

# Analysis of the Student Numerical Literacy in Completing the Division Count and Multiplication Operation of the 6<sup>th</sup> Grade Elementary School Round Number

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## ABSTRACT

### Article History:

Received : 02-02-2023

Revised : 10-06-2023

Accepted : 14-06-2023

Online : 18-07-2023

### Keywords:

Numeration literacy;

Division;

Multiplication.

The background of this study is that students are unable to solve the problems and problems of daily life and which of the students associated with literacy, are unable to think critically and be able to reason in understanding the concept of division operations and multiplication integers. The aim of this study was to describe numerical literacy in the division and multiplication operations of integers in 6<sup>th</sup> grade elementary school. Research type use descriptive with a qualitative approach. Research instrument consist of interview instrument, observation instrument, and test subject. Research has found no significant obstacle, the study subject can complete most numerical literacy components on the test issue. Research subjects has not been able to dominate numerical literacy of patterns and statistic intact, but some of the components appearing on the subject have not been fully resolved.



<https://doi.org/10.31764/jtam.v7i3.13555>



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## A. INTRODUCTION

Numeration literacy as a new invention of the math section serves as measure and hone the students' skills so that students can become proficient in the various numerical literations exercises (Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi Direktorat Jenderal PAUD, Pendidikan Dasar, 2021). The 21<sup>st</sup> century in the process of mathematical learning, has entered numerical literace studies where in the process of learning not only quantitative or dominant to calculate numbers but also develops student's understanding of reading a stories relates to mathematics. However, elementary school students have difficulty studying mathematics especially a numerical literature field relating to a systematic application of concepts and interpretations that need to understand numerical literature primarily in the form of a practical exercise in daily life. Numerating literacy is an important part of the mathematical sphere (Pusat Kurikulum & Perbukuan Jakarta, 2017). Numerical literature influences cognitive thinking about how problem solving has continuity from grammar to

numerical skills (Mimeau et al., 2016; Wang et al., 2021). The important points in mathematics, which are how to think correctly and systematically, creativity, foster motivation to implement the ability to read, write, and count (Lange, 1990a; Leest & Wolbers, 2021).

Based on field studies, some student problems are difficult to relate an exercise problem with student's daily life, experiencing the complexity of understanding concepts and symbols are results in misinterpreting mathematical sentences and the lack of students thinking critical in manage the numerical literacy tests because students are accustomed to memorizing the formula without knowing the concepts so that students are only calculate and lack interest in reading the literacy question that students want practical ways without thinking or studying carefully.

Numeration literacy means knowledge and competence for (1) obtain, interpret, use, and communicate mathematical numbers and symbols to solve practical problems in the various contexts of life; and (2) analysing the information presented in various forms (graphs, tables, charts, etc.) to make decisions (Pangesti, 2018). Numerical literacy involves a complete component of learning mathematics that student can collaborate among students, build an effective knowledge, efficient, critical thinking, independent and creative knowledge to reasoning on solving math problems (Hoyles, 2018). Numerical literacy skills are not just mathematical activities but students struggle to solve the story problem and relate to understanding reading involves investigating the reasons for a situation, building the text itself, critical thinking of an evaluation where centered in understanding numeration literacy (Epifanio et al., 2012). The study evaluation of numerical literacy is supported by a written record, an objective evidence either from a teacher or peers (Creswell, 2012). Important element of reading and counting that effect the student's way to work in significant personal life of each individual both early and future in improving the ability to read and count is numerical literacy (Sepúlveda et al., 2020).

An earlier study problem's about discrepancy the content of the thematic book with numerical literacy's aspect and unstructured context into daily life (Mahmud & Pratiwi, 2019). The more complex students problems are regarding difficulties to translate a problem into math sentence and about negative numbers also some of the mathematics symbols (Sidik & Wakih, 2020). Numeration literacy is uncommon for students to be implemented in math studies (Perdana & Suswandari, 2021). Numerical literacy is one of important part, because it hones an individual's ability to think through reason and think in a positive collating into daily life (Cohrssen & Niklas, 2019; L, 2021). Students will be difficult to studying numeration literacy but counting skills is the basis for building mathematical skills in a cumulative way both in the beginning or future (Lopez-Pedersen et al., 2020). Based on previous research exposure related to the importance of numeracy literacy, the purpose of this study was to describe the ability of numeracy literacy in completing calculations for division and multiplication of integer operations for grade 6 elementary school.

