



Four New Techniques of Addition and Subtraction of any Two Numbers

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ABSTRACT: The addition and subtraction operations are some of the most basic mathematical arithmetic operations. The arithmetic operation in the form of addition and subtraction in integer is a basic arithmetic operation that elementary school students must master from an early stage. In fact, there are some students who have difficulty in adding up numbers with existing techniques, namely the saving technique for addition and borrowing technique for subtraction. The problem happened because students forgot that they had saved or borrowed numbers. Eventhough the technique was done correctly, the answer was still incorrect. Therefore, researchers developed several addition and subtraction techniques without saving and borrowing. There were four techniques that had been developed in this research namely multi-level, box, and stacking and table techniques. These new techniques had advantages in making students easier to solve addition and subtraction problems.

KEYWORDS: Addition, Subtraction, New Techniques, Two Numbers

INTRODUCTION

The addition and subtraction are some of the most basic mathematical arithmetic operations. According to Ariani's opinion (2010: 60), addition is a basic operation in mathematics that is used to obtain the sum of two or more numbers. Sri Subarinah (2006: 29) also states that addition is combining two groups. The addition operation on an integer is a rule that associates each pair of integers. If a and b are integers, then the sum of the two numbers is denoted by " $a + b$ " which is read as " a plus b " or "the sum of a and b ".

Sri Subariah (2006: 30) argues that subtraction is the opposite of the addition operation. An integer defines subtraction using addition. If integer a is subtracted by integer b to give integer c (denoted by $a - b = c$), then the corresponding addition operation is $b + c = a$.

The arithmetic operation in the form of addition and subtraction in integers is a basic arithmetic operation that elementary school students must master from an early stage. However, there were several students who had difficulty in adding numbers using the borrowing technique. At this stage, students were not able to think logically because their orientation was still related to concrete objects. Students could understand the existing definitions, but they had not been able to formulate these definitions by themselves and master verbal symbols and abstract ideas. Therefore, learning mathematics at the elementary level should be adjusted to the characteristics of students as well as the objectives, so learning mathematics becomes useful and relevant for students' life.

According to Shadiq (2006), the main task of math teachers is helping students to get information, ideas, skills, values, and build their ways of thinking and expressing opinions. Based on the case, the researcher developed a new technique, namely multilevel, square and break down, and table technique. These new techniques will give advantages in making students easier to solve addition and subtraction problems without using borrowing and saving techniques.

METHODOLOGY

This study used mathematical inductive-deductive techniques with undergrounded theory phases. Visualization through the specific illustration given by the researchers was the simplest step to generalize. The researcher integrated the simplest software such as Matlab and Excel to test the reliability of the results. After generalizing, the researcher brought this technique into classroom to do try out and development whether the results have reached the target or not. The steps which were carried out in this research were: 1) Observing problems from the research subjects, 2) conducting problem-posing activities in the classroom,



3) Giving some initial solution to the students, 4) analyzing and developing the cases research subjects' deeply, 5) Disseminating the results to test the accuracy, 6) Analyzing to generalize the cases, 7) concluding the results.

RESULT

This section provided the result of the new four addition and subtraction techniques. The researcher had four addition and subtraction techniques, namely a multilevel, square and break down technique, and table technique. The results of four techniques were shown in the following:

Addition

addition without saving	addition with saving
$23 + 14 =$ $23 + 14 = 37$ 	$63 + 18 =$ $63 + 18 = 81$
$231 + 25 =$ $231 + 25 = 256$ 	$563 + 49 =$ $563 + 49 = 612$
$435 + 361 =$ $435 + 361 = 796$ 	$855 + 361 =$ $855 + 361 = 1216$
$6572 + 314 =$ $6572 + 314 = 6886$ 	$6572 + 359 =$ $6572 + 359 = 6931$

Algorithm 1.

- Summed the numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Drew a line from the numbers that had the value of the ones in the number on the left with the number that was the value of the ones in the number on the right, placed the sum on the line that connects the two numbers.



