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Is it required to remove borrowing techniques in clearly subtraction operations in elementary school?

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Abstract. Operational learning on chunks, especially subtraction operations conducted in grade II elementary school, is still an important and interesting issue to discuss, and one of the problems in learning to count the number of counts is the application of borrowing techniques. There are still many teachers who are learning this part unreasonably to the students because it is too abstract and tends to provide a forced way and does not offer a contextual strategy to the students. Operational learning on chunks, especially reduction operations conducted in grade II primary school, is still an important and interesting issue to discuss and discuss, and one of the problems in learning to count the number of counts is the application of borrowing techniques. There are still many teachers who are learning this part unreasonably to the students, because it is too abstract and tends to provide a forced way and does not offer a contextual strategy to the students. The problem mainly arises when the number is reduced in the form of hundreds or thousands that contain the number 0. The subtraction algorithm offered by teachers is in fact very difficult to understand by students. As a result, many errors are made by students in the operation of counting numbers like this. This study aims to provide alternative solutions for teachers in completing the reduction of counting operations, especially on the use of borrowing techniques. This research uses a descriptive method where researchers collect data and studies that related to the process of reducing the number of counting done by the students.

1. Introduction

Learning in primary schools has three basic skills, namely, students are able to read, write, and count. The principle of mathematics learning is from simple to complex, from concrete to abstract, and from the immediate environment to the wider environment. According to the curriculum of 2013 primary education that in the second grade of elementary school has been given the subject matter of the main calculation operation (addition, subtraction, learning mathematics at elementary level especially in low grade is a learning that is still concrete) According to Piaget students at elementary school is in phase (concrete operational stage) [1]. At this stage, students are only capable of reasoning and logical thinking in accordance with the specific or concrete things. Therefore learning mathematics should adjust to the life of students. The task of a mathematics teacher is to help students get the information, ideas, skills, values and ways of thinking and how to express an opinion [2]. Among the tasks above there is the most important task that is able to guide students about how to learn the truth, how to solve problems so that it can be used for the future learning basic operational calculations that include addition and subtraction,
Suradi stated that understanding the concept of count operation affects the mathematics learning achievement of students in primary school [3].

A study revealed that fractions were more difficult than decimals or whole numbers for low ability students. Low ability students tend to use rule-based methods more often than high ability students [4]. Students’ errors are often systematic and rule-based rather than random [5]. In addition to student inventiveness, the errors may be caused by the instruction that focuses on rote memorization. Students abstract or generalize procedures from following the steps in the works-out examples, but their knowledge of the rules and procedures. Study on error patterns in computation also supports this [6]. The first step students’ in this process, recognizing the errors, is accomplished through a systematic examination of students mathematics work [7]. Note that teachers need to be more sensitive to what pupils do compose successfully. In fact in elementary school, learning mathematics especially on the material operation of the subtraction of the number of students counting difficulties and mistakes in solving the problems given the teacher. In the case of subtraction of the counting number, for example, if the first number is smaller than the deductible number, or which is usually solved by borrowing technique then the student has difficulty to subtraction it. For example: below student answer sheet.

| LATHAN SOAL MATEMATIKA OPERASI HITUNG | LATHAN SOAL MATEMATIKA OPERASI HITUNG |
|----------------------------------------|----------------------------------------|
| PENGURANGAN BILANGAN CACAH             | PENGURANGAN BILANGAN CACAH             |
| KELAS II SD                            | KELAS II SD                            |
|                                         |                                         |
| A. Identitas Siswa                     | A. Identitas Siswa                     |
| Nama Lengkap                           | Nama Lengkap                           |
| Kelas                                  | Kelas                                  |
|                                         |                                         |
| B. Petunjuk Pengisian                  | B. Petunjuk Pengisian                  |
| 1. Waktu mengerjakan soal 30 menit     | 1. Waktu mengerjakan soal 30 menit     |
| 2. Kerjakan soal dengan teliti        | 2. Kerjakan soal dengan teliti        |
| 3. Kerjakan terlebih dahulu soal yang dianggap mula              |
|                                         |                                         |
| C. Pertanyaan                          | C. Pertanyaan                          |
| 1. Kerjakanlah soal di bawah ini dengan benar!                |
| a. 288                                 | a. 288                                 |
| b. 96                                  | b. 96                                  |
| c. 300                                 | c. 300                                 |
| d. 200                                 | d. 200                                 |
| e. 245                                 | e. 245                                 |
|                                         |                                         |
| Figure 1. Photograph of student’s answered.                     |

