

Differences in Counting Skills between Classes by Using Mental Calculation and Conceptual Methods

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ABSTRACT

The low numeracy of children also has an influencing factor. Factors that affect a child's numeracy ability include internal factors and external factors. The next problem that arises when learning is the lack of interest and attention of students in mathematics lessons so that students lack mastery of the subject and the impact of students will be difficult to understand mathematics lessons. To overcome this problem, the researcher will conduct an experiment using the plucking method. This research uses a quantitative approach because the data obtained is in the form of numbers and the method of data analysis uses statistical analysis. This type of research is a type of experimental research. The place and time of the research used in this study is SMP Negeri 7 Brebes which consists of 18 study groups. The experiment in this study was carried out in 3 (three) stages, namely the pre-test stage, the treatment stage, and the post-test stage. The data analysis method in this study is divided into two stages, namely the initial stage analysis which is an analysis to investigate the similarities of two groups before being given treatment and the final stage analysis which is an analysis to test hypotheses. Based on the data in the output table of the statistics group, it can be seen that the Mean N-gain percent value for the class is quite effective in improving students' numeracy skills and learning interest in learning mathematics integer calculation operation material. As for the conceptual class, the mean N-gain was obtained, the conceptual method was not effective in increasing students' interest in learning mathematics integer counting operations. With the results of this research, it is hoped that it can be used as a consideration in designing learning and the use of the method of learning on students' numeracy.

Keywords: Numeracy ability, plucking method

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INTRODUCTION

One of the math skills that students must have is the ability to count. A prerequisite for learning math is learning to count, both of which are interconnected in supporting math skills. Counting is the basic numeracy ability of every child in the field of mathematics, such as sorting or counting numbers (Khan and Yuliani, 2016: 66). Numeracy skills are very important in everyday life and education, especially in primary and secondary schools. Because counting skills are the foundation of learning mathematics, counting skills are an important content to be improved by teachers in learning mathematics. Numeracy is the ability to understand, analyse, and apply simple numerical concepts. Therefore, in problem-solving skills, there are several indicators that must be met in the process of achieving learning goals.

Usually, children who have good logical mathematical skills have several signs. Among them are enjoying playing with numbers, enjoying mathematical counting, solving number problems faster and being able to think logically. There are 2 dominant factors that influence children's mindset that math is difficult, including: (1) Children are not accustomed

to counting since childhood at home, for example counting how many family members there are, how many toys they have, the number of windows in their house, and others. (2) Teachers or parents do not package math lessons with methods that please children and this is what causes children to not want to learn to count, children will prefer to play because they are very happy with games.

The low counting ability of children also has influencing factors. Factors that affect a child's ability to count include internal factors and external factors. Internal factors are factors that exist within the child in the form of motivation, maturity, learning styles that are unique to each child, talents that exist within the child during the learning process carried out inside and outside the classroom. While external factors are factors from outside the child such as from the teaching and learning process that can affect the low ability of children to count, for example learning that is less fun, monotonous learning and less interesting learning media, learning that does not facilitate student diversity. Another factor that also affects counting ability is the uniqueness of each child's learning style.

Mathematics has long been considered a difficult subject by students, primarily due to the perception that it is complicated—an assumption that ultimately reduces their interest in learning. Another issue is the lack of variety in teaching methods, as many teachers rely on a single approach rather than integrating multiple methods suited to different topics. However, these challenges are not without solutions. As educators, we must continually seek ways to address them. At its core, mathematics is the science of counting, and when students develop counting skills, they may find math easier and more enjoyable. In addition to understanding fundamental math concepts, there are various quick-learning techniques such as mental calculation, finger math, *gasing*, and others, which focus on basic operations like addition, subtraction, multiplication, and division—essential foundations for numeracy. Unfortunately, many students, even at advanced levels, struggle with these basic calculations, leading to further difficulties in learning mathematics. This issue cannot be ignored, and educators must find ways to strengthen students' foundational arithmetic skills to support their overall mathematical development.

