

The Comparative Study between Using Factor Tree Technique and Tabular Technique in Determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM)

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Abstract

The objectives of the research were to find out the profile of the students learning result using factor tree technique, to find out the profile of the students learning result using tabular technique, and to find out the difference between students learning result implementing factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade students of MI Al Ma'arif Kebumen village, Banyubiru district, Semarang regency. This research was quantitative research with quasi-experiment design. The research population was 54 students. Its samples were 5th-grade students of A as the first experimental class while 5th-grade students of B as the second experimental class. The instruments were pre-test and post-test of the students learning result, and the observation sheet. The technique of data analysis was descriptive statistical analysis and inferential statistic. The research showed that in the first experimental class the mean of pre-test was 42,59 and the post-test mean was 60,96. Thus, in the second experimental class the pre-test mean was 41,15 and the post-test mean was 83. Based on the result of inferential analysis was t_{count} in the amount of 6,4787 and t_{table} as big as 2,6737 with 99% level of trustiness and 1% level of error, because $t_{count} > t_{table}$ consequently H_1 was accepted and H_0 was rejected. It meant there was significant difference between students learning result using factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade students of MI Al Ma'arif Kebumen village, Banyubiru district, Semarang regency.

Keywords: Comparative, Factor Tree, Tabular, Greatest Common Divisor (GCD), and Least Common Multiple (LCM)

INTRODUCTION

Mathematics is very instrumental in the development of science and technology, among others as a tool in the application of other disciplines and as a means of logical, analytical, creative and systematic thinking (Marifatun et al, 2018: 79).



One of the competencies to be achieved in the learning process of mathematics is problem-solving ability. Problem-solving is the essence and has a role as the core of the domain of competence in the implementation of the mathematics learning process. Our daily life is surrounded by all these elements forming part of our culture and individuals must be able to appreciate and understand it. It not only contributes to a greater understanding of reality but also the integral development of children (Diaz, 2017: 709)

Cognitive development of elementary school children according to Piaget is including the concrete operational stage (ages 7-11). Children in the stage have skills in conservation, classification, ranking and reversing a process, and logical thinking begins to transform. Teaching program within this period should be qualified enough for children to learn necessary basic skills in reading, writing and calculating arithmetic problems. Since children during the concrete operations stage are more enthusiastic and excited, teacher should provide the children with opportunities to utilize their enthusiasm and excitement (Bakir & Bicer, 2015: 150).

The facts showed that mathematics learning carried out in elementary school is still memorized, the material is abstract, and not in accordance with the cognitive development of primary school-age children. Mathematics is the core of science, so that it can lead students to think logically (Mirza et al, 2019: 170).

One of the materials using as a basis of mathematics in the school is a number. A good comprehension of the number's concept would help to master the other concept. In the abstract mathematics learning the students need some helped devices such as media or techniques that it can make to clarify what teachers are saying so it can be faster to be understandable and to be realized by the students (Heruman, 2007: 1-2). Mathematics is not only material transferred by teacher to students. In this case, student should be given chance and be guided into situation to reinvent mathematics concepts using their own way (Triyani et al, 2012: 152).

The appropriate technique in teaching proses is vital importance to be attentive because the successful teaching is based on a suitable technique with the learning topics. As a result, the appropriate topics can make the learning purpose can be achieved well.

The factor tree technique is some steps applied for determining prime multiplication factor from the number (Saepudin et al, 200:23). There are several ways to find factors. This is a

diagram with a vaguely treelike shape. It use branches to show the factors of a number (Brackett, 2004: 30).

The way to decide prime factor is by the division between its number and prime numbers to remain prime number at last.

While tabular technique is the steps used to determine multiplication factor by the table. Table is the list of number arranged in line and column (Dadi & Triyati, 2008: 142).

According to the research by Cicik Pratiwi (2018) in her thesis entitled “The Correlation between Skewer Method and Factor Tree Method by the Mathematics Learning Result of Least Common Multiple (LCM) and Greatest Common Divisor (GCD) of 4th Grade Students of SDN 01 Kalibeji Tuntang”.

Furthermore, the research written by Indah Asfaradina (2016) in her thesis entitled “The Improvement of Mathematics Learning Result in Greatest Common Divisor (GCD) and Least Common Multiple (LCM) materials by Using Mathematics Table of Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade Students of MI Ma’arif Gedangan Tuntang” shows that during the process of using mathematics table (tabelmatika) of greatest common divisor (GCD) and least common multiple (LCM) the mathematics learning result progress from the 1st cycle is 60% into the 2nd cycle is 91%.

