

The Effectiveness of The Multiplication Finger Technique on Students' Understanding of Division Operation Material in Public Elementary School 2 Kaliwungu

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ABSTRACT

Spelling arithmetic division is one of the things that is difficult in mathematics, especially in elementary schools. This is evidenced by the low evaluation or assessment results on the load. With this concern, the authors conducted research and trials regarding this matter in order to overcome the difficulties and obstacles experienced by students at SD Negeri 2 Kaliwungu, Mandiraja sub-district, Banjarnegara district. The action taken is by applying the Multiple Finger Technique (Teknik Jari Kelipatan). According to L. James Havery (2000) technique is a logical and rational procedure for designing a series of components that are related to each other with the intention of functioning as a unit in an effort to achieve a predetermined goal. While this multiple finger is the use of the fingers in the process of calculating division as a result. The application of this technique is felt to be very effective and able to generate students' understanding in SD Negeri 2 Kaliwungu regarding distribution so that the achievement and enthusiasm of students is increasing.

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1. INTRODUCTION

Education is the basic foundation of the progress of a nation, citizens in particular. The progress of education in Indonesia requires strengthening, including by making breakthroughs that trigger the acceleration of intellectual understanding such as teaching aids, learning techniques, teaching methods and learning innovations.

As is the case with the existing conditions at SD Negeri 2 Kaliwungu, Mandiraja, Banjarnegara, which until 2023 still had difficulties in learning Mathematics subjects on division operations, especially in the Low (Early) Grade. Some of the things that are found in the classroom include: many students do not memorize multiplication, are still confused about division, pay less attention during learning, and the lack of time needed.

From some of the problems above, it inspires the author to find the best solution in order to deliver student understanding in terms of division which until now has been difficult with the application of the Multiplication Finger

Technique as an innovation and breakthrough that is expected to be able to improve student understanding towards a better future.

Based on the background previously described, this mini research will reveal the problems: (1) "How is the Effectiveness of the Multiplication Finger Technique in Improving Students' Understanding of the Division Operation Material?" (2) "How does the Use of the Multiplication Finger Technique affect Students' Understanding of the Division Operation Material?".

This mini-research is conducted with the aim of: creating meaningful innovations that facilitate students' understanding of division operations.

2. LITERATURE REVIEW

Effectiveness comes from the basic word effective, according to the large Indonesian dictionary effective is the effect, efficacious or effective, can bring results, successful use and come into effect. Meanwhile, effectiveness has the meaning of effectiveness is a state of effect, efficacy, success and things coming into effect (2003: 284). Effectiveness is a measurement of the completion of a particular job in an organization (Kumorotomo, 2005: 362). Several experts put forward the notion of effectiveness, including as described below: According to James L. Gibson Effectiveness is the achievement of goals showing the degree of effectiveness. (in the book Herhani Pasolong, 2010: 4). Effectiveness is a measurement of the completion of a particular job in an organization (Kumorotomo, 2005: 362). According to Keban, an organization can be said to be effective if the organizational goals or values as set out in the vision are achieved. (in the book Herhani Pasolong, 2010; 4).

Engineering which is often also called engineering is the application of science and technology to solve human problems, as explained above engineering makes everything in human life much easier, lighter and also much faster.

If studied in depth, the definition of engineering is a set of ideas obtained from certain studies that are deliberately made for the convenience of humans in carrying out their activities. Techniques are usually made in detail by people who are experts in their fields. According to Ludwig Von Bartalanfy: Engineering is a set of elements that are bound together in an inter-relationship between these elements and the environment. According to Anatol Rapoport: Engineering is a collection of unities and sets of relationships with each other. According to L. James Havery: Engineering is a logical and rational procedure for designing a series of components related to one another with the intention of functioning as a unit in an effort to achieve a predetermined goal. According to John Mc Manama: Engineering is a conceptual structure composed of interconnected functions that work as an organic unit to achieve a desired result.

In the process of development, humans usually apply a system of trial and error to be able to obtain certain techniques or methods that can facilitate their activities. After the world of science and technology developed, trial and error activities were reduced and humans began to use what they had previously obtained as a reference material and foundation in making various other new findings.

Fingers are limbs and one of the two types of fingers, apart from toes, that are organs of manipulation (skill) and sensation (touch) found in the hands of humans and primate animals.

Fingers are the end parts of limbs, such as hands and feet, found in humans and vertebrate animals.

Fingers are a bodily process located on both the left and right hands and feet. In normal humans, there are five fingers, namely: thumb or thumb, index finger, middle finger is the longest finger in the interval of fingers, ring finger and little finger.

Fingers consist of several segments of bone covered by flesh or muscle, not only humans have fingers, some majestic animals also have but the number is uncertain, totaling five pieces. In addition, fingers are also often used as a means of communication through the movement and shape of the finger. One example that is often used by people with speech impairments, they communicate through movements that contain certain uses.