## B. METHODS

This study use descriptive research type with a qualitative approach. Through the test method about operation of integers numeration literacy of the division count and mulpication. This study was taken at elementary school in 6<sup>th</sup> grade with three research subjects (PD<sub>1</sub>, PD<sub>2</sub>, and PD<sub>3</sub>). This study use three instruments there is instrument of interview guidance, observation instruments, and testing instruments, as shown in Table 1 and Table 2.

**Table 1.** Observation instrument

Indicator	Observed aspect
Analyze operations and calculations on integers	Completion of calculating integer operations in grade 6 students
Take measurements in negative integers	The process of measurement in negative integers
Evaluate and process integer data	Assessment of students in processing integer data
Concluding literacy analysis in integer statistics	Interpretation of students in numeracy literacy on integer problems
Decompose the pattern of literacy numbers into a mathematical form	Students' understanding of integer patterns

**Table 2.** Interview Guidelines

Aspect	Indicator
Operations and calculations	a. Analyze operations and calculations on integers
	b. Operates on negative integer multiplication and division
Geometry and measurement	a. Take measurements in negative integers
	b. Perform measurements in negative integers
Data processing	a. Evaluate and process integer data
	b. Perform integer data processing
Statistical interpretation	a. Concluding literacy analysis in integer statistics
	b. Creating an interpretation of literacy into a mathematical form by using integers in everyday life
Pattern	a. Decompose the pattern of literacy numbers into a mathematical form
	b. Using patterns with numeracy literacy relationships in integers

At the stage of extracting data is divided into three that is, pre-implementation stage is carried out by compiling a research design, choose a reseacrh field, administering reseach permits, compiling research instruments, research supplies preaparation, the implementation stage namely data collection and analysis, as well as the reporting stage. The first data collection procedure is carried out by observing how the research subject is accepted an issue in terms of story that has been received before. Then the researcher conducts interviews to receive information from the research source, then continue the test methods to be able to collect more accurate data. And the latter documentation to be able to describe or visualize circumstances in field when doing data set.

Data that has been collected is used as one to be processed, all data is arranged and analyzed which the results can be explained in the results and discussions of the descriptive, narrative, objective, and systematic. Data analysis is three stages, namely reducing data, presentation, and draw a conclusion. The data analysis stage is to carry out several activities including data reduction, data presentations, dan data verification (Miles & Huberman, 1984). Data from the observation results of the interviews, and the test concerns are then compared

to being able to see the final result. After that from the results of the study, it can be examined by the validity of the findings using triangulation of the method and triangulation of the source.

### C. RESULT AND DISCUSSION

The result of descriptive research with a qualitative approach of students has been able to dominate several aspects of the test question contain in numeration literacy. However, from the results of triangulation there are aspects that are not controlled by research subjects, namely students do not understand the pattern of numerical literacy aspect and it can't interpret the problem with a higher level of difficulty as well as the evaluation aspect of frequently neglected and not studied by students. The results of the study that indicate that the study subject cannot control the components, which has been completing the test questions once worked on by the subject of research. In discussion the results, the subject will be mentioned with the code PD<sub>1</sub>, PD<sub>2</sub>, and PD<sub>3</sub> code to make easier to mention the research subject. The results of the research can be proven to the results of solving test problems by the following research subject.

#### 1. Test Number 4 by PD<sub>1</sub>

At number 4 PD<sub>1</sub>, can calculate a room temperature that found in this problem nicely. But PD<sub>1</sub> feels very difficult to connect answers with meaning of questions, PD<sub>1</sub> also feels confused to connecting questions about numerical literacy with measurements at a number line. PD<sub>1</sub> cannot give a sign to a number line as instructed. PD<sub>1</sub> also looks confused in placing a negative symbols or minus sign (-) in processing data, the final answer given has been correct. However, in data processed it looks not in accordance with what is supposed but this section does not make a main point in this numerical literacy analysis. So it can be concluded regarding the number line model's of numeration literacy is a difficult problem to understand by PD<sub>1</sub> even though the answer is correct, as shown in Figure 1.

