RightStart ™ Mathematics

There are 13 major characteristics that make this research based program effective.

1. Refers to quantities of up to 5 as a group; discourages counting individually.

2. Uses fingers and tally sticks to show quantities up to 10; teachers quantities 6 to 10 as 5 plus a quantity, for example 6=5+1.

3. Avoids counting procedures for finding sums and remainders. Teaches fie-and ten-based strategies for the facts that are both visual and visualizable.

4. Employs games, not flash cards, for practice.

5. Once quantities 1 to 10 are known, proceeds to 10 as a unit. Uses the "math way' of naming numbers for several months; for example, "1 ten-1" (or "ten-1"-for eleven, "1-ten 2" for twelve, "2-ten" for twenty, and "2-ten 5" for twenty-five.

6. Uses expanded notation (overlapping: place-value cards for recording tens and ones: the ones card is placed on the zero of the tens card. Encourages a child to read numbers starting at the left and not backward by starting at the ones column.

7. Proceeds rapidly to hundreds and thousands using manipulatives and place-value cards. Provides opportunities for trading between ones and ten, ten and hundreds, and hundreds and thousands with manipulatives

8. Only after the above work, about the fourth month of first grade, introduces the traditional English names for quantities 20-99 and then 11 to 190.

9. Teaches mental computation. Investigates informal solutions, often through story problems, before learning procedures.

10. Teaches four-digit addition on the abacus, letting the children discover the paper and pencil algorithm. This occurs in the first grade. Four-digit subtraction is mastered in second grade.

11. Introduces fractions with a linear visual model.

12. Approaches geometry through drawing boards and tools.

13. Teaches short division (where only the answer is written down) for single digit divisors, before long division. Both are taught in Grade 4.

Some General Thoughts on Teaching Mathematics

1. Only five percent of mathematics should be learned by rote; 95 percent should be understood.

2. Teaching with understanding depends upon building on what the child already knows. Teaching by rote does not care.

3. The role of the teacher is to encourage thinking by asking questions, not giving answers. Once you give an answer, thinking usually stops.

4. It is easier to understand a new model after you have made one yourself. For example, children need to construct graphs before attempting to read ready-made graphs.

5. Good manipulatives cause confusion at first. If the new manipulative makes perfect sense at first sight, it wasn't needed. Trying to understand and relating it to previous knowledge is what leads to greater learning, according to Richard Behr and others.

6. Lauren Resnick says, "Good mathematics learners expect to be able to make sense out of rules they are taught and they apply some energy and time to the task of making sense. By contrast, those less adept in mathematics try to memorize and apply the rules that are taught, but do not attempt to relate these rules to what they know about mathematics at a more intuitive level.

7. According to Arthur Baroody, "Teaching mathematics is essentially a process of translating mathematics into a form children can comprehend, providing experiences that enable children to discover relationships and construct meaning, and creating opportunities to develop and exercise mathematical reasoning."

8. Mindy Hilte puts learning the facts in proper perspective then she says, "In our concern

How This Program (RightStart ™ Mathematics) Was Developed

We have been hearing for years that Japanese students do better than U.S. students in math in Japan. The Asian students are ahead by the middle of fist grade. And the gap widens every year thereafter.

Many explanations have been given, including less diversity and a longer school year. Japanese students attend school 240 days a year.

A third explanation given is that the Asian public values and supports education more than we do. A first grade teacher has the same status as a university professor. If a student falls behind, the family, not the school, helps the child or hires a tutor. Students often attend after-school classes.

A fourth explanation involves the philosophy of learning. Asians and Europeans believe anyone can learn mathematics or even play the violin. It is not a matter of talent, but of good teaching and hard work. Although these explanations are valid, I decided to take a careful look at how mathematics is taught in Japanese first grades. Japan has a national curriculum, so there is little variation among teachers.

I found some important differences. One of these is the way the Asians name their numbers. In English we count ten, eleven, twelve, thirteen, and so on, which doesn't give the child a clue about tens and ones. But in Asian languages, one counts by saying ten-1, ten-2, ten-3, for the teens, and 2-ten 1, 2-ten 2, and 2-ten 3 for the twenties.

Still another difference is the criteria for manipulatives. Americans think the more the better. Asians prefer very few, but insist that they be imaginable, that is, visualizable. That is one reason they do not use colored rods. You can imagine the one and the three, but try imagining a brown eight-the quantity of eight, not the color. It can't be done without grouping.

Another important difference is the emphasis on non-counting strategies for computation. Japanese children are discouraged from counting; rather they are taught to see quantities in groups of fives and tens.

For example, when an American child wants to know 9+4, most likely the child will start with 9 and count up 4. In contrast, the Asian child will think that if he takes 1 from the 4 and puts it with the 9, then he will have 10 and 3 or 13.

Unfortunately, very few American first-graders at the end of the year even know that 10+3 is 13.

I decided to conduct research using some of these ideas in two similar first grade classrooms. The control group studied math in the traditional work-book-based manner. The other class used the lesson plans I developed. The children used that special number naming for three months.

They also used a special abacus I designed, based on fives and tens. I asked 5-year-old Stan how much is 11+6. Then I asked him how he knew. He replied, "I have the abacus in my mind."

The children were working with thousands by the sixth week. They figured out how to add four-place numbers on paper after leaning how to do it on the abacus.

Every child in the experimental class, including those enrolled in special education classes, could add numbers like 9+4, by changing it to 10+3.

I asked the children to explain what the 6 and 2 mean in the number 26. Ninety-three percent of the children in the experimental group explained it correctly while only 50% of third graders did so in another study.

I gave the children some base ten rods (none of them had seen them before) that looked like ones and tens and asked them to make 48. Then I asked them to subtract 14. The children in the control group counted 14 ones, while the experiment class removed 1 ten and 4 ones. This indicated that they saw 14 as 1 ten and 4 ones and not as 14 ones. This view of numbers is vital to understanding algorithms, or procedures, for doing arithmetic.

I asked the experimental class to mentally add 64+20, which only 52% of nine-year-olds on the 1986 National test did correctly; 56% of those in the experimental class could do it.

Since children often confuse columns when taught traditionally, I wrote 2304 + 86 = horizontally and asked them to find the sum any way they liked. Fifty-six percent did so correctly, including one child who did it in his head.

This following year I revised the lesson plans and both first grade classes used these methods. I am delighted to report that on a national standardized test, both classes scored in the 98th percentile.

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