- Drew a line from the tens number on the left to the tens on the right, and so on until the last digit.
- If the sum results in a two-digit number then wrote the last number above the line and the number in front of it, placed it on the next line
- If there was the last number that did not have a match, then that number was transferred directly to the answer, placed in front of itself /the far left of its own
- Wrote the result of the answer above the line starting from the far left or top digit

Done

Subtraction

Subtraction without borrowing	Subtraction with borrowing
$53 - 21 =$ 	$63 - 18 =$
$874 - 43 =$ $874 - 43 = 831$ 	$563 - 49 =$ $5^5 6^1 3 - 49 = 514$
$653 - 521 =$ $653 - 521 = 132$ 	$78155 - 361 = 494$
$6577 - 314 =$ $6577 - 314 = 6263$ 	$56156712 - 759 = 5813$

Algorithm 2.

- Subtracted numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Drew a line from the number that was the unit value on the number on the left with the number that was the unit value on the number on the right, placed the result of the subtraction on the line connecting the two numbers
- Drew a line from the tens number on the left to the tens on the right, and so on until the last digit
- If there was a number that could not be subtracted then borrow one number in the number in front of it (crossed the number in front of subtracting one and added one in front of the number behind it)
- If there was the last number that did not have a match, then that number was transferred directly to the



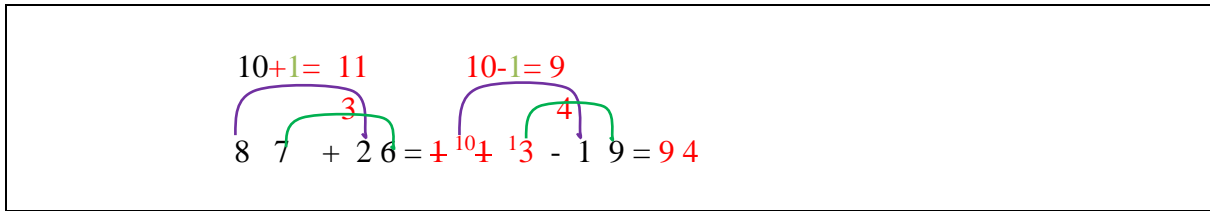
answer, placed in front of itself / the far left of its own

- Wrote the result of the answer above the line starting from the far left or top digit

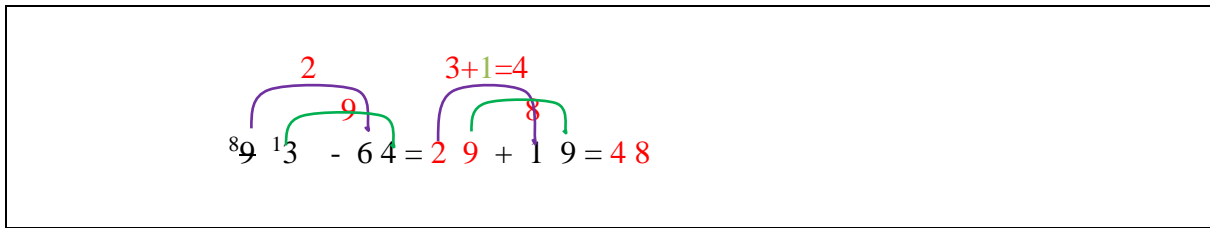
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Multilevel operations

