



Feltballs Arithmetic Study - Feel and Imagine Arithmetic with their Ears and Hands

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Abstract

The goal of arithmetic learning so far has been to cultivate the ability to think by teaching arithmetic step by step to learners, and solve problems on their own. But learners who are not good at recognizing arithmetical sign got stuck in the early stage, and ended their lives without meeting advanced arithmetic thought. So we thought of a method that could experience advanced arithmetic thinking simply by moving felt balls according to voice instructions for them five years ago. In this case, felt balls are numerical entities and the movement corresponds to a calculation formula. An adult who practiced this method said, "why does arithmetic that could not be understood at the head understood by just moving the felt balls?" A child who practiced this method said, "Arithmetic is free and so fun." The arithmetic experience gained through ear and hand will become established as arithmetical power linked with logic in mind some days. In this paper, we will do a practical report of experimenting this EAR-HAND-MATH method from a child to an adult.

Keywords: arithmetic method, ears, hands;

1. Introduction

When I was presiding over a high school mathematics cram school, I suddenly had doubts, "why does the degree of comprehension differ from one student to another in spite of getting the same classes?" For example, a student has a flash of graphics problems even though he cannot do any analysis field at all. On the contrary, although the field of analysis can be improved, he took zero points in graphics test as he cannot imagine the spatial figure being questioned. In order to find out where this difference comes from, I interviewed the mothers of nine students about their small childhood situation. A student with a graphic flash has been hooked to a toy in shape as a baby, he seems to have played without getting tired for days or days. Another student who can find the extension line immediately in them seems to have been good at "ayatori" (Japanese hands play with yarn), when he was young. Another student who can improve the field of analysis seems to discover that many numbers of phone numbers can be made by combining numbers while playing with the cell phone toys made by his mother. Looking at these examples, I felt that mathematical thinking might have something to do with actual experience in early childhood. So I decided to shift to arithmetic education for children.

2. EAR-HAND-MATH

It is often said that Japanese people dislike arithmetic like calculation. So where is the cause of arithmetic dislikes? A woman who cannot get a job because she doesn't understand the meaning of the consumption tax visited me. I was in trouble. I did not know how to teach arithmetic to adult. But I thought of teaching the way of proportion, I brought twelve felt balls that were rolling around that and I told her. "please represent to divide twelve by three using these" Then her hands did not move at all. I was surprised. Then I noticed that people who do not know arithmetic have no movement of the number in their heads! So I moved the felt ball. I taught her each calculation mechanism. She said and cried after completing an hour's lesson. "No one has ever taught arithmetic in this way until now." I was shocked to touch the hardships of the people who do not know the arithmetic. So I devised a new arithmetical method to experience by moving the felt ball instead of using their head. That is the "EAR-HAND-MATH" It is just only listen and move.

3. How to EAR- HAND -MATH

I The leader speaks the story.

II Learners think of that scene in the head.



III The leader instructs the arithmetic problem out of the story to express numerical values t by felt balls.

IV The learner moves the felt ball as instructed.

V Learners can derive answers to arithmetic problems.

The point of note here is that the story must be one that stimulates learner's interest.

You do not need to understand arithmetic by just one experience. Depending on the age and thinking habits of the learner, the timing when mathematical theory matches felt ball exercise is different.

4 Three problem examples of EAR- HAND -MATH

4.1 Calves go to the zoo

"It is a sunny day. I would like to go out on such a day. Surely, the cows' mother seems to be thinking about the same thing. She seems to go to the zoo with a lot of calves in the neighborhood. One,two, three ...There are twelve calves. It seems that the number of boys is four more than the number of girls. Here is the question. Do you know how many boys and girls each? Let's try using felt balls. Please take twelve felt balls instead of calves first. Are you OK? The number of boys is four more than the number of girls, so if you remove four boys, the number of boys and girls will be the same. Then remove the 4 felt balls. How many are the rest? Let's halve because it is the same number of boys and girls. Let's return four felt balls that you removed earlier. Oh, it is strange, you understand that there are eight boys and four girls."

4.2 A cheetah and a Leopard run around the Colosseum

"This is the Colosseum in Rome. There is a battle of the beasts from now. Oh, just a moment!

There are a cheetah and a leopard from the entrance. And each began to run around the Colosseum in the opposite direction at a tremendous speed. What shall I do. They hit themselves. Here is the question. How many seconds after will the disaster occur? What kind of information do you want to know for that? The length around the Colosseum? The speed of cheetah and leopard ?

Then I teach you them. The Colosseum is around 600 meters. The cheetah can run 100 meters in two seconds, the leopard can run 50 meters at the same time. Because it is hard to use the head, let's use felt balls. As the area around the Colosseum is 600 meters, let's create a Colosseum circle with twelve felt balls as 50 meters per felt ball. Could you do it? Since they run in the opposite direction, there is a distance of 600 meters between the cheetah and the leopard. But the distance between them is zero meters when they hit themselves. Let's start! After two seconds, cheetah runs 100m, so remove two felt balls, leopard does 50 meters, please remove one felt ball. After another two seconds, please remove two felt balls of the cheetah and remove one felt ball of the leopard. After another two seconds, please try it the same way as before. After another two seconds, please try it the same way as before. Oh, have you completely removed the felt ball yet? you have repeated it four times so far. Two multiplied by four is eight. You know that they hit themselves after eight seconds."

4.3 A hungry lion goes shopping

"A hungry lion went shopping in the evening supermarket. A discount of 40% was made for ten euros beef. A discount of 20% was made for pork with eight euros. He does not know which is cheaper. Let's think with felt balls. Please take out ten felt balls. Because 40% is a percentage of 100. Since there are not 100 felt balls, in this case let's consider it as a percentage of ten. Are you OK? In the case of beef, ten represents ten euros, so one is one euro. let's remove four felt balls, because it is discounted 40%, How many are the rest? It is six. You know the price of the beef is six euros. In the case of pork, please take out ten felt balls. ten represents eight euros. Then one represents eighty cents. Please remove two felt balls, because it is 20% discount. How many are the rest? It is eight felt balls. Since eighty multiplied by eight is six hundred forty. You know the price pf the pork is six hundred forty cents, six euros and forty cents. So you know that the beef is cheaper than the pork. Very good!"

5. Practice report of EAR-HAND-MATH

I conducted an experiment to see if you can truly understand the arithmetic by doing EAR-HAND-MATH. Twenty-seven people came to the experiment. The age was three-seventy years old.The time required to do the above three questions was 10 minutes. I will report the subject's impressions.

- I was able to materialize the meaning of how to calculate in my head. (female in her 40s)
- The problem of leopard and cheetah was fun (10 year old girl, 14 year old boy)
- I hated arithmetic so I wanted to meet up this when I was a child. (female in her 40s)



- I'd like to do EAR-HAND-MATH while talking with my three year old daughter.(female in her 30s)
- I would like to teach the problem of the lion to my students who do not know the ratio. (Male elementary school teacher)
- I would like you to make EAR-HAND-MATH problem for kindergarten as well (female in her 30s)
- It was fun to move the felt ball (three year old boy)
- Even though I do not understand the meaning at first, I became happy when I understand it later (female in her 30s)

6. Summary

Even in the age group who is not interested in arithmetic in this way, by doing EAR-HAND-MATH, they begