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Application of the Jarimatics Method in Mathematics Learning to Increase the Ability of Students of Class V Min 2 Palangka Raya in Calculate Multiplication

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Abstract

Calculating multiplication in Mathematics for the 5th-grade students of MIN 2 Palangka Raya only relied on the teacher's direct instruction through a series of formulas which made students feel bored, unactivated, and burdened (especially for those who are weak in memorizing the formulas). This study aims to improve the ability to calculate the multiplication of the students through the implementation of Jarimatika. This research is a Classroom Action Research (CAR) consisting of two cycles. The data of the students' abilities in calculating multiplication obtained in the first cycle reached 64 or around 40.5% while it in the second cycle reached 76 or around 81%. The results showed that students' learning activities through Jarimatika method became more active. In addition, their ability to calculate multiplication was also successfully increased.

Keywords
math; calculating multiplication; jarimatika method

I. Introduction

Learning is a complex internal process, covering the mental aspects of the cognitive, affective, and psychomotor domains. The internal process as an interpretation of student learning cannot be observed directly but is understood by the teacher. The learning process will appear through the behavior of students when they study certain teaching materials given by the teacher to actualize the three domains, one of which is in Mathematics. The learning behavior is the student's response to the act of learning from the teacher (Dimyati & Mudjiono, 2013) as well as satisfaction with efforts to solve challenging problems (Abdurrahman, 2003). Mathematics learning presented using Student Worksheets requires active participation from students, because the Student Worksheets are a form of teacher effort to guide students structured through activities that are able to attract students to learn mathematics. In addition, learning with Student Worksheets can make the learning process more effective as expected in each learning that is increasing the creativity of students' thinking so that learning objectives are achieved. (Tarigan, E. et al. 2020)

Although Afsari et. al. (2021) stated that the application of Mathematics can improve students' critical thinking and numeracy skills, this subject is still considered difficult so it tends to be less attractive. Moreover, the Covid-19 pandemic for the past two years has forced students to study at home with minimal interaction with teachers. These interactions are then presented online through various forms of adjustment of facilities and infrastructure so that the effectiveness of learning is maintained (Effendi et.al., 2021).

Basically, one of the efforts to foster student interest in this subject is to innovate in applying various learning methods. Mathematics learning itself essentially requires

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collaboration between teachers and students by utilizing all potential and learning resources to achieve learning goals (Putra & Millennia, 2021).

The selection of learning methods needs to be considered so that the expected learning outcomes can be achieved. Even the use of technology in learning mathematics must be adjusted to its function. As mentioned by Putrawangsa & Hasanah (2018) that there are three dedactic functions of technology in mathematics learning, namely technology for doing mathematics, technology for practicing skills and technology for developing conceptual understanding where each of these functions interprets the views and traits of teachers in the teaching and learning process. However, in reality, the application of conventional methods that only transfer knowledge from teachers to students is still a mainstay and has an impact on not achieving maximum learning outcomes.

Based on the results of observations, the ability to calculate the multiplication of class V students of MIN 2 Palangka Raya has not met the Minimum Completeness Criteria (KKM) that has been set by the school, which is 68. So far, learning Mathematics, especially about multiplication material is very monotonous because the method of memorizing formulas is still applied without there are interesting activities. In other words, students only get direct teacher explanations (direct instruction) so that they are easily bored, burdened (especially for those who are weak in mathematical memorization) and less active. Consequently, there are still many students who have not been able to reach the KKM. This is in line with the statement of Panggarra & Trivena (2021) where the habit of memorizing formulas for students should be avoided because it will be in vain.

Based on these problems, students' ability to calculate multiplication needs to be improved by applying an interesting method. This is because the application of interesting methods will be able to accommodate and facilitate the modality needs of students (Warlela, 2020). In addition, it is important to enrich students' learning experiences that support their mathematical connections so that the quality of learning outcomes increases (Parinata & Puspaningtyas, 2021). One method that has these characteristics is Jarimatika.

Jarimatika is a method of counting using both hands without having to use paper media (Yudha, 2020). The use of fingers in solving counting problems is also believed to make mathematics more meaningful (Panggarra & Trivena, 2021). Several studies also stated that the application of the Jarimatika method was able to improve students' numeracy skills (Tasliah et.al., 2019; Yudha, 2020; Panggarra & Trivena, 2021).

The results of previous studies became the basis for this research. But what distinguishes it is that the application of the Jarimatika method has never been done to students at MIN 2 Palangka Raya, especially class V, in Mathematics with the topic of Calculating the Volume of Cubes and Blocks. Thus, the formulation of this research is 'how to increase the ability to calculate multiplication of students of class V MIN 2 Palangka Raya in solving volume problems of cubes and blocks through the application of the Jarimatika method?'. The formulation of this problem implies two main things that are the objectives of research on the application of the Jarimatika method, namely describing student learning activities when calculating multiplication and measuring student learning outcomes.

II. Research Method

This study uses the Classroom Action Research (CAR) method which aims to improve student learning outcomes as a form of improvement in the learning process (Ismaela & Ramadhani, 2021). Classroom Action Research is a plan that is intentionally

designed to occur in classroom learning (Handayani & Irwan, 2020). This research is generally carried out by teachers considering their role as the main party carrying out the learning in the classroom (Widiarini et.al., 2022). The CAR design in this study refers to the Kemmis & McTaggart model where there are four stages, namely planning (plan), implementation (action), observation (observe) and reflection (reflect). This series of four stages is carried out repeatedly as a cycle. The first stage in each cycle begins with planning and ends with reflection.

This study involved students of class VC MIN 2 Palangka Raya in the academic year 2021/2022 with a total of 37 students, consisting of 20 boys and 17 girls. One cycle is said to be successful if a) the activities of the teachers and students of class VC MIN 2 Palangka Raya are included in the "good" category, where the observer's assessment reaches an average of 3, and b) the average value of students' Mathematics learning outcomes is able to achieve the KKM score (68) with a minimum level of achievement of 80%. Thus, the second cycle is executed if the data from the first cycle does not meet these indicators.

Table 1. Criteria for Teacher and Student Activities

Score	Criteria
1 – 1.9	Not good
2 – 2.9	Pretty good
3 – 3.9	Well
4	Very good

Data collection is done through:

1. Interviews with class teachers and students in VC class to find out their perceptions of the Mathematics learning process. This data also serves as feedback on the application of the Jarimatika method.
2. Observation, by observing the mathematics learning process before and after the Jarimatika method was applied. More specifically, the observations made when Jarimatika was applied became one of the stages in the research cycle so it needed to be analyzed.
3. Test, namely the initial test (*pre-test*) and the final test (*post-test*). The initial test is carried out before the teaching and learning process to determine the students' initial ability in calculating multiplication before the application of the Jarimatika method, while the final test is carried out after the Jarimatika is applied to the teaching and learning process to determine whether there is an increase in students' abilities. The form of the test is a written test in the form of stuffing questions. The test instrument has been through a validity test conducted by two mathematicians as validators.
4. Documentation, by taking an inventory of learning tools, the value of learning outcomes, and photos of research implementation.

Data from observations and tests were analyzed descriptively qualitatively and quantitatively. To calculate the class average (*mean*), the following formula is used:

$$\bar{X} = \frac{\Sigma X}{N}$$

Information:

$\bar{X}$ = Grade average

X = Total score obtained by students

N = Number of students

To calculate the percentage of completeness (achievement of KKM), the following formula is used:

$$TB = \frac{\sum s \geq 68}{N} \times 100\%$$

Information:
s _ = Number of students who reach KKM
N = Many students
100% = Fixed number percentage
TB = Mastery of classical learning at least 80%

III. Result and Discussion

The data analyzed in this study were data from observations and tests. The observations made are part of the research cycle where the observer observes and provides an assessment of the learning process by applying the Jarimatika method carried out by teachers and students. In addition, the learning test results data in the form of student scores taken 1 time from the initial test results before the first (first) cycle begins and the final test results in each cycle. Cycle II (second) takes place if the indicators of success have not been achieved in cycle I.

