Zhusuan and Mental Arithmetic By Image of Abacus And Training of Creativity

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The foundation of the World Association of Abacus and Mental Arithmetic announces a new era of abacus and mental arithmetic. The era brand is creation, which com- poses the melody of worldwide talents training. Creativity is a part of creative quality. How to forge the creative quality of a man is a key task of prevalent education re- search.

Now I mainly discourse upon functions and principles of tapping intelligence abacus and mental arithmetic, and how to foster children's creativity, and so on.

I. Functions and Principles of Tapping Intelligence

According to mental science, creativity is composed of creative thinking and creative imagination. Creative thinking is the organic combination of emanative thinking and collective thinking. Creative imagination plays an important role in creative activities. To some extent, creative imagination is a process of image thinking. Einstein considered re-organization of imagination as an essential feature of creative thinking. Children's early -stage creativity is mainly shown as creative imagination.

The process of creation can be divided into four phases. The first phase is preparation phase. The second is brew phase. The third is maturity phase and the last is testing phase. In the first arid fourth phases, the left - brain exerts linguistic and logical functions so it plays a leading role. The second and third phases are a period for new ideas and new concepts, and the most important period in creation process, because there is no fixed mode for logical thinking available for new thoughts. Thereupon, this period fully exerts right- brain functions of imagination, instinct and inspiration, and other non -logic mental functions. It should be made clear that the left -brain and the right -brain are in close connection and coordination in each phase of creation process. In another perspective of brain science, Robert Spain, an American neural physiologist and the winner of the Nobel Prize for Physiology in 1981, proved a high specification of the two parts of the brain, and their division and coordination through research. The left-brain plays a decisive role in abilities of language, calculation, logical thinking and analysis, while the right brain plays a vital role in creation process as a nerve center of sensibility, imagination, sense of figure space, and image thinking.

From above, we can see that the right brain plays a decisive role in creativity and creation both in mental science and brain science. Therefore, developing children' s creativity must start from developing children's right brains.

Now let's see how mental arithmetic by image of abacus develop the right brain.

1. Moving beads with two hands. In line with brain science, moving fingers of the left hand can tap left-brain functions. According to the Chinese Zhusuan Association, people are encouraged to drive beads with two hands when using an abacus; that is to say, one should drive

beads with his two hands. Continual actions of this kind motivate fingers of the left hand and develop one's right -brain functions.

2. Mental arithmetic by image of abacus. As is known for those who can avail themselves with mental arithmetic by image of abacus imagined beads move on an imagined abacus in the mind when they just begin to learn mental arithmetic by image of abacus. With development of proficiency, what move in mind become short sticks or dots, and even pictures at last, instead of beads. The faster the mental arithmetic becomes, the more drastically pictures change in mind. In this perspective, abacus and mental arithmetic is a process of picture changing in imagination of the right -brain, thus develops its functions of imagination and image thinking.

Professor Tosio Nakano, Ph. D. at Great Eastern Cultural University of Japan and a famous abacus expert, has probed into functions of developing intelligence in mental arithmetic by image of abacus in brain science and has gained remarkable achievements.

II. Operations of Developing Children's Right-Brain through Mental Arithmetic by image of abacus

To foster children's creativity, right -brain activities should be stressed to well develop the right brain while developing the left-brain. There are many methods to develop children's right brain. Practices prove that abacus and mental arithmetic are among the best methods. But how can we develop children's right brain through mental arithmetic by image of abacus? Since it is a systematic project to foster creative thinking and develop the right brain, I just mention a few methods in perspective of technique for better discussion in the limited essay.

1. Topics should stimulate children's curiosity and desire for knowledge.

Children' s curiosity and active exploration about knowledge compose the basis of creative thinking development and remain the drive to foster sense of creative thinking, to improve ability of creative thinking, and to grasp creative methods and tactics.

Example 1: There are six numbers: 1 , 2 , 3 , 4 , and 0.

Which is bigger, the sum of them or the their product?

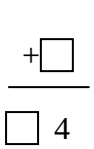
There are two solutions for the problem. –

Solution 1: Calculate in mental arithmetic by image of abacus:1 + 2 + ...+ 5 + 0 = 15. Then calculate in mental arithmetic by image of abacus: 1 x 2 x 3 x 4 x 5 x 0 = 0. So the answer is clear: the sum is bigger than the product.

Solution 2: The product of 0 and any numeral is 0, too. But the sum of different integers (negative excluded) is certainly bigger than 0 .So the sum is bigger than the product.

The problem of the insect and food is set to get the rest of food if the insect bites off apart.

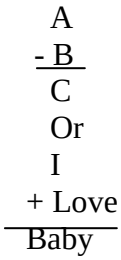
Example 2: Fill in the blanks to solve the problem of addition, that is to say, to make the equation right.



After analysis, 8 and 1 can fill the two blanks respectively.

We can design many problems of this sort, and letters and Chinese words can also replace the blanks.

Example 3:



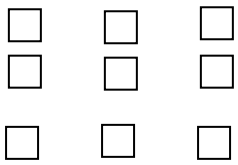
After analysis, it can be concluded that A = 6, B = 5 and C = 1 or "I" stands for 6, "love" for 5 and "Baby" for 1.

Example 4:

After analysis, it is can be concluded that they are 1, 4, 6, 5 respectively from toe to top.

Example 5:

Fill in the following blanks with the nine natural numerals from 1 to 9. Use each of them for only once to make up a right mathematic equation.



There are two groups of answers for them. One is as follows:

4 + 5 = 9
8 – 7 = 1
2 x 3 = 6

Can you get the other group?