Dedy Setiawan in McBride (2019) stated that math teachers in elementary schools usually teach multiplication using old techniques. In elementary school children, teachers usually deliver multiplication material by using the technique of calculating multiplication by short stacking and long stacking. This method has been widely and often used by teachers in delivering multiplication material. In this case, teachers need to make a new innovation in calculating multiplication. Thus, in this day and age, there are many innovations in calculating multiplication in Mathematics. However, there are also some teachers who still use quick calculation of multiplication including mental calculation, some use finger math, abacus and so on. These techniques have also been widely used by teachers in delivering multiplication material. From the above methods, there will be a choice that can make students have more numeracy skills and interest in learning math better. Which will be more efficient between the two methods. As an example, when students are faced with a problem of calculating basic multiplication, it will be more effective, between children who use concepts and storytelling techniques. If mental calculation is done continuously, it will make students accustomed to doing calculations where this can reduce the counting obstacles that are rampant in students. Especially in basic materials that must be mastered as material for understanding knowledge afterwards. Mental calculation in mathematics is counting out of the head without using tools and immediately writing down the results. Mental calculation can also be interpreted as an activity of calculating outside the head or by memory only which is written only the results of the calculation / opinion. The mental calculation method is quite easy to implement. In the mental calculation activity, the teacher asks questions orally within a certain time limit to all students. Then, students write the answers on their respective papers. This is done repeatedly every day until it becomes a habit.

In this research, the author will compare two methods that have been presented above, namely the method of storytelling and conceptual. Researchers took from several previous

studies on these two methods, the first conceptual method and the second method of storytelling. Radiusman (2020) on the importance of concept understanding in learning mathematics. The results of the study revealed that students will more easily understand math lessons if they have the right concepts in their thinking. Furthermore, Azri Keisha Alea et al (2023), the conclusion of the research stated, MID is a learning model that emphasizes the meaningfulness of learning so that the benefits of learning mathematics can be felt by students in understanding mathematical concepts that have been given or just delivered, so that students can know how to obtain these concepts with the skills they have, and students can understand the process of analyzing the solutions obtained.

In terms of the mental calculation method, previous research has also been conducted by Abdul Karim (2017) and the results of the study state that there is an effect of the mental calculation method on learning outcomes on the subject of multiplication and division in class IV students of SDN Mekarjaya 10 Depok II Tengah. Furthermore, research by Ramlan (2017), after being given a mental strategy, the obstacles to counting students seemed to decrease, because students no longer depended on stationery and paper, 10% of students took more than 15 seconds / question to answer, and 6.7% of students answered incorrectly or did not answer.

Therefore, it is necessary to conduct another research on the effectiveness of the two methods. Can we still apply the mental calculation and conceptual methods in classroom learning, especially for junior high school students? Researchers will re-test the two methods on students of SMP Negeri 7 Brebes in the 2024/2025 academic year. The purpose of this study is to prove the occurrence of students' numeracy skills using the method of storytelling in learning in Mathematics subjects, to prove the occurrence of students' numeracy skills with conceptual methods, and to prove the difference in students' numeracy skills between those using the method of storytelling and conceptual in Mathematics subjects.

Khadijah (2016: 143) counting ability is the ability possessed by every child in mathematics to try to do, do calculations such as addition, subtraction, multiplication and division, activities carried out in counting in children by sorting numbers or counting and about numbers to develop skills that are indispensable in everyday life.

In this study, researchers used expository learning. Harmuni (2012), Expository learning is learning that emphasizes the process of delivering material verbally from a teacher to a group of students with the intention that students can master the learning material optimally. There are several characteristics of expository learning. First, it is done by delivering the subject matter verbally, meaning that oral speech is the main tool in doing this learning. Second, usually the subject matter delivered is ready-made subject matter, such as data or facts, certain concepts that must be memorized so that it does not require students to rethink. Third, the main objective of this learning is the mastery of the subject matter itself. That is, after the learning process ends students are expected to understand it correctly by being able to re-express the material that has been described.