The type of error is the basic fact of subtraction, student errors are often systematic and rule-based rather than random [8]. Students might overgeneralize the rule for subtracting subtractions to multidigit subtraction problems if they are taught to subtract the smaller from the greater number. Similarly, if students are exposed to borrowing only two digits subtractions, they may overspecialize borrowing from the units-digits to multi-digit subtractions [9]. The error lies in the time they make a subtraction of the
number smaller than the number of the reducer. The procedure is correct, but in determining the result of the reduction is wrong. Forgot to subtract the loan at the time of unit reduction by unit, tens of tens and thousands of thousands. In addition, the lack of teacher strategy in teaching.

In order to correct the errors that students have made in count deduction operations, this study focuses on reducing students' errors and eliminating "borrowing techniques" on count deduction operations for elementary school students. The purpose of this study is to obtain a clear explanation as an alternative solution to overcome learning errors in counting operations in primary schools.

2. Method
This research uses a descriptive method where researchers collect data and studies that related to the process of subtraction the number of counting done by the students. This research is in the form of descriptive because the purpose to be submitted in this research to try not to use a lending technique in doing the matter of counting count operation. This research is still is a preliminary study for more in-depth review of the need for or whether or not to make a reduction with borrowing techniques. The instrument used tested the test to grade 2 students and teachers at Elementary School in an East Jakarta Rawamangun primary school. In addition to the tests, it also uses interviews with class teachers in order to obtain more accurate data collection. Data collection techniques using tests. While the technique of data analysis is done by checking the test results and analyzing student answers.

3. Results and discussion
Based on the results of interviews and experiments in the study found that teachers still use lending methods and have no alternative other solutions in lesson deductions. Teachers in preparing the learning materials should change the paradigm of learning mathematics that tends to be convergent to become more divergent, by opening as many ways or strategies mastery of mathematical concepts. The direction of learning about the algorithm or how to obtain a mathematical problem-solving concept should be more open and make sense according to the student's experience in daily maths.

The results of data analysis state that student errors are located almost every number. Of the 5 questions done by 10 students, the most mistakes made by the students lie in the problem of using the number of deductions greater than the number to be reduced, the error when the student completes the number in the hundreds in the tens and the unit is smaller than tens and units of reduction. When the reduction operation involves borrowing the respondent directly reduces a large number of the small number, subtracting the zero to fix. In addition, the child is hard to explain what he wrote. This is seen when interviews with students there are some students who ignore the answer because they can not give the reason for the answer he wrote. The cause of this error is due to the low way of thinking of students in understanding the concept. Conceptual knowledge should be defined as “knowledge about facts, generalizations, and principles”, without requiring that the knowledge be richly connected [10]. Here is one of the strategies of learning mathematics that can be developed by teachers to make learning more fun, on the subject material with the technique of borrowing.

3.1. Utilizing context (everyday events / events)
Characteristic of RME is that rich, “realistic” situations are given a prominent position in the learning process. These situations serve as a source for initiating the development of mathematical concepts, tools, and procedures and as a context in which students can in a later stage apply their mathematical knowledge, which then gradually has become more formal and general and less context specific [11]. Based on Freudenthal’s (1977) idea that mathematics – in order to be of human value – must be connected to reality, stay close to children and should be relevant to society, the use of realistic contexts became one of the determining characteristics of this approach to mathematics education.[12]. The main difference with the mechanistic and structuralistic approaches is that realistic mathematics education does not start from abstract principles or rules with the aim to learn to apply these in concrete situations, nor does it focus on an instrumental type of knowledge. The process of constructing knowledge and principles by the pupils themselves gets the main emphasis. As Freudenthal (1978) puts it, this reflects
a shift from mathematics as a created subject (created by others, especially mathematicians) towards mathematics as a subject to be created. This implies a more dynamic view of mathematics: mathematical actions and the process of developing strategies gets much more attention in comparison with static clear-and-cut knowledge. Freudenthal (1991) emphasizes that this presents children with the opportunity to ‘reinvent’ mathematical ideas [13].