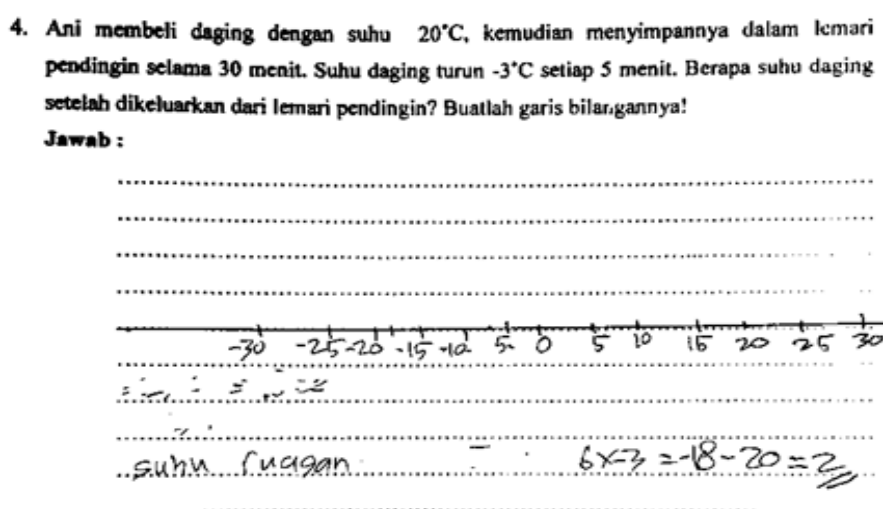


Figure 1. Result by PD<sub>1</sub> Number 4

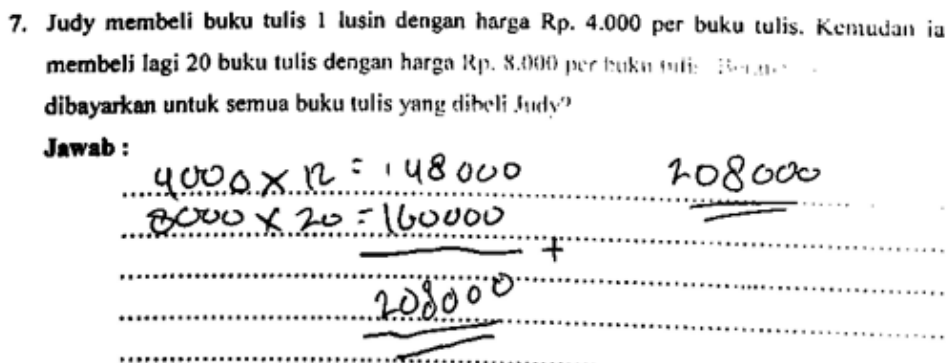
The components that appear in the results of the test that has been completed are operations and calculations, data processing, and statistical interpretations. That three component appear can be explained after seeing the work results of research subject. After

being analyzed it can be concluded, the PD<sub>1</sub> research subject can do and calculates an integer operations properly, PD<sub>1</sub> also can process data from the problems with the correct answers. PD<sub>1</sub> so highly dominate to interpret the question into mathematical form, from the answer results are known that PD<sub>1</sub> is wrong in placement a minus sign (-).

The components that do not appear here are components of geometry and measurement and component of patterns. Both of these skills did not appear because PD<sub>1</sub> cannot solve number lines where it is the components of measurement skills that are connected to the problems and answers. Then the PD<sub>1</sub> cannot understand about numeration literacy's pattern in these problem. So both of these components did not appear on the number test 4 which has been completed by PD<sub>1</sub>.

**2. Test Number 7 by PD<sub>2</sub>**

Question test number 7 is a problem test there is a patterns aspect of numeration literacy contains. PD<sub>2</sub> can done the question test nicely it's can conclude based on PD<sub>2</sub> answer sheet. PD<sub>2</sub> also can understand the problem meaning nicely and nice to interpret into mathematical form. PD<sub>3</sub> can dominating aspects of patterns and can connect the literacy pattern contained in problems nicely. PD<sub>2</sub> has been able to dominate data processing components, operation and calculations, as well as the interpretation of numerical literacy into mathematical form very well. PD<sub>3</sub> counts with his own way and finish it very confident. This proves that PD<sub>2</sub> can resolve components and have a good numeration literacy skill, so then can complete the problem test very well, as shown in Figure 2.



**Figure 2.** Result by PD<sub>2</sub> Number 7

In question test number 7, that is appear some components which has been complete by PD<sub>2</sub> thats component namely operations and calculates, geometry and measurements, data processing, statistical interpretation, and patterns. The results of problem test number 7 which PD<sub>2</sub> has been complete with no component that has not been completed. Every component that has been complete, it can explained according the problem test results that has been complete.

PD<sub>2</sub> can does multiplication integer operations and calculate it very well, it's prove that PD<sub>2</sub> can done component of operation and calculate. Likewise in component of geometry and measurement that is seen from how the PD<sub>2</sub> research subject can conduct the number and price of notebooks so that it gets the desired result. In data processing's component can be analyzed quickly that PD<sub>2</sub> can dominate the components, this is seen from how PD<sub>2</sub> can finish

it with a multi-storey calculate or with his own way. Research subject also can interpret problems into mathematic form so that research subjects can dominate statistical interpretation components nicely. In pattern components, research subject can understand the pattern of numeration literacy in that problem nicely.