A comparative study is a research practicing to compare the value of a variable with other variables in a different time and it use more samples (Iqbal, 2004: 7). Based on the explanation above, the researcher was fascinated to study the comparative study of learning result between using factor tree technique and tabular technique to determine greatest common divisor (GCD) and least common multiple (LCM) of 5th-grade students of MI Ma’arif Kebumen village, Banyubiru district, Semarang regency. In addition, this objective of the research was to recognize how far the students learning result using factor tree technique to determine Greatest Common Divisor (GCD) and Least Common Multiple (LCM), the table result of Greatest Common Divisor (GCD) and Least Common Multiple (LCM), whether there are significant differences between student using factor tree technique and tabular technique to determine Greatest Common Divisor (GCD) and Least Common Multiple (LCM) of 5th-grade students of MI Ma’arif Kebumen village, Banyubiru district, Semarang regency.

METHODS



A research method is a way that seems like the way to find out the truth scientifically (Kasiram, 2008: 31). This research was quantitative research by quasi-experiment design. It consisted of two experimental classes. The first experimental class was taught by using factor tree technique. In another hand, the second experimental class was taught by using tabular technique. Previously, there was the pre-test before implementing treatment. After the treatment, students are given post-test.

This research was carried out at MI Ma'arif Kebumen village, Banyubiru district, Semarang regency. The population of the research was all of 5th-grade students in MI Ma'arif Kebumen village, Banyubiru district, Semarang regency. There were two classes containing 54 students. Moreover, the research sample was composed of 5th-grade students of A as the first experimental class and 5th-grade students of B as the second experimental class.

The learning outcome given to 5th-grade students of A and 5th-grade students of B in mathematics learning result was treatment before test namely pre-test and treatment after test called post-test. It was used description test design.

DISCUSSION

The Technique of Factor Tree

A factor tree is used to determine the prime factors of a number (Smith, 2010: 11). The prime number is an appropriate number having two factors. They are 1 (one) and that number itself. (Untoro & Tim Guru Indonesia, 2010: 11). There are some ways to decide Greatest Common Divisor (GCD) by the factor tree as follows:

- a. Determining prime factorization from each numbers
- b. Taking the same factor from those numbers
- c. If the same factors have different powers, choose the lowest (Dadi & Triyati, 2008: 6)

There are some steps to decide Least Common Multiple (LCM) by the factor tree as follows:

- a. Determining prime factorization from each numbers
- b. Taking the same or the different factor from those numbers
- c. If the same factors have different powers, choose the highest (Dadi & Triyati, 2008: 9)

Tabular Technique

Table is a list of numbers arranged in line and column. Asfaradina (2016: 12) says that mathematics table (tabelmatika) of Greatest Common Divisor (GCD) and Least Common Multiple (LCM) is the procedure to accomplish Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by using table. Tabular technique includes the procedure to

determine prime factor using table and divide that number with prime number remained prime number that is 1. There are some steps to decide Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by the tabular technique as follows:

- a. The division between the numbers and the lowest prime numbers.
- b. The lowest prime numbers located on the left side, and it will be a divider of those roots.
- c. When those numbers are same can be divided with the prime numbers, so write that prime numbers also on the right side.
- d. If there are some numbers can not be divide with the prime numbers, it is sufficient to be written only in the left side
- e. The processing was finished can be marked with the last result that is 1
- f. The result of prime numbers multiplication in the left side namely Least Common Multiple (LCM) and the result of prime numbers multiplication in the right side called by Greatest Common Divisor (GCD) (Asfaradina, 2016: 53).

The Description of 5th A Grade Students Learning Result of MI Al Ma'arif Kebumen in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by using Factor Tree Technique

This was a descriptive statistic of students learning result in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by using factor tree technique.

Table 1. Recapitulation of First Experimental Class Learning Result

Statistic	Pretest	Posttest
Samples	27	27
Lowest score	30	25
Highest score	70	90
Mean	42,59	60,96
Deviation Standard	10,11568	15,26554

Based on the descriptive statistic table above showed the result of pre-test from 27 samples were achieved the highest score that is 70, while the lowest score is 30. The mean had gotten 42,59. Moreover, the deviation standard was 10,11568. Whereas the result of post-test from 27 samples were reached 90 as the highest score, the lowest score was 25, the mean was 60,96, and the last about the deviation standard was 15,26554.



