

Hey, where do I plug this in? Oh... it's an ABACUS!

This is a highly technical world we are living in, and it is easy to forget that there are simple, manual ways of doing things. In the race to do everything faster, fancier and with more power, the "basics" may get left behind in the dust. It's easy to forget that there is a low tech aid for teaching basic computational skills and arithmetic concepts that doesn't require a screen, synthesized voice output or graphics. It's the abacus.

When I took my original training as a teacher of the visually impaired, part of the course work was learning the abacus, specifically the Cranmer Abacus*, designed as a computational tool for the blind. We were taught to use the abacus with the traditional Japanese procedures, or "secrets" of indirect addition and subtraction. I just couldn't get it.

I had always been a weak Math student, so expecting me to learn a new way to add and subtract was asking a great deal. I vividly remember sitting in class, hearing the instructor say things like, "Now, to add 9, you set 4, clear 5, and set 1 to the left." (Or was it 2 to the right?) My fingers fumbling along the abacus beads were working in the same confused mode as my brain. *Set what? Clear how many? How did you get THAT answer?*

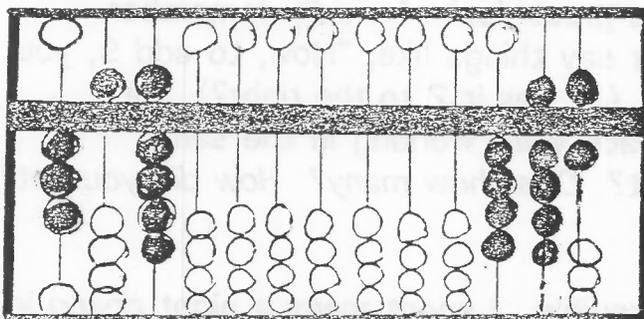
The bewilderment for me was incredible. I spent many a night crying in anger and frustration over the manual, The Abacus Made Easy. (Ha!) The wall of my room became pocked and gouged from the impact of the abacus being flung against it. I finally decided that it was me, and my own poor mathematical abilities that were keeping me from understanding those procedures that may well have been written in Sanskrit for all the sense I could make of them. They truly were "secrets" to me --- I felt like a failure.

As I began teaching the blind, I was regularly haunted by having to teach early computational skills, because that meant teaching the dreaded abacus. And since I knew that I really shouldn't start my students on the calculator until they had mastered the basic operations, the abacus and its bewildering "secrets" assumed larger and larger proportions of dislike and avoidance.

Then, several years ago at a Vision Teachers meeting, one of my colleagues shared with us a resource book called the HANDBOOK for ITINERANT and RESOURCE TEACHERS of BLIND and VISUALLY IMPAIRED STUDENTS, by Doris M. Willoughby and Sharon L.M. Duffy**. One of the Appendices was devoted to a different method of teaching the abacus. Called the "paper compatible" method, this process almost immediately made sense to me. Employing the same language as the Math books, terms such as "borrow" and "carry", this method followed virtually the same process used by a sighted student using pencil and paper.

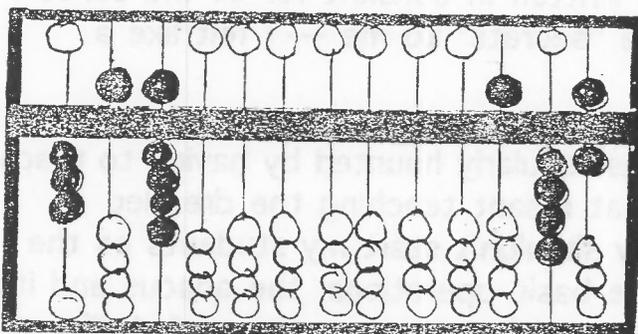
For example: 487
 +359

-- Set 487 on the far right, as you would normally, and set 359 on the three farthest left columns. The number that is set on the right will become the answer. Start adding in the ones. Seven plus 9 is 16. Set a 6 in the ones column and carry a one over to the tens by adding one bead to the tens column.



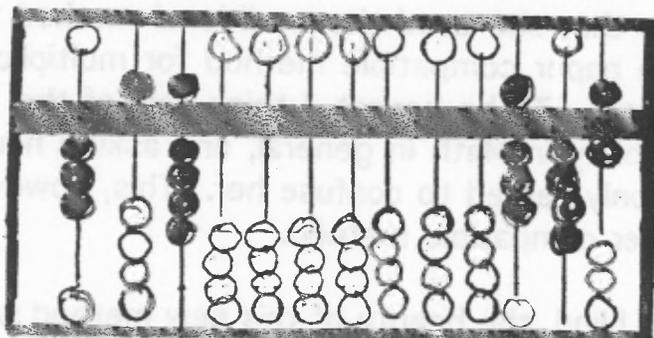
$$\begin{array}{r} 487 \\ +359 \\ \hline 6 \end{array}$$