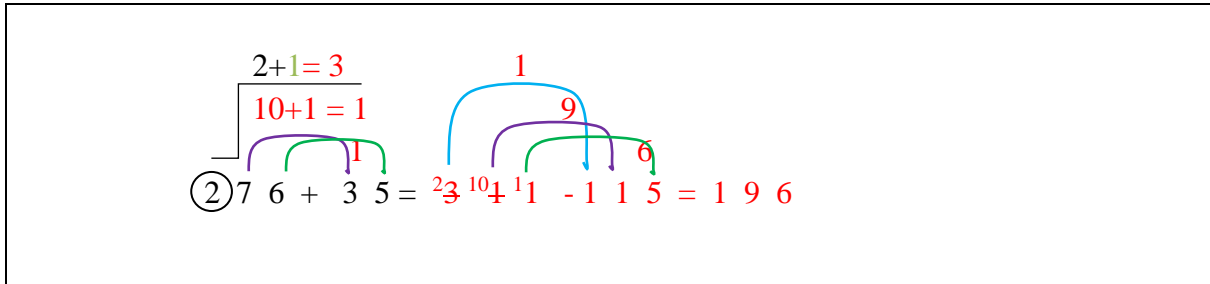
87 + 26 - 19 =



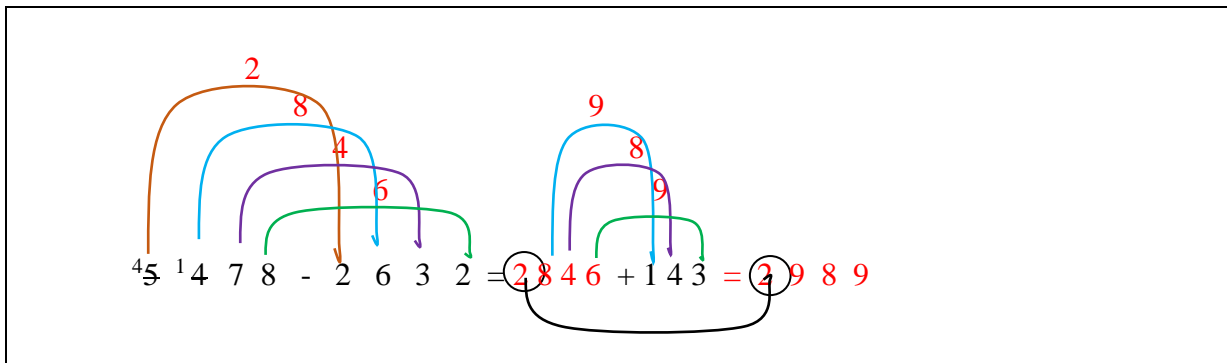
93 - 64 + 19 =



376 + 35 - 115 =



5478 - 2632 + 143 =





Algorithm 3

- If the arithmetic operation started with addition followed by subtraction, performed the addition according to the first method for addition followed by subtraction according to the second method for subtraction, vice versa
- If the arithmetic operation started with subtraction followed by addition, subtracted according to the second method for subtraction followed by addition according to the first method for addition.

Done

Grade Technique

Addition of savings without saving	Substraction of borrowing without borrowing
<p>63 + 18 =</p>	
<p>563 + 49 =</p>	
<p>855 + 361 =</p>	
<p>6572 + 359 =</p>	

- Graded technique: Substraction of borrowing without borrowing
 - Addition was done if the first number could not be subtracted, if the first number could be subtracted then it was still subtracted
 - If the first number was smaller then added the addition by adding the pairs of numbers that subtract and the number in front of them was added by 1



Algorithm 4.

Addition without saving

- Summed the numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Drew a line from the numbers that had the value of the ones in the number on the left with the number that was the value of the ones in the number on the right, placed the summed on the line that connects the two numbers
- Drew a line from the tens number on the left to the tens on the right, and so on until the last digit
- If the sum results in a two-digit number then write all the numbers above the line
- If there was the last number that did not have a match, then that number was transferred directly to the answer, place in front of itself / the far left of its own
- Wrote the result of the answer above the line starting from the number that was the most left or the top by giving a sign [...] of each answer
- Added all of them, starting with the last number (the first number in the first number was added to the last number in the second number, the starting number in the second number was added to the last number in the third number, and so on).

Done

Algorithm 5.

Subtraction without borrowing

- Subtracted numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Drew a line from the number that was the unit value on the number on the left with the number that was the unit value on the number on the right, placed the result of the subtraction on the line connecting the two numbers
- Drew a line from the tens number on the left to the tens on the right, and so on until the last digit
- If there was a number that could not be deducted, wrote down the pair of the subtraction number (crossed the subtraction number replaced with the pair that results in the number 10 (example: pair 7 is 3, pair 4 was 6) and add one in front of it). After turning into a partner, it no longer functioned as a subtraction, but was added up, and other than those who use a partner, it was still subtracted.
- If there was the last number that did not have a match, then that number was transferred directly to the answer, place in front of itself / the far left of its own
- Wrote the result of the answer above the line starting from the far left or top digit

Done



Table technique

Addition of savings without saving	Substaction of borrowing without borrowing																														
$56 + 34 =$ <table border="1"> <tr><td>5</td><td>6</td><td></td></tr> <tr><td>3</td><td>4</td><td>+</td></tr> <tr><td>8</td><td>10</td><td>90</td></tr> </table>	5	6		3	4	+	8	10	90	$56 - 25 =$ <table border="1"> <tr><td>5</td><td>6</td><td></td></tr> <tr><td>2</td><td>5</td><td>-</td></tr> <tr><td>3</td><td>1</td><td>31</td></tr> </table>	5	6		2	5	-	3	1	31												
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Algorithm 6.