Table 2. Distribution of Frequency and Pretest and Posttest Percentage of First Experimental Class

Interval	Interpretation	Pretest First Experimental Class		Posttest First Experimental Class	
		Frequency	Percentage (%)	Frequency	Percentage (%)
81-100	Excellent	0	0	2	7,41
61-80	Good	1	3,70	7	25,92
41-60	Adequate	9	33,34	16	59,26
21-40	Poor	17	62,96	2	7,41
0-20	Very Poor	0	0	0	0
Total		27	100	27	100

Based on the frequency distribution table above, the result of students pre-test there was no an excellent category or 0%, in the good category there was one student with the percentage of 3,70%, then the adequate category there were nine students with the percentage of 33,34%. The poor category there were 17 students with the percentage of 62,96. Lastly, no students were reaching very poor category or 0%. At the same time, the post-test result showed there were two students as the excellent category with the percentage of 7,41%. The good category got 7 students with the percentage of 25,92%, in the adequate category reached 16 students with the percentage of 59,26%. Furthermore, category of poor there were two students with the percentage of 7,41% and there was no student as the very poor category or 0%.

The Description of 5th B Grade Students Learning Result of MI Al Ma'arif Kebumen in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by using Tabular Technique.

This was a descriptive statistic of students learning result in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) by using tabular technique.

Table 3. Recapitulation of Learning Result in Second Experimental Class

Statistic	Pretest	Posttest
Excellent	27	27
Good	20	60
Adequate	60	100
Poor	41,15	83,48
Very Poor	10,85463	9,69278

Based on the descriptive statistic table above showed the result of pre-test from 27 samples were achieved the highest score that is 60, while the lowest score was 20. The mean had

gotten 41,19. In addition, the deviation standard was 10,85463. Whereas the result of post-test from 27 sample was reached 100 as the highest score, the lowest score was 60, the mean was 83,48, and the last about the deviation standard was 9,69278.

Table 4. Distribution of Frequency and Pretest and Posttest Percentage of Second Experimental Class

Interval	Interpretation	Pretest Second Experimental Class		Posttest Second Experimental Class	
		Frequency	Percentage (%)	Frequency	Percentage (%)
81-100	Excellent	0	0	18	66,67
61-80	Good	0	0	8	29,63
41-60	Adequate	11	40,74	1	3,70
21-40	Poor	14	51,85	0	0
0-20	Very Poor	2	7,41	0	0
Total		27	100	27	100

Based on the frequency distribution table above, the result of students pre-test there was no an excellent category and the good category or 0%, then the adequate category there was eleven students with the percentage of 40,74%. The poor category there were fourteen students with the percentage of 51,85. Lastly, there were two students reaching very poor category or 7,41%. At the same time, the post-test result showed there were eighteen students as the excellent category with the percentage of 66,67%. The good category got eight students with the percentage of 29,63%, in the adequate category reached one student with the percentage of 3,70%. Furthermore, there were no students that have predicate as poor and very poor category or 0%.

The Difference of Learning Result between using Factor Tree Technique and Tabular Technique in Determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade Students of MI Ma'arif Kebumen Banyubiru.

This part would answer the third problem statement that was whether there were significant differences between student using factor tree technique and tabular technique to determine Greatest Common Divisor (GCD) and Least Common Multiple (LCM) of 5th-grade students of MI Ma'arif Kebumen village, Banyubiru district, Semarang regency.

The researcher analyzed by observing the post-test data of the first experimental class or 5th-grade of A, and the second experimental class or 5th-grade of B. This was an inferential



statistics analysis and its examination done by using test of normality, homogeneity, and hypothesis

Test of Normality

Test of Normality in this result data of pre-test and post-test both of samples was at the first and the second experimental class. Test of normality purposed to measure whether those data was normal or not. If those data had a normal distribution the result would confirm sign $X^2_{\text{count}} < X^2_{\text{table}}$.

On the contrary, if those data do not have a normal distribution the result would prove $X^2_{\text{count}} \geq X^2_{\text{table}}$.