### 3. Test Number 8 by PD<sub>3</sub>

Question test number 8 is a problem in it must connect the number lines with the answer. PD<sub>3</sub> can understand the meaning of the problem but doesn't about the relationship with the number lines. PD<sub>3</sub> can't evaluate the answer properly so that it gives the wrong answer. From the answer it can concluded that PD<sub>3</sub> confused in interpreting the answers problem about numeration literacy into number lines, it seen how PD<sub>3</sub> describe the number lines without giving a sign. Although PD<sub>3</sub> gives a wrong answers, but in a data processing not different at much from the final answer. It's just a possible that PD<sub>3</sub> does not understand the brackets sign functions in mathematics so thats why PD<sub>3</sub> not give a clearly information in data processing. PD<sub>3</sub> has not been able to dominate a numerical literacy patterns by decomposing mathematical literacy patterns into mathematical form, as shown in Figure 3.

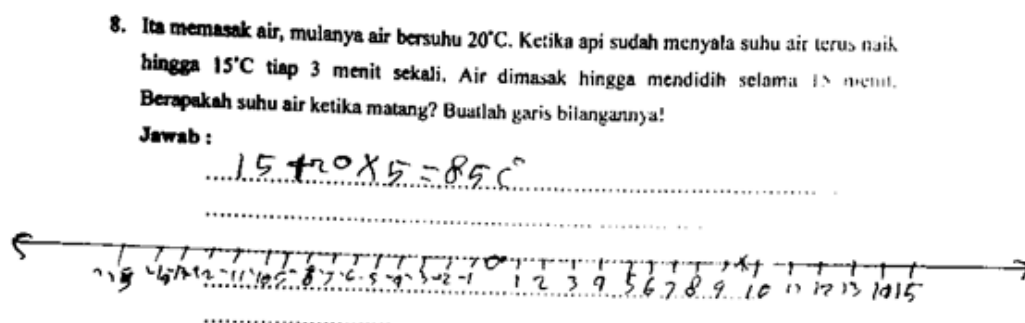


Figure 3. Result by PD<sub>3</sub> Number 8

Question test number 8 it known that PD<sub>3</sub> can solve the statistical interpretation components. These three components has been completed it can seen from the research subject work's results. In the statistical component, it's known that PD<sub>3</sub> as a reasearch subject has been able to solve it, this based on how reseacrh subject can determine the claculations of the question but, it's different when it must connected to number lines, PD<sub>3</sub> find it difficult and can't dominate.

Research subject can't complete four components of numerical literacy, that is operations and calculating, geometry and measurement, data processing, and patterns. That's four components are interrelated, so it explaining why PD<sub>3</sub> cannot solve it. In operations and calculating component research subject can't evaluate the results of calculating, so that the results get not as expectations. Based on PD<sub>3</sub>'s results has been complete about geometry and measurements components it known research subject could not measure the answer into number lines. Data processed correctly based on the problems interpretation it based on data processing components, but this data cannot be processed into maximum because PD<sub>3</sub> makes mistake in answer results. Research subject cannot complete numeration literacy's pattern components in the problems so that the answers given still far from the expectations.

Based on the results that have been analyzed were found that some students who experienced misunderstandings with the problems provided. Then some students also can less to interpret the problems in systematic forms. According to the research, it explaining that the research subjects also experience misconceptions in terms of literacy numeration problems and a lack of understanding the numeral pattern concepts (Faznur et al., 2020). According to the research that has been put forward by Lange (1990b), problem stories about numerical literacy regarding the multiplication and distribution of this integer's operations proves that mathematics could not based only on numbers but can be explained through literacy. Numeration literacy has a pattern concepts that must be dominated to be able to solve the numerical literacy problems well. Concept understanding is a important thing in math learning, not only that to can dominate numeration literacy also require a good concept understanding to be able to understand the content of numeration literacy (Yulianty, 2019) (Armstrong et al., 2018). In line with the principle of *Common Core State Standards for English Language Arts and Literacy*, the goal of achieving concept also explains that the concept of literacy content to support students and teachers in conducting mathematical disciplines. A simple numeration ability is a ability to understand and use mathematics in variety contexts to solve problems, and is able to explain to others how to use maths (Maulidina, 2019). Finding the math problem solving concepts by itself and applying in everyday life that is related to the numeration literacy ability's student (Maghfiroh et al., 2021a).

