# AL ABACUS

Teaching Number Sense - The Value of the AL ABACUS

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The Importance of Number Sense

A basic understanding of number sense is foundational for solving algebra, geometry, fractions, and computation problems (Powell & Fuchs, 2012). In fact, specific weaknesses in counting (one-to-one correspondence), subitizing, and magnitude estimation have been linked to mathematical difficulties. Research suggests that early intervention targeting these competencies may profoundly increase mathematical achievement in students typically underserved by the educational system (Gersten, Jordan, & Flojo, 2005).
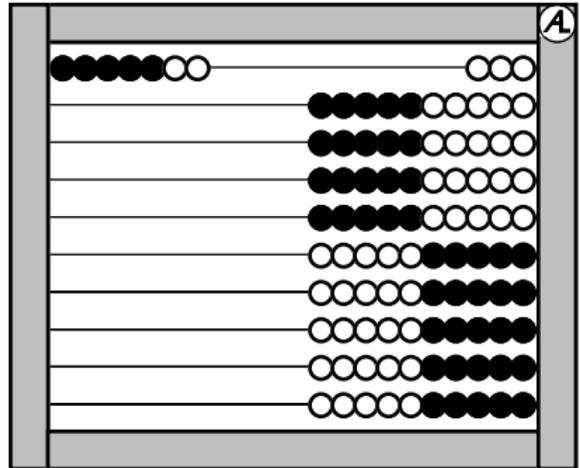
The English Number System is Complex!

The English language, twenty-eight unique names are used to count one to one hundred. For instance, tens value numbers are represented by different word endings –teen and –ty, which not only complicates number memorization but also contradicts our place-value system as the ones component of –teen numbers precedes the tens component. On the other hand, in Asian dialects only eleven unique number names are needed to count to one hundred. Numbers beyond ten are simply broken down into quantities of ten followed by the name for the single digit that follows. For example, the number 23 is spoken "2-ten 3". Thus, implicitly, Asian dialects foster deep understanding of composition and decomposition because their vocabulary forces children to think about the relationship between digits and their relative position.

What Can We Do About It?

Based on the effectiveness of the Chinese numbering system in preventing math difficulties, Cotter (2000) has suggested tools that make use of this segmentation approach and are relevant in Western contexts. Of particular value, she viewed the AL abacus as the perfect visual counterpart to how numbers are symbolized within the Chinese system as previously addressed. Just like how numbers are grouped by position (23 as "2-ten followed by 3) the AL abacus groups beads in rows of ten. Once students understand this detail, they begin counting numbers in quantities of tens and ones instead of just ones (11 is not eleven-ones but ten followed by 1). This is an important understanding that students must internalize prior to learning double-digit addition because counting on strategies become increasingly time-consuming and tedious as numbers grow in size.

WHY THE AL ABACUS IS AN ESSENTIAL MANIPULATIVE

The best tool for representing quantities to one hundred is the AL abacus, which has two groups of five beads in contrasting colours strung on each of the ten wires. The fact that the two groups of five are contrasting colours is very important as people cannot subitize quantities of six to ten without some type of grouping. It is also crucial that the colours are reversed after five rows as this helps children subitize the number of tens.

We believe using an AL abacus has several advantages over using rods of varying lengths and colours

- For rods representing the quantity of five or greater, only the colour, not the quantity can be visualized as individuals cannot instantly recognize quantities greater than five unless they are grouped.

- Putting two rods together does not give the immediate sum, the student must either compare with third rod or count.

- When the sum is over 10, the rods do not reveal the tens structure. On the AL abacus, the resulting sum is seen immediately as tens and ones.

- Young children frequently regard each rod as a single unit, regardless of length

- Quantities to one hundred can be subitized and visualized

- The "counters" are self-contained so more class time can be spent on instruction and less on the organization and

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Teaching Place Value With The AL Abacus

Showing 37 using the place value cards and the AL abacus:

Materials: AL Abacus, Place Value Cards

Introduce the 3-ten (30) card by pointing to the 3 and saying "three", and then pointing to the 0 and saying "ten". Then the 7 card is introduced as "seven". To show 37 the student must place the 7 card directly on top of the 0 on the 30 card and say "3 ten 7". Next they will label this as "thirty-seven" using correct English terminology. To construct 37 on the AL abacus the student moves 3 rows of 10 beads to represent 30, and then 7 more beads on the fourth row to show 37.
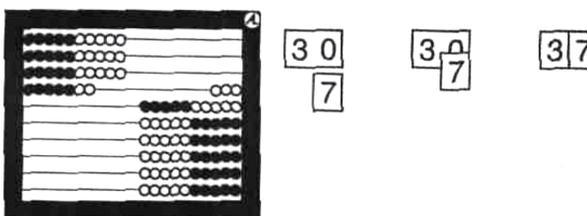
37 (3-ten 7) entered and recorded

Purpose: The purpose of this activity is for students to see the number 37 as 30 and 7, not just the digit 3 joined with the digit 7. It is helpful for students to read the numbers in the normal left to right pattern, not backwards as in the column model. With this hands on activity children are able to visualize and construct our number system.

References

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Gersten, R., Jordan, N. C., & Flojo, J. R. (2005). Early Identification and Mathematics Difficulties. Journal of Learning Disabilities, 38(4), 293-304. http://doi.org/10.1177%2F00222194050380040801

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