Frequently the learning of traditional written algorithms was associated with an endless sequence of memorizing and forgetting facts and procedures that make little sense to the students [14]. In effect these criticisms echo that over emphasis on teaching traditional written algorithms resulted in “frustration, unhappiness and deteriorating attitude to mathematics” [15].

How to solve the following problem: 300 - 15 =...?
During this time almost, all teachers will do it one way by “down stack reduction”. But when they were asked to explain how the outcome of the operation resulted, almost all the teachers gave way and explanation that did not make sense, because usually when they had to subtract 0 by 5 teacher explanations it did not make sense with “borrowing techniques done” lending a dozen of 0 in the tens, because 0 then borrowing followed by borrowing 1 hundreds of 3 hundred, so that actually will be obtained the circumstances,

\[
\begin{array}{cccc}
300 & \text{borrowing techniques will make} & 200 & \text{and} \quad 100 \quad \text{of these things-} \\
15 & - & 15 & - \\
\end{array}
\]

It is no different from the original state of affairs! The question remains unreachable.

Teachers should develop by exploiting the everyday context to solve this. The context in question is a state or thing that is in the daily life of students who contain it and can be utilized to approach the learning of mathematics! The corresponding contest is a "Counting machine" or "Speedometer".

![Figure 2. Counting machine and speedometer.](image)

Students can be given demonstrations of how this tool works. This tool has uniqueness when stay counting state will go to tens, hundreds, ritual or tribe. When a counting will lead to the numbers the state of numbers will show like:

\[
\begin{array}{cccc}
99 & 199 & 299 & 399 & 4999 & 5999 & \ldots \\
\end{array}
\]

When a pressure is applied to the counting device on the state of the upper number then the student will see the number change in the counting tool becomes

\[
\begin{array}{cccc}
100 & 200 & 300 & 400 & 5000 & 7000 \\
\end{array}
\]

Through the observation of this demonstration students are invited to understand the situation that,

100 means 99 + 1
200 means 199 + 1
400 means 399 + 1
5000 means 4999 + 1...
This situation can be used to solve the above abatement problem more pleasantly and sensibly without reduction operations with borrowing techniques! Even with this learning, the reduction operations with borrowing techniques can be eliminated equally once from the subject matter, namely:

\[
\begin{array}{c}
300 \\
15 \\
285 \\
\end{array} \quad \text{to be} \quad \begin{array}{c}
300 \\
299 \\
1 \\
285 \\
\end{array}
\]

The development of this material is to find a reduction in numbers that typically use borrowing techniques, for example:

\[
\begin{array}{c}
4 \quad 3 \quad 5 \\
\hline
5 \quad 8 \\
\end{array}
\]

The materials used for teaching standard traditional algorithms include ten frames and counters followed by the use of bundle sticks and place value charts for the learning of the four vertical algorithms of addition, subtraction, multiplication and division. The language that is used is designed to promote meaning. For example if 18 is to be taken away from 45, the connecting language would be “Start with the ones, I have 5 ones, can I take away 8 ones? No. Rename one ten into 10 ones, now there are 15 ones…” Such explicit language makes the relationships between what is being modelled with the materials and the symbolic recording of the processes meaningful [16]. Contend that the repetitive use of the focusing questions and explanatory nature of the language associated with teaching and doing the algorithms helps students to remember the processes and meaning underpinning the algorithms.

4. Conclusions
The result of this study concludes that the type of error in counting operation of deducting counting numbers, that is the type of basic fact fault and the most mistake is the lack of master understanding of deduction concept and the teacher only use a lending method and there is no other alternative solution. So low the way students think in understanding the concept of mathematics. To overcome this then one alternative solution that researchers offer is to utilize the context. Make learning fun and plausible without using borrowing techniques.
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