3.1 Pre-Action Data

Pre-action data is data from the results of the initial test (*pre-test*). This initial data aims to determine the level of students' initial ability to the material that will be used as a learning topic before the classroom action research takes place. This test is in the form of a question that consists of 10 questions. The calculation of the class average value and the percentage of learning demands from this initial test are as follows:

a) Grade average

$$\overline{X} = \frac{\sum X}{N}$$
$$\overline{X} = \frac{1420}{37}$$
$$\overline{X} = 38$$

b) Percentage of classical learning completeness

$$TB = \frac{\sum s \geq 68}{N} \times 100\%$$
$$= \frac{8 \geq 68}{37} \times 100\%$$
$$= 22\ \%$$

Based on the results of the *pre-test* above, it can be seen that the value of student learning outcomes in class VC MIN 2 Palangka Raya with an average value of 38 and classical completeness of 22% which is included in the criteria is very less achieved. So, it can be seen that the achievement of learning success has not met classical learning completeness (at least 80%) so that changes to learning methods are needed to improve student learning outcomes.

3.2 Cycle Data I

The implementation of the first cycle begins at the next meeting, after the initial test is given. The learning process in this cycle is based on the Learning Implementation Plan (RPP) which has been prepared in the research planning stage. Furthermore, activities that were also carried out in the first stage of the CAR cycle included preparing teaching tools and materials as well as compiling observation sheets and final tests.

In the second stage of CAR, namely implementation, the Jarimatika method began to be applied to the learning process. Like usual learning, the teaching and learning process in this study begins with preliminary activities, continues with this activity and ends with closing activities. But what makes the difference is the application of Jarimatika as a learning method to help students solve multiplication practice questions.

The application of the method was then observed by the observer and recorded the results of the observations into the observation table. The observations made were not only aimed at knowing whether the application of Jarimatika had been properly carried out by the teacher in accordance with the procedures that had been designed in the lesson plans but also to find out whether the students being taught were able to practice Jarimatika when solving problems about multiplication. Observation data is in the form of categorization of learning activities by teachers and students. The results of these observations can be seen in the following table:

Table 2. Observation Result Data Cycle I

No.	Activity	Teacher Score	Student Score
1	Opening of learning	4	4
2	Understanding of learning objectives	3	3
3	Understanding of the subject matter	3	2
4	Jarimatics Demonstration	2	2
5	Application of Jarimatika in solving sample questions	2	2
6	Discussion and Q&A	2	2
7	Jarimatika practice guidance	2	2
8	Management of student Jarimatika practice in small groups	3	2
9	Implementation of the final test	3	3
10	Closing of learning	3	3
Total Score		27	25
Average		2.70	2.50
Category		Pretty good	Pretty good

Table 2 shows that there are still weaknesses in carrying out learning with Jarimatika. The lack of optimal learning occurs due to several factors such as the lack of teacher explanations that link the subject matter with the use of Jarimatika, examples of questions that show the use of Jarimatika are considered too complicated and less varied, and the teacher's lack of attention to students who need more guidance in practicing Jarimatika.

After the Jarimatika method was applied and observed, the next research stage was to provide a final test (*post-test*) to measure the achievement of learning outcomes. Besides the results of observations, giving this test is also a reflection and evaluation of whether cycle II needs to be done. The following are the results of calculating the class average value and the percentage of learning completeness from the final test of the first cycle:

a) Grade average

$$\overline{X} = \frac{\sum X}{N}$$

$$\overline{X} = \frac{2360}{37}$$

$$\overline{X} = 64$$

b) Percentage of classical learning completeness

$$TB = \frac{\sum s \geq 68}{N} \times 100\%$$

$$= \frac{15 \geq 68}{37} \times 100\%$$

$$= 40.5\ \%$$

Based on the results of the *post-test* cycle I, it can be seen that the value of student learning outcomes in class VC MIN 2 Palangka Raya with an average score of 64 and classical completeness of 40.5% which is included in the criteria is not achieved. This means that it does not meet the requirements of classical learning mastery and some students have not achieved the specified learning mastery of 68. Coupled with the observations obtained, the effectiveness of teaching and learning activities for teachers and students still needs to be improved.