A multiple is the product of a non-zero integer with every natural number. It can also be interpreted that multiples are derived from repeated addition of the same number. For example:

The multiples of 2 are 2, 4, 6, 8,

Multiples of 5 are 5, 10, 15,

The Multiple Finger Technique is an integration technique between Bruner's theory which divides children's intellectual development into three categories, namely enactive, iconic and symbolic (Ruseffendi, 1988) and Gagne's theory of learning which is grouped into 8 types. The eight types are learning with: (1) signal, (2) stimulus response, (3) motor chaining, (4) verbal chaining, (5) discrimination learning, (6) concept formation, (7) principal formation

and (8) problem solving (Ruseffendi, 1988). In addition, there is also a concept that states that multiplication is repeated addition. In other words, division as the opposite of multiplication can be solved by addition or multiples which the author calls the Multiple Finger Technique.

The way this technique works are:

1. Look at the number to be divided and the divisor number first.
2. If the divisor number is a one-digit number, then look one number ahead of the number to be divided. The same goes for 2-digit, 3-digit or other numbers.
3. If the number to be divided (in method number 2) is \geq the divisor number, then proceed directly to the next method/operation. But if the number to be divided $<$ the divisor number, then show the next one number then do the next method/operation.
4. Perform the division calculation by folding the fingers of the multiples of the divisor number until the number that is close to or equal to the number to be divided.
5. Count the number of fingers that represent the multiples of the calculation.
6. Write the result at the top. The spoken number is recorded below the divided number.
7. Subtract the divided number from the result and move down one number.
8. Perform the above operation (from number 4) until 0 remains.
9. Notes: If lowering 2 numbers, then the top part is given as 0.

Example:

$918 : 2 = \dots$ (Figure 1)

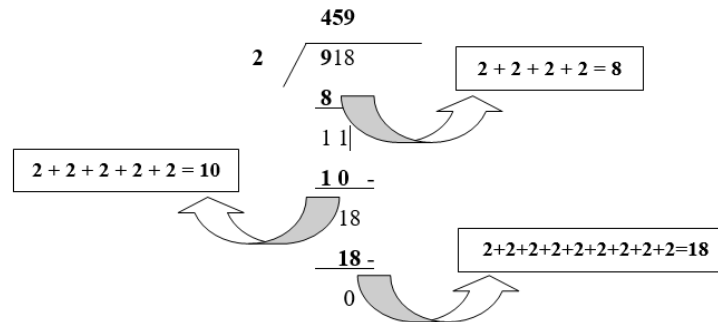


Figure 1. $918 : 2 = \dots$

The first number in the number 918 is 9. Because the number 9 is greater than the divisor (2), the calculation operation can be done directly. That is by finding the multiples of the divisor (2) which cannot be more than 9. Together with the students, demonstrate using fingers as a sign of multiples ($2+2+2+2=8$). The final number of the stated multiple is written below the 9 and the number of fingers of the multiple is written above as the result. Next we subtract ($9-8$) and lower one number right next to it. Do the previous operation of finding a multiple of 2 that cannot be more than 11 ($2+2+2+2+2=10$). Write the number 10 below the number 11, while the number of fingers (5) is written above just to the right of the previous number. Then subtract 11 from 10, and lower the next number by one to 18. Find a multiple of 2 that cannot be more than 18. Obtain the number 18 ($2+2+2+2+2+2+2=18$) write below the number 18, the number of fingers marking the multiple write above as a result. Then subtract 18 with 18 ($18 - 18$), result = 0. Result 0 indicates the division operation is complete. So, $918 : 2 = 459$.

$1.035 : 3 = \dots$ (Figure 2)

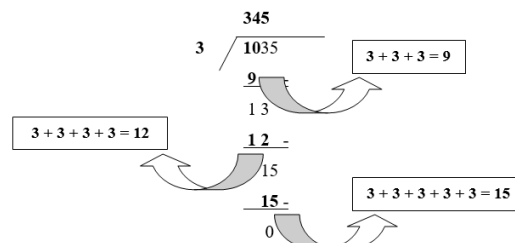


Figure 2. $1.035 : 3 = \dots$

The first number in the number 1,035 is 1. Because the number 1 is smaller than the divisor (3), the counting operation cannot be done immediately. Then find the multiples of the divisor (3) that cannot be more than 10. Together with the students, demonstrate using fingers as a sign of multiples ($3+3+3=9$). The final number of the stated multiple is written below the number 10 and the number of fingers of the multiple (3) is written above as the result. Next we subtract ($10-9$) and lower one number right next to it. Do the previous operation of finding a multiple of 3 that cannot be more than 13 ($3+3+3+3=12$). Write 12 below 13, while the number of fingers (4) is written above to the right of the previous number. Then subtract 13 with 12, then lower the next number to 15. Find a multiple of 3 that cannot be more than 15. Obtain the number 15 ($3+3+3+3+3=15$) write below the number 15, the number of fingers marking the multiple write above as a result. Then subtract 15 from 15 ($15 - 15$), result = 0. Result 0 indicates the division operation is complete. So, $1,035 : 3 = 345$.