The methods that the author will compare are mental calculation and conceptual methods. According to the Big Indonesian Dictionary (KBBI), the meaning of the word mental calculation is to count out of the head (by memory only, only the results are written). Another meaning of mental calculation is to lift your face (head) up. Furthermore, one method that is closely related to mathematics is the conceptual method, where the conceptual method in mathematics can be interpreted as learning mathematics that is fulfilled by solving using mathematical concepts. The definition of mathematics until now there has been no unanimous agreement among mathematicians about what is called mathematics. Mathematicians in describing mathematics have never reached the "peak" point of perfect agreement. The number of definitions and the variety of different descriptions put forward by experts may be due to the science of mathematics itself, where mathematics is one of the disciplines that has a very broad study, so that each expert is free to express his opinion about mathematics based on his own point of view, ability, understanding, and experience. The explanation of what and how mathematics actually is

will continue to evolve along with human knowledge and needs and the pace of change. In essence, in learning mathematics, there are many basic concepts that are used as a reference in doing simple calculations. This concept is often used by educators to introduce children to ways to solve a problem presented in math problems. The hypothesis of this study is "The numeracy skills of students who use the Mental calculation method are higher than those who use the conceptual method".

METHOD

This research was conducted using a quasi-experimental research method on a quantitative approach. Place and time The research used in this study was SMP Negeri 7 Brebes consisting of 18 study groups with a total of 521 students, as a sample the researcher took two classes (class 7E and 7F) as many as 63 children. The research was conducted for approximately four months starting around July to October 2024. In this study two data collection techniques were used, namely test techniques and questionnaires or questionnaires. The first step is to test the validity, the validity of the instrument in the study was carried out using the Rasch modeling approach (Rasch Model). After being declared valid by the expert, it was tested in class VII at SMP Negeri 1 Wanasari involving 70 students.

Experiments in this study were carried out in 3 (three) stages, namely the initial test stage (pre-test), the treatment stage (treatment), and the final test stage (post-test). First, the researcher gave a pre-test to the control group and the experimental group with the same question weight to find out the conditions regarding the dependent variable. After the post-test has been carried out, then the second stage is the treatment, namely by applying the storytelling and conceptual methods to the experimental group while the control group is not given treatment. The data analysis method in this study is divided into two stages, namely the initial stage analysis which is an analysis to investigate the similarity of the two groups before being given treatment and the final stage analysis which is an analysis to test the hypothesis.

FINDINGS AND DISCUSSION

Based on the results of the research, it is stated that the instrument for assessing students' numeracy skills in mathematics learning has met the content, psychometric, and construct validity tests. Content and psychometric validity tests were conducted by experts, while construct validity tests were conducted using Rasch modeling. Modern test theory was used in data analysis to improve students' numeracy skills by using the storytelling method. The use of the analysis was carried out to find a valid instrument that can be used to test students' numeracy skills in learning junior high school mathematics grade VII on integer material. Based on the output of the analysis, it can be explained that all test items of the student counting ability instrument in learning junior high school mathematics grade VII on whole number material are in the interval -2 to 2 so that it can be said to be effective as a competency test.

The data normality test in this study used the Kolmogorov-Smirnov test with a significance level of 0.01 in the Storytelling class and Conceptual class. The results of the normality test of students' numeracy skills are presented in the following table:

**Table 1. Normality Test Results of Counting Ability
(Pre-Test and Post-Test) of Storytelling and Conceptual Classes**

Class	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.