3.3 Cycle II Data

The *post-test scores* and observational data in the first cycle that did not meet the criteria for research success indicators became the basis for the second cycle. Explanation of teaching materials and strengthening of the application of fingers to solve multiplication problems became the main focus as an improvement in the learning process. In this case, the teacher should provide more examples of questions by practicing the use of Jarimatika to complete the multiplication count and guiding students who have not been fluent in applying Jarimatika more intensively. The results of observations on the implementation of learning in cycle II are as follows:

Table 3. Observation Result Data Cycle II

No.	Activity	Teacher Score	Student Score
1	Opening of learning	4	4
2	Understanding of learning objectives	4	3
3	Understanding of the subject matter	4	4

4	Jarimatics Demonstration	4	3
5	Application of Jarimatika in solving sample questions	4	3
6	Discussion and Q&A	4	4
7	Jarimatika practice guidance	3	3
8	Management of student Jarimatika practice in small groups	3	3
9	Implementation of the final test	4	4
10	Closing of learning	4	4
Total Score		38	35
Average		3.80	3.50
Category		Well	Well

The following are the results of the calculation of the class average value and the percentage of learning completeness from the final test of the second cycle:

a) Grade average

$$\bar{X} = \frac{\Sigma X}{N}$$

$$\bar{X} = \frac{2830}{37}$$

$$\bar{X} = 76$$

b) Percentage of classical learning completeness

$$TB = \frac{\Sigma s \geq 68}{N} \times 100\%$$

$$= \frac{30 \geq 68}{37} \times 100\%$$

= 81 %

Results of the post *-test* cycle II showed that the value of student learning outcomes in class VC MIN 2 Palangka Raya with an average score of 76 and classical completeness of 81% which was included in the criteria was very achieved. That is, it has met the requirements of classical learning completeness. However, there are still 7 students who have not achieved the completeness score. The reason for the incompleteness of the seven students was due to the lack of focus on understanding the subject matter. For that, it is necessary to notify and submit this problem to the class teacher in order to provide more guidance or remedial to them.

Table 4. Recapitulation of Student Learning Results

No.	Activity	Average value	Complete	Percentage
1	Pre-Test	38	8 people	22%
2	Final Test I	64	15 people	40.5%
3	Final Test II	76	30 people	81%

Table 4 above shows the recapitulation of increasing student learning outcomes . Before the arithmetic method was implemented , the average value of student learning outcomes obtained was 38 with a mastery percentage of 2 2%, while in the first cycle an average value of 64 was obtained with a completion percentage of 40.5 %. In the second cycle, the average value reached 76 with a percentage of completeness 8 1 %. Furthermore, table 5 shows an increase in the categories of learning activities while the Jarimatika method is applied. Thus, the application of the Jarimatika method in two cycles in this study was declared successful in accordance with the established criteria.

Table 5. Recapitulation of Observation Results

Implementation of Observation	Observation Object (Average value)		Category	
	Teacher	Student	Teacher	Student
Cycle I	2.70	2.50	Pretty good	Pretty good
Cycle II	3.80	3.50	Well	Well

IV. Conclusion

Activities and learning outcomes of students in class VC MIN 2 Palangka Raya in learning Mathematics with the material of calculating the Volume of Cubes and Blocks can be improved through the application of the Jarimatika method. This is based on the average student learning activity during the mathematics learning process in the first cycle, which is 2.64 and is included in the "good enough" category. In cycle II, student learning activities increased significantly reaching 3.55 so that it was included in the "good" category.

In addition, there is an increase in the ability to calculate multiplication in students of class VC MIN 2 Palangka Raya in learning Mathematics after the Jarimatika method is applied. This can be seen from the results of the average value of the first cycle, which is 64 with a classical completeness percentage of 40.5% and in the second cycle the average value increases to 76 with a classical mastery percentage of 81%.

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