-- Add the tens columns. Nine plus 5 is 14. Set a 4 in the tens column (by clearing the 5 bead) and carry a one to the hundreds column by making the 4 into a 5.



$$\begin{array}{r} 487 \\ +359 \\ \hline 46 \end{array}$$

-- Add the hundreds columns. Five plus 3 is 8. Set an 8 in the hundreds column. The answer is 846.



$$\begin{array}{r} 487 \\ + 359 \\ \hline 846 \end{array}$$

If you wish, you can have the student clear the numbers on the left as they are added. I generally leave that number intact, in case the student gets muddled part of the way through and has to start again. Even so, you can see how straight-forward this system is.

I was totally galvanized by this discovery. I began using it with a blind student in grade four who had been taught the basics of the traditional method, but who was having difficulty using it to solve problems that required regrouping. His success with the new method was almost instantaneous. He went from getting most of his Math wrong to getting most of it correct. He was thrilled and, needless to say, so were his classroom teacher and I. His entire attitude towards Math underwent a change for the good, and his marks continued to improve. When the class moved on to long division, which he had previously done manually on the braille, he was able to keep up with the class on the abacus.

Much to the amusement of friends and colleagues, who had listened to me whine and whinge about teaching the abacus, I became a vocal proponent of the paper compatible method. I enthused about it at meetings and demonstrated it at sharing sessions. My conversion was complete.

I sought to replicate my success with another student. This young lad had not yet begun to use the abacus, so when we began abacus skills in grade three, I went straight to the paper compatible method. He learned to add with regrouping in one forty-minute lesson, taught to him in the resource room immediately after the class had received their first lesson on adding with regrouping. Subtraction with borrowing was learned almost as quickly.

The following year, grade four, was just as successful. That year, I taught him how to multiply and divide *before* the rest of the class got to those chapters. When the new skills were taught to his sighted peers, he was primed to follow along with the examples done in class.

An older student (grade six), who had used the traditional method for three years, did not accept the new method as easily. We ended up in an unsatisfactory compromise, in that she used the traditional method to add and subtract, and learned the paper compatible method for multiplication. Division was done on a calculator. To be honest, I think part of the problem was in her level of ability in Math in general, and asking her to learn a new way to compute only served to confuse her. This, however, did not shake my faith in the paper compatible method.

To me, as a teacher of the blind, the beauty of this new method was not just in its simplicity, but in the use of language. By using the same terms as the sighted children, the blind student was then able to follow along with the teacher's input lesson, do the examples in virtually the same way, and *STAY IN THE CLASS* for all of this. The blind student only needed to be withdrawn by the resource teacher to learn the basics of each new operation, then they could return to class and continue with their peers. Gone were the days when I had to re-teach the Math lesson so we could learn and commit to memory all the abacus secrets. Gone also were the days of my students having to learn two distinctly different methods of computation.

The traditional method, based as it is on the Japanese system of using the abacus, can be very fast and it has been tested and proven over hundreds of years. However, for students who find the indirect "secrets" confusing and frustrating, it may lose its value as a tool for them.

In addition to the success with blind children using the paper compatible method, I also taught several sighted learning disabled students to use the abacus. These students had been experiencing serious difficulties learning and retaining their number facts. Using the abacus (a Cranmer abacus is best, as the beads do not move until you move them), they quickly learned the value of the beads, ie. that the four beads below the bar are worth one each, and the single bead above the bar is worth five. They gradually learned to add, with regrouping, up to 2-digit numbers. It seemed that the opportunity to manipulate the beads on the abacus, and to actually "see" how the answer was achieved, made the learning somewhat easier for them. As a manipulative, concrete tool, the abacus could make an interesting addition to a Math program for children with learning difficulties.

The abacus, either the Cranmer or the traditional Asian model, could also be used as a "challenge centre" for students who would benefit from enrichment in Math. Learning the traditional Japanese system was given as an enrichment activity to a group of gifted students, as a way of bringing them closer to their blind classmate. The sighted students took off with the task, and it wasn't long before the room was filled with the clicking sounds of abacus beads totting up an equation.

There's nothing high tech or fancy about it. There are no dazzling colours or laser sound effects. It's only a quick, efficient way to teach computational skills, before you move on to the work requiring calculators. It's just an abacus.

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* Cranmer Abacus available from PRCVI

** Willoughby, Doris M. & Sharon L.M. Duffy, Handbook for Itinerant and Resource Teachers of Blind and Visually Impaired Students, National Federation of the Blind, 1800 Johnson Street, Baltimore, Maryland