It known that understanding of numeration literacy concepts is very important. If it can't understand and dominated the numeration literacy concepts by itself, so the results it get wrong and occur such as the results of problem test that can not be in aligned. Communication skills mathematical aspect that must be possessed by students in solving problems related to number patteerns, among others : explain math ideas into written form, explain math ideas into visual form (picture, tables, or diagrams), and explain the ideas into math expression by using the right mathematical symbol/memorandum (Saidah et al., 2021) (Hodiyanto, 2017) (Rahman et al., 2021). So by mastering the components ability research subject can be proficient and can make decisions in everyday life. Numeration as the probability process ability (opportunities and possibilities that are encountered in a problem) and the numerical concept, as well as being able to contribute in making decisions in everyday life (Ellen Peters et al., 2017).

From the analysis result were obtained opposition and updates from the researchers previous. This opposition can be seen from the results and research subjects in completing the exam problem that have been given. This oppositions began from the research previous results which stated that the research subject was not used to the numeration literacy problems and difficulty to operating and translating from mathematical problems and interpret into mathematical forms. In research result not all agreed with the opposition, the results from research previous were suitable as this research that the reserach subjects are difficulty in solving unstructured problems in everyday life, but the research subject could answer some things that are in accordance with the right answers so understanding of the concept and pattern of numeration literacy is very much needed. With high literacy skills can encourage the development of science and technology to a higher level (Siskawati et al., 2021). This update is associated with 7 numerations literacy components in mathematical

coverage that has been tailored to the study research needed, these component namely operatiion and calculations, geometry and measurements, data processing, statistical interpretation, and patterns. From 7 components of numeration literacy in mathematical coverage was obtained as shown in Table 3.

**Table 3.** Findings Based on Numeration Literacy Components in Mathematical Coverage

No	Numeration Literacy Components	Finding
1	Numeral	Research subject understand and master the integer that used as focused on research.
2	Operation and Calculations	Research subject can master operating components and calculating, but often ignore the calculation law between the multiplication and addition.
3	Geometry and Measurement	Research subject can take measurements well, but cannot connect the numeration literacy problem stories into numeral lines.
4	Data Processing	Research subject can did data processing well, even though lack of evaluation thoroughness in settlement.
5	Statistical Interpretation	Research subjects have fairly skills in interpreting numeration literacy problems into mathematical forms.
6	Spatial Reasoning	Some of research subject can define basic relationships regarding numeration literacy with numeral line, but cannot pour into mathematical form correctly.
7	Pattern	Research subject cannot connect numeration literacy patterns in mathematical coverage with positive-negative number lines.

The components of the numeracy literacy pattern in the scope of mathematics are also less mastered by the research subjects. Components that are not mastered by research subjects have a close relationship (Mahmud & Pratiwi, 2019). In the pattern component, the research subjects were unable to relate literacy questions to the number line, as well as the spatial component. The research subjects have not been able to define abstract basic relationships in the test questions that have been given (Maghfiroh et al., 2021b). So that the research subjects could not fully interpret the problem in a mathematical form properly.

Numerical literacy is indeed considered important for education, especially mathematics at this time, not only in the world of education, numeracy literacy is also often encountered in everyday life (Purpura, 2017). This happens because almost all commands are adapted to literacy. So it is very important for students to be able to understand numeracy literacy before working on a problem (Armstrong et al., 2018). Problems are found to be able to recognize, evaluate, and improve what and how about numeracy literacy.

Based on this problem, numeration literacy can concert students' became critical thinking patterns and structured in problems solving and relate in students everyday life in the division and multiplication lesson of 6<sup>th</sup> elementary school. Expected through this problem, students can understand about numeration literacy so it can solve the problems and relate problems its faced in everyday life and how to resolve it in numerical literacy learning, students thinking patterns become more critical and systematic, especially in integers of division and multiplication.



#### D. CONCLUSION AND SUGGESTIONS

From the numeration literacy analysis result, students in completing problems calculating question about division and multiplication integer's it obtained to complete the problems needed skills in numeration literacy components. As is known that skills in learning numeration literacy are very important. Because with components skills that are existing numeral literacy, research subject can be easily to completed the problems that its receive. Each component needs to be mastered and completed for quality learning upgrade. In each component has the strengthening of their skills so it cannot be separated from each other, all components in numeracy literacy are very relating to each other. Research subjects need to deepen and master skills in numeration literacy components. Based on the result that have been explained, research subject still feel confused in solving problems based numeration literacy problems. So there needs to be increase in implement numeration literacy, especially in everyday life.

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