Addition without saving

- Wrote down the numbers to be added arranged downwards, aligned starting from the very back then drew a line down according to the place value (units, tens, hundreds, etc.)
- Summed the numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Placed the sum below the number that had been added
- If the sum result was a two-digit number then wrote all the numbers below it
- If there was the last number that had no pair to add to it, that number was derived
- Add all of them, starting with the last number (the first number in the first number was added to the last number in the second number, the starting number in the second number was added to the last number in the third number, and so on).

Done

Algorithm 7.

Deductions without borrowing

- Wrote down the numbers to be subtracted arranged downwards, aligned starting from the very back number then drew a line down according to the place value (units, tens, hundreds, etc.)



- Subtracted numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Placed the result of the subtraction below the number that was subtracted
- If there was a number that could not be deducted, wrote down the pair of the subtraction number (crossed the subtraction number replaced with the pair that results in the number 10 (example: pair 7 is 3, pair 4 is 6) and added one in front of it). After turning into a partner, it no longer functioned as a subtraction, but was added up, and other than those who used a partner, it was still subtracted.
- If there was the last digit that does not have a match then that number was lowered

Done

Square technique

Addition of savings without saving	Substraction of borrowing without borrowing																																																																																																												
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Algorithm 8.

In this technique, both addition and subtraction must be the same number of digits, if the first number was 3 digits and the second was 2 digits then the second number was added with a leading zero so that they both had the same digit.

Addition without saving

- Wrote down the numbers to be added to the side, align them starting from the very back then drew a vertical and horizontal line according to the place value (units, tens, hundreds, etc.)
- Unpacked all numbers according to their place values (eg 76 means 7 becomes 70) write them below.
- Summed the numbers sideways from the top to the bottom in sequence (thousands, hundreds, tens, units)
- Placed the sum in the middle of the added number and straightened it from the rightmost number
- Added the sum back down

Done

Algorithm 9.

Subtraction without borrowing

- Wrote down the numbers to be subtracted arranged sideways, aligned starting from the very back then drew a vertical and horizontal line according to the place value (units, tens, hundreds, etc.)
- Unpacked all numbers according to their place value (eg 867 means 8 becomes 800) write below it.
- Subtracted the lateral numbers from the top down in sequence (thousands, hundreds, tens, units)
- Placed the subtraction result in the middle of the number that was subtracted and straighten from the rightmost number
- If there was a number that could not be deducted, wrote down the pair of the subtraction number (crossed the subtraction number replaced with the pair that results in the number 10 (example: pair 7 is 3, pair 4 is 6) and added one in front of it). After turning into a partner, it no longer functioned as a subtraction, but was added up, and other than those who used a partner, it was still subtracted.
- Added the subtraction results down

Done



Table technique

Addition of savings without saving	Substaction of borrowing without borrowing
$56 + 34 = 90$ 	$56 - 25 = 31$
$758 + 93 = 851$ 	$758 - 93 = 665$
$376 + 634 = 1010$ 	$896 - 687 = 209$
$7643 + 439 = 8082$ 	$7643 - 839 = 6804$

Algorithm 10.

In this technique, both addition and subtraction must be the same number of digits, if the first number was 3 digits and the second was 2 digits, then the second number was added with a leading zero so that they both had the same digit.

Addition

- Wrote down the numbers to be added, arranged vertically and horizontally, then drew a line down and sideways according to the place value (units, tens, hundreds, etc.)
- Summed the numbers from the left / most front numbers in the sequence (thousands, hundreds, tens, units)
- Put the sum in the column that connects the two numbers, wrote one number for one column and wrote the sum in two digits, wrote the next number in the column behind it
- Added up according to the column, starting by adding from right to left or vice versa).



- If there was the sum of two numbers, wrote all in one column above it
- Added the sum of two digits (the first number in the two-digit number was added to the last number in the next number and so on if there was a two-digit sum result)

Done

Algorithm 11.