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Pre-Test Mental calculation	0,147	32	0,078
Post-Test Mental calculation	0,126	32	0,200
Pre-Test Konseptual	0,115	31	0,200
Post-Test Konseptual	0,159	31	0,045

Source: SPSS 22 output data

Based on the data in table 1, it is known that the sig value for the pretest storytelling class is 0.078 ($0.078 > 0.01$) and the post-test is 0.200 ($0.200 > 0.01$), for the conceptual class the pretest is 0.200 ($0.200 > 0.01$) and the post-test is 0.045 ($0.045 > 0.01$). Because the sig value for both groups is greater than 0.01, it means that it is concluded that the data on students' numeracy skills for the storytelling and conceptual classes are normally distributed. The paired sample t-test is used to determine whether there is a difference in the average of two paired samples. And to prove "Does the Storytelling Method have an effect on Counting Ability and Student Learning Interest in Mathematics Learning material for calculating integers" can be seen in the following table:

Table 2. Paired Simple t-test of Counting Ability Storytelling and Conceptual Class

		Mean	Std. Deviation	T	df	sig.(2-tailed)
Pair 1	Pre Tes Mental calculation - Post Tes Mental calculation	-8.375	3.982	-11.898	31	0,000
Pair 2	Pre Tes Konseptual - Post Tes Konseptual	-2.032	1.923	-5.883	30	0,00

Source: SPSS 22 output data

Based on pair 1 above, the sig. (2-tailed) value is $0.000 < 0.005$, so there is a difference in the average student interest in learning for the experimental class pre-test and control class post-test (storytelling class). While based on pair 2, the sig value (2-tailed) is $0.000 < 0.05$, it can be concluded that there is a difference in the average student learning outcomes for the pre-test of the control class and the post-test of the control class (conceptual class), so that the Storytelling Method has an effect on Students' Counting Ability in learning Mathematics, the material for counting integers. And to prove "Is there a difference in counting ability and interest of students who use the storytelling method and conceptual method?" This test was conducted using the Independent Sample T-Test with a significance level of 0.05, the results of which are presented in the following table:

Table 3 Group Statistics of Students' Numeracy Ability

	Class	N	Mean	Std. Deviation	Std. Error Mean
Ngain_Score_Persen	Mental calculation	32	53,3831	9,58711	1,69478
	Konseptual	31	1,3023	10,76892	1,93416

Sumber : Data output SPSS 22

Table 4. Independent Sample T-test Results

Data	t	Df	Sig. (2-tailed)	Perbedaan rerata	Perbedaan std. Error
N-Gain Numeracy Skills	20,290	61	0,000	52,08079	2,56682

Sumber : Data output SPSS 22

Based on the data in table 3 of the group statistics output, it can be seen that the Mean N-gain percent value for the mental calculation class is 53.3831% or 53.38%, meaning that the use of the mental calculation method in learning mathematics is effective enough to improve students' counting skills in learning mathematics the material of integer counting operations. While for the conceptual class, the N-gain percent was obtained at 1.3023% or 1.30%, meaning that conceptual learning is not effective in improving students' counting skills in learning mathematics integer counting operations. Furthermore, based on the output of table 4, the significance (sig 2-tailed) is 0.000. The value is smaller than 0.05 (sig 0.000 < 0.05), so it can be concluded that there is a significant difference between the average value of the counting ability of the mental calculation and conceptual classes. so that the hypothesis "The counting ability of students who use the Mental calculation method is higher than those who use conceptual learning." (sig 0.000 < 0.05).

CONCLUSIONS

The experimental group got a higher Mean N-gain score of numeracy skills. Thus, the researcher can conclude that the method of storytelling is effective enough to improve counting ability in the material of integer operations of class VII semester 1 SMP Negeri 7 Brebes. Theoretically, this research illustrates the effect of the use of the storytelling method on counting skills on the material of integer operations in junior high school students, so the implication of this research is that it can be used as a consideration in designing learning and using the storytelling method on students' counting skills. Recommendations from the results of this study are intended for schools to make school programs with the method of looking up, for teachers to use the method of looking up in learning, and for students to take mathematics lessons at school seriously, enthusiastically, pay attention to the explanation of the teacher and at home learn more material that has been taught in order to become an outstanding student, so that they can continue to a higher level of education.

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