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Student strength -101
Teacher strength - 4

Teaching Subtraction using math Manipulatives

Background about school: Most children are first generation learners in the School. Parental care is very low and the students come from poor families.

Some key areas of interest : Drawing & craft work, debates and discussions.

Why I was interested in joining the teachers' circle :
To share and receive teaching ideas and guidance from other experienced teachers

Summary of the different things I did last year :
Prepared my students to participate in competitions and learning activities; did art and craft work; Created lesson plans, resources and songs.

Experience Sharing

Classroom challenge:

In Subtraction, it is difficult for students to understand the borrowing method. It takes time to make them understand this concept. Only when the foundational concepts of addition and subtraction are strong in their minds, do children progress to understand multiplication and division.

How I planned to work on this objective :

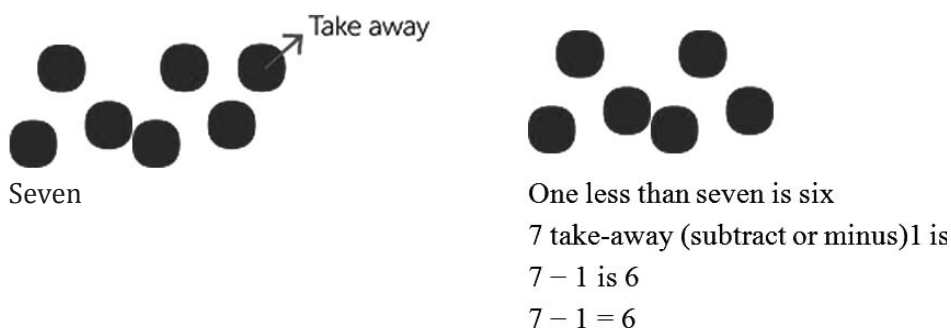
Generally, subtraction is considered complex for primary school children. It is important to teach subtraction in the easiest way possible without complicating it for children. So I designed a way to teach two digit subtraction to my 2nd grade students using videos, fixed boards and real life materials.

Summary of teaching and assessment approach:

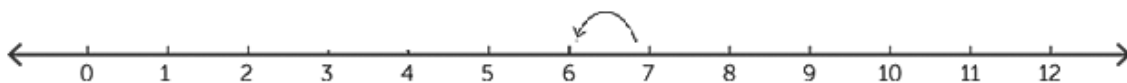
Initially I evaluated their prior knowledge by giving them a test on single digit subtraction. They did very well in that.

Here are some of methods I used to help them recall the concept of subtraction :

I used counters (manipulatives) to demonstrate subtraction.



'One less' can also be illustrated on the number line:



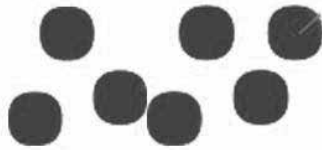
After sufficient exploration, children began to recall the subtraction 'fact' quickly, without having to think for very long about it. We call these methods quick or automatic recall of facts. This serves as a foundation to develop higher level math skills. Here they simply do not memorize but understand the process involved.

Then I introduced double digit subtraction in the usual method to identify areas they struggle. I found that they were making mistakes in the area of regrouping. Then I explained that concept using learning materials in a detailed manner

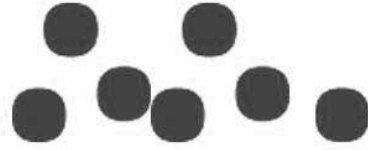
First I explain and compare the place value of tens and ones in two methods - Subtraction with and without regrouping

I used counters (manipulative) to demonstrate addition

When we connect addition and subtraction, it will help children understand addition and subtraction. Grouping and regrouping has been found to help understanding of the structure of place value, being able to partition larger number into tens and units (Fischer 1990). I did similar work with children using Multi base Arithmetic Blocks (MAB)



Seven



One more than seven is eight

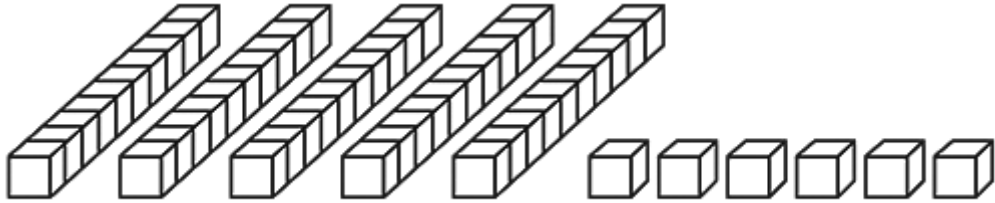
7 and add one more is 8

$7 + 1$ is 8

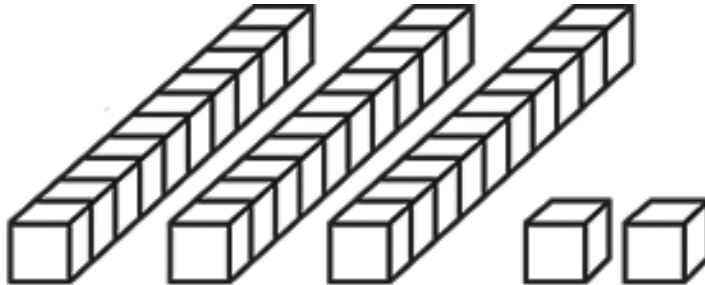
$7 + 1 = 8$

Subtraction without regrouping method:

E.g. I taught students to do subtraction of a double digit number by another double digit using MAB. For example, to subtract 24 from 56 we make the number 56 using 5 tens and 6 ones



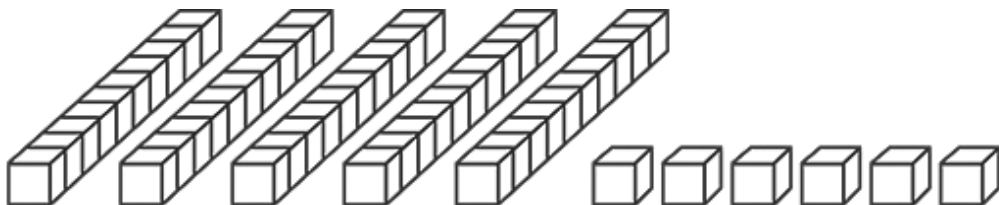
Then take-away 4 ones and 2 tens, which leaves 32.



Subtraction with regrouping:

Trading, or decomposition, relies on the student understanding that ten ones can be traded for one ten.

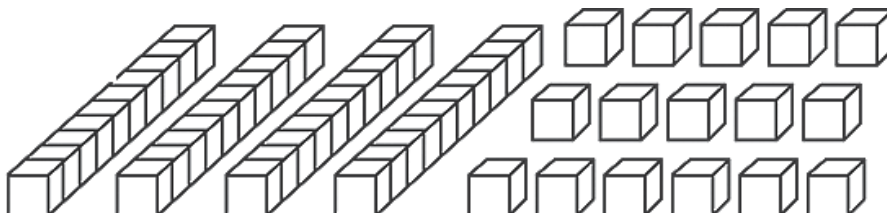
To calculate $56 - 19$, we make the number 56 using 5 tens and 6 ones with MAB.



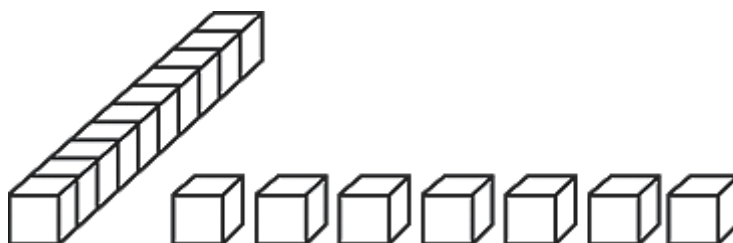
The next step is to take 9 ones. To have enough ones we need to 'trade' one ten for ten ones:



Making 4 tens and 16 ones



Now we can take 9 ones and 1 tens, which results in



The calculation $56 - 19 = 37$.

The regrouping is an important step.

$$\begin{aligned}
 & 56 - 19 \\
 = & 40 + 16 - (10 + 9) \\
 = & 40 - 10 + 16 - 9 \\
 = & 30 + 7 \\
 = & 37
 \end{aligned}$$

Reflections

What improvements did you make in the course of teaching, your assessment of why this works / what could be further improved

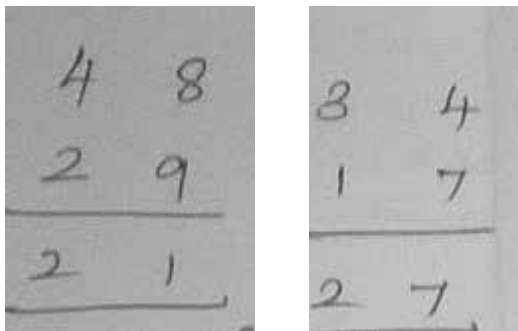
Rather than explanation method, students were much more interested to learn math using activities. They actively participated in the activities, watching videos and came forward to clear their doubts. Now children are able to do two digit subtraction without mistakes.

Student error in subtraction :

These are two commonly found problems while doing subtraction.

Here in the first one, student subtracts the small number from the big number (9-8 and 4-2) and in the second problem they subtract only if the small number is below the big number (3-1). One may not find these issues if the smaller digits are below the bigger digits.

To address this problem I showed some videos from Khan Academy website.



<https://www.khanacademy.org/math/arithmetic/addition-subtraction/sub-borrowing/v/basic-regrouping-or-borrowing-when-subtracting-three-digit-numbers>

<https://www.khanacademy.org/math/early-math/cc-early-math-add-sub-100/subtraction-within-100/v/subtracting-2-digit-numbers-without-regrouping>

After watching videos and using worksheet. My students were able to perform better than earlier.

Way forward

The next plan is to search for methods to teach three or more digits subtraction to my students.

Reference

Fisher, F.E (1990) 'the part-part-whole curriculum for teaching number in the kindergarten' Journal for Research in Mathematics Education, 21 (3): 207-215