operation on the number line so that he produced an addition of 9 - 8 + (-7) = 2, this was because Fauzan did not understand that the of addition and subtraction of integers was a unit that must be connected

Post test



Picture of Faujan postes work

In the already visible post, faujan can use the number line to correctly blend integer operations. When using the Faujan number line traffic props, it can be seen that the addition operation on that number line is a unit that must be connected to one another. Only he plays his cars to be able to obey the rules on the number line traffic if it is positive then the car faces the right and the negative of the car facing left, then when we meet the addition then the car goes forward and if it meets a subtraction then the car backs off.

With game simulations and learning media that are close to the daily lives of students, the learning process becomes more enjoyable.

The difference indicates that the use traffic number line has influence on students learning result.

4. Conclusion

Based on research elaboration, conclusions that can be drawn from this research are: 1) there is difference in learning result between students who learn using traffic number line with those who do not and 2) the use of traffic number line can improve students understanding about addition and subtraction of integer.

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