The first test of normality was done at the pre-test of the first and the second experimental classes. The significance level applied was 0,01%. Based on the processing of the data in the first experimental class, then it was achieved X^2_{count} in the mount of 10,6% and X^2_{table} as big as 11,3. Because of $X^2_{\text{count}} < X^2_{\text{table}}$ accordingly the first experimental class data was normal contribution.

Based on the processing of pre-test data in the second experimental class, then it was achieved X^2_{count} in the mount of 10,5% and X^2_{table} as big as 11,3. Because of $X^2_{\text{count}} < X^2_{\text{table}}$ accordingly the second experimental class data was normal contribution.

The second test of normality applied for post-test data of the first and the second experimental class. The significance level was used 0,01. Based on the data procession of the first experimental class then it was achieved X^2_{count} in the mount of 1,69 and X^2_{table} as big as 11,3. Because of $X^2_{\text{count}} < X^2_{\text{table}}$ so, the data of the first experimental class was normal contribution. Moreover, the data procession of the post-test data of first the second experimental class then it was achieved X^2_{count} in the mount of 2,32 and X^2_{table} as big as 11,3. Because of $X^2_{\text{count}} < X^2_{\text{table}}$ so that, the data of the second experimental class was normal contribution

Test of Homogeneity

Test of Homogeneity in this result data of pre-test and post-test both of samples was at the first and the second experimental class. Test of homogeneity purposed to know whether the sample had the same variants or not. If its data was homogeneous, thus $F^2_{\text{count}} < F^2_{\text{table}}$ and if $F^2_{\text{count}} > F^2_{\text{table}}$ it means the data was not homogeneous. The significance level applied was 0,01.

Based on the processing data of pre-test in the first and second experimental class was reached F^2_{count} in the amount of 1,151 and F^2_{table} was 2,553. Because it showed $F^2_{\text{count}} < F^2_{\text{table}}$ so the pretest data of the first and second experimental class was homogeneous.

Based on the processing data of post-test in the first and second experimental class was reached F^2_{count} in the amount of 2,480 and F^2_{table} is 2,553. Because it showed $F^2_{\text{count}} < F^2_{\text{table}}$ so the post-test data of the first and second experimental class was homogeneous.

Test of Hypothesis

The test of hypothesis in this research was t-test. This study was done to know how far the difference between the post-test results of the first experimental class by using factor tree technique, and the second experimental class was applied tabular technique with the hypotheses form as follows:

H_0 = There was no significant difference between students learning result using factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade students of MI Al Ma'arif Kebumen village, Banyubiru district, Semarang regency

H_1 = There was significant difference between students learning result using factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade students of MI Al Ma'arif Kebumen village, Banyubiru district, Semarang regency

Test of hypothesis applied for the two classes post-test, they are the first and second experimental class with the criterion of test as following:

H_0 will be accepted if $t_{\text{count}} \leq t_{\text{table}}$

H_1 will be accepted if $t_{\text{count}} > t_{\text{table}}$

Based on the calculation was achieved $t_{\text{count}} = 6,4787$ and $t_{\text{table}} = 2,6737$ with the significance level of 0,01. Because $t_{\text{count}} > t_{\text{table}}$ so H_1 was accepted. As the result, there was significant difference between students learning result using factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) at the 5th-grade students of MI Al Ma'arif Kebumen village, Banyubiru district, Semarang regency.

CONCLUSION

This journal was arranged to be used by the potential of article's authors as the reference related to the comparative study between factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM) in context



Islamic Elementary School level. The weakness of this guideline may not yet be complete as expected by many parties, however, as the recent contribution this journal would hopefully be initial guidance sufficient at a time meanwhile many other journal managers even do/have publish(ed) similar guidelines. In order to arrange this journal had showed that there was a significant difference between the use of factor tree technique and tabular technique in determining Greatest Common Divisor (GCD) and Least Common Multiple (LCM), and also can be a suggestion to the school in teaching-learning process particularly in mathematics learning of Greatest Common Divisor (GCD) and Least Common Multiple (LCM) materials. Both of Greatest Common Divisor (GCD) and Least Common Multiple (LCM) can use tabular technique, so students would get better teaching-learning process and more achievement of learning result. The following journal in the future is hoped to complete the lackness of this journal particularly researching to compare the method or other technique that can be useful for finding out the Greatest Common Divisor (GCD) and Least Common Multiple (LCM). So, the future researcher can discover the more effective and also to adjust with internationally standardized article writing guidelines.

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