Subtraction

- Wrote down the numbers to be subtracted, arranged vertically and horizontally, then draw a line down and sideways according to the place value (units, tens, hundreds, etc.)
- Subtracted numbers from the right/backmost numbers in the sequence (units, tens, hundreds, etc.)
- Placed the subtraction result in the column connecting the two numbers.
- If there was a number that cannot be deducted, wrote down the pair of the subtraction number (crossed the subtraction number replaced with the pair that results in the number 10 (example: pair 7 is 3, pair 4 is 6) and add one in front of it). After turning into a partner, it no longer functioned as a subtraction, but was added up, and other than those who used a partner, it is still subtracted.
- Wrote down the results in the appropriate column

Done

DISCUSSION

Based on the results of this study, the four new techniques had both advantages and disadvantages. The use of multilevel techniques, square and break down, and table techniques were able to ease students in calculating the addition without saving and subtracting without borrowing. In other words, it could indirectly help students solving addition and subtraction problems in everyday life without remembering the savings or borrowing steps. It was believed that studying mathematics was very useful for elementary students since it had benefits of their daily lives. The interests of their environment to form a logical, systematic, critical, and careful mindset can be used to study other sciences (Tiurlina, 2006: 16). Besides, this technique also had weakness. If there were addition and subtraction with numbers that had large numbers and many digits, then students needed more boxes that impacted on the difficulty in the process of adding numbers in the box. In addition, the advantage of the box technique was that it considered as the most practical and the easiest technique to apply. It could also be used for larger numbers with large numbers. As a result, this implies that calculating addition and subtraction using the square technique will be faster than the cascading technique, and even tables compared to other techniques. But in this subtraction technique without borrowing, we must be able to memorize pairs of numbers that produce the number.

CONCLUSION

This research is the result of developing new addition and subtraction techniques that have not been used before. These four new techniques have their advantages and disadvantages that can make students easier to do addition without saving and subtraction without borrowing quickly and precisely. However, several new techniques need to be continuously developed so that students have many choices in solving addition and subtraction problems. Thus, the development of the next latest technique is indispensable.

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REFERENCES

1. Antonius Cahya Prihandoko. (2006). Memahami Konsep Matematika Secara Benar Dan Menyajikannya Dengan Menarik. Jakarta: Depdiknas.



2. Ariani, Nita dan Dina Lianita Sari. 2010. *Ensiklopedia Matematika*. Depok: Arya Duta.
3. Gazali, Rahmita Yuliana. 2016. Pembelajaran Matematika yang Bermakna. *Jurnal Pendidikan Matematika* Vol. 2, No. 3, September – Desember 2016 STKIP PGRI Banjarmasin
4. Kartika, I. K., & others. (2012). Pengaruh Pendekatan Pembelajaran Matematika Realistik dan Penalaran Operasional Konkret terhadap Prestasi Belajar Matematika Siswa Sekolah Dasar Negeri 1 Semarapura Kangin. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, 7(1). Retrieved from http://119.252.161.254/ejournal/index.php/jurnal_pp/article/view/20
5. Pangastuti, Sonia. 2018. Pengembangan Media Papan Flanel Berbasis Lingkungan Pada Pembelajaran Penjumlahan Dan Pengurangan Bilangan Cacah Di Kelas I Sekolah Dasar. Di akses dari <https://repository.unja.ac.id/id/eprint/4418> tanggal 8 Maret 2021
6. Rakhimah. 2020. Penerapan model kooperatif tipe NHT untuk meningkatkan aktivitas dan hasil belajar matematika pada materi penjumlahan dan pengurangan bilangan Cacah kelas I MIN 10 Aceh Besar. *Jurnal Pendidikan dan Pengabdian Vokasi*, vol 1, no 2 (JP2V)
7. Shadiq, Fajar. 2006. Implikasi Konstruktivisme Dalam Pembelajaran Matematika Sekolah Dasar. Di akses dari https://fadjar3g.files.wordpress.com/2007/09/med2-konstruksd-ok_median_.pdf tanggal 8 Maret 2021
8. Sri Subarinah. (2006). *Inovasi Pembelajaran Matematika SD*. Jakarta: Departemen Pendidikan Nasional.
9. Suharta, G. P. (2003). Kemampuan Guru-Guru Sekolah Dasar dalam Memecahkan Masalah Matematika Realistik. *Jurnal Pendidikan dan Pengajaran IKIP Negeri Singaraja*, (4)
10. Tiurlina, dkk. 2006. *Model Pembelajaran Matematika*. Bandung: Upi Press,