In short, the Multiplication Finger Technique is a method used in order to simplify the process of calculating division using the fingers as the result of calculating the multiples of the divider number.

3. RESEARCH METHODOLOGY

To answer the first problem formulation using the N-Gain Statistical Test and to answer the second problem formulation using the Simple Linear Regression Statistical Test. Data was taken from the acquisition of pretest and posttest scores.

4. RESULTS AND DISCUSSIONS

A. Statistical Test Results and Interpretation of SPSS Results

First part output (Entered/Removed Variables)

The table above explains the variables entered and the method used. In this case, the variables entered are the Multiple Finger Technique variable as an independent variable and Understanding as a Dependent variable and the method used is the Enter method (**Table 1**).

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Multiplication Finger Technique ^b	.	Enter

a. Dependent Variable: Comprehension

b. All requested variables entered.

Table 1. Variables Entered/Removed

Output Part Two (Model Summary)

The table above explains the value of the correlation / relationship (R) which is 0.359. From the output, the coefficient of determination (R square) is 0.267, which implies that the effect of the independent variable (Multiple Finger Technique) on the dependent variable (Understanding) is 26.7% (**Error! Reference source not found.**).

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.599 ^a	.359	.267	18.87674

a. Predictors: (Constant), Multiple Finger Technique

Table 2. Output Part Two

Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Ngain_Score	9	.33	1.00	.8426	.25835
Ngain_Persen	9	33.33	100.00	84.2593	25.83483
Valid N (listwise)	9				

Third Part Output (ANOVA)

From the output, it is known that the value of F count = 3.914 with a significance level of $0.088 > 0.05$, then the regression model cannot be used to predict the understanding variable or in other words, there is no influence of the Multiple Finger Technique variable (X) on the Understanding variable (Y) (Table 3).

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1394.571	1	1394.571	3.914	.088 ^b
	Residual	2494.318	7	356.331		
	Total	3888.889	8			

a. Dependent Variable: Comprehension

b. Predictors: (Constant), Multiple Finger Technique

Table 3. ANOVA

Fourth Output (Coefficients)

It is known that the value of Constant (a) is 70.682, while the value of Multiple Finger Techniques (b / regression coefficient) is 0, 427, so the regression equation can be written:

$$Y = a + bX$$

$$Y = 70.682 + 0, 427X$$

The constant of 70.682 means that the consistent value of the Understanding variable is 70.682.

The regression coefficient of 0, 427 states that every 1% increase in the value of the Multiple Finger Technique, the Understanding increases by 0, 427. The regression coefficient is positive, so it can be said that the direction of the influence of variable X on Y is positive.

Effectiveness test (N-gain)

The mean value is $0.8426 > 0.7$, meaning the effectiveness is high.

N-gain score $84.2593 > 76$, meaning that the use of the Multiple Finger Technique is in the effective category (Table 4).

		Coefficients ^a				
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	70.682	10.021		7.053	.000
	Teknik Jari Kelipatan	.427	.216	.599	1.978	.088

a. Dependent Variable: Comprehension

Table 4. Coefficients

B. Previous Research Results

- 1) Endang Putri Susanti, Yantoro dan Agung Rimba Kurniawan: Strategi Guru in Learning Division Counting in Primary School; 2020
- 2) Ninit Permata Sari, Yufiarti and Makmuri: Realistic Mathematics Improves Students' Understanding of the Concept of Division in Elementary School; 2022
- 3) Prisqi Nur Adi Prianto, Fajar Cahyadi and Ikha Listyarini: Analysis of Learning Difficulties in Division Calculation Operations of Class IV SDN Tengki 01 Brebes Regency; 2022
- 4) Wardani Siti: The Effect of The Learning Cell Learning Model on Critical Thinking Ability in View of Spiritual Intelligence; 2021
- 5) Arfan Rahmat Jayadi: Improving Understanding of Multiplication and Division Concepts in Grade 3 through the Jumping Frog Game; 2022

C. Findings

From the data obtained through the initial test (pretest) and after the application and teaching of division operations with the Multiplication Finger Technique, the following results were obtained:

1. Before the application of the multiplication finger technique, only one student was able to do it;

2. After the introduction of this technique there was an increase of 44%;
3. As for after repeating the understanding of students able to at the point of 89%
4. From the description above, the following conclusions can be drawn:
5. Number counting operation about division is part of the Mathematics subject which is classified as difficult;
6. Difficulties in division arithmetic operation can be helped to solve using the Multiplication Finger Technique;
7. Mathematics learning can be liked by students if the delivery is fun;
8. Teacher creativity and innovation in learning need to be improved

The research respondents revealed that the application of the Multiplication Finger Technique in the process of division arithmetic operation can improve students' understanding and is very effective in working on division.

The author's suggestions include:

1. Increasing the capacity and competence of teachers continues to be improved through seminars, technical guidance, or workshops so that the quality of education is getting better;
2. Teachers should remain enthusiastic in facing difficulties in educating and teaching students. Make these difficulties a field of worship and a whip to find breakthroughs / tricks in problem solving so that you are more experienced in the world of education.

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