2. Exercises for Emanative Thinking

Mental arithmetic by image of abacus teaching, some illuminative and interesting examples and exercises with many solutions can be designed for students in line with different grades and conditions, not only to foster their emanative thinking ability but also to strengthen their comprehension of mathematics knowledge they have learned.

Example 1: Write out the numerals bigger than 2 but smaller than 9.

Solution: Students are asked to drive 2 beads on an abacus with the left hand, then add 1, write 3 with the right hand simultaneously, and write out 4, 5, 6, 7, 8 similarly. Therefore, this solution not only stimulates students to move the two hands but also deepens their understanding of this problem.

Example 2: A, B, C, D, are integers among 1 and 20. If A + B = 9, C – D = 3, what is A, B, C, and D respectively?

Solution:

(1) A + B = 9.

Analysis: Both A and B have a maximum of 8, minimum of 1. So there are four groups: A = 8, B = 1: A = 7, B = 2, A = 6, B = 3, A = 5, B = 4.

2. C – D = 3. There are many keys respectively for C and D. I don't write them out here.

Example 3 : There are 5 people at the start station on a bus. After start:

The first stop	2 off	1 on
The second stop	3 off	2 on
The third stop	1 off	1 on
The fourth stop	0 off	2 on

Ask: After the fourth stop, how many people are there on the bus?

There are atleast three solutions for this problem.

Solution 1: Calculate the number of people after each stop one by one.

After the first stop, there are 4 people, ... and there are 5 people after the fourth stop.

Solution 2: The sum of the people on subtracts the sum of people off, and the result is added to the original number on the bus, to get the answer 5.

Solution 3: Addition and subtraction of the numbers on and off in the four stops are made with the original number of 5 to get the answer. For instance, at the first step, 1 is subtracted from 5 to get 4. At the second stop, similarly 1 is subtracted from 4, . . . at last to get the answer 5.

Example 4: How many solutions can you get to divide 10 pears into two piles? What is the number of each pile?

Solution: Students are first asked to make the problem clear, instead of giving random answers: one solution, 5 for each pile.

Therefore, six solutions are available for this problem: 0 and 10, 1 and 9, 2 and 8, 3 and 7, 4 and 6, and 5 and 5.

Example 5: There are 5 bottles of medicine A; each bottle of them has 100 tablets and each tablet weighs 10 gram. But among them lies a bottle of medicine B, a tablet of which weighs 9 gram. How many times at most should a scale weigh to get medicine B out of them?

Solution 1: Weigh the bottles one by one, at most for 4 times.

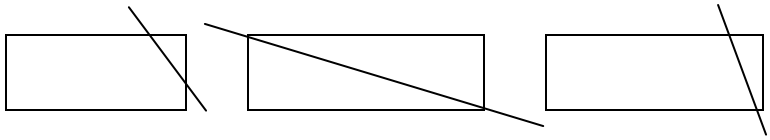
Solution 2: Weigh them by twos, at most for 3 times.

Solution 3: Label them with 1, 2, 3, 4, 5, take out tablets from each by the amount of their number. For example 3 tablets are taken out from bottle 3. Weigh the 15 tablets on the scale. If they weigh 146 gram, it can be concluded that bottle 4 is medicine B. So you can weigh only once to get it out.

3. Students are asked to operate by themselves to broaden their horizons and stimulate their creative thinking ability through practices.

Example 1: Students are asked to prepare a small piece of oblong paper and a pair of scissors. The problem is that there are four angles of an oblong. How many angles are left when an angle is cut off?

Solution: Students are asked not to giver answers first, instead, to think it over and them practice before answer.



From the above figures, there are three answers:

Example 2: Students are asked to make exercise problems by themselves on the basis of mathematics knowledge they have learned.

For example, the teacher presents three numbers: 1, 2, 3, asks students to complement other conditions and make up practical problems or calculating problems with these numbers.

II. Two Problems for Discussion

Combination of abacus and mental arithmetic education and mathematics in primary schools

President Zhu Xi'an of the Chinese Zhusuan Association, in Cross-Strait Abacus and Mental Arithmetic Academic Exchange Seminar held in Taipei, made a clear statement, "Abacus

is integrated into mathematics as a new thing. Experience will be continuously summarized for more remarkable achievements."

Calculation in primary schools may be conducted in mental arithmetic by image of abacus. Without mathematics in primary schools, abacus and mental arithmetic cannot play its role in developing children's intelligence so it must be combined with mathematic education in primary schools. In many areas, experiments of this kind have been carried out or are under way and have gained remarkable achievements. For example, the 3-arithmetic training center has gained many achievements and abundant experience on integration of abacus and mental arithmetic into mathematics education in primary schools. The Shanghai Zhusuan Association consistently pointed out that the principle of this mental arithmetic is "to add efforts to abacus and assess it through results on teaching." Besides, it has carried out experiments in some primary schools, edited relevant textbooks and secured staged achievements in co-operation with the local educational commissions.

2. Degree should be properly handled in popularization of abacus and mental arithmetic.

In popularization of mental arithmetic by image of abacus, the problem of degree is to make clear that what algorithms and how much the students should learn. We divide the algorithms of abacus and mental arithmetic into the method for common use and that for competition. In the popularization of abacus and mental arithmetic, the method for competition is not encouraged and requirements should be appropriate on degree. For instance, as for student in grade one in primary schools, they are required to be proficient with addition and subtraction numbers within one hundred. A higher level of requirements is unavailable for them, so as to beneficial to develop the right brain.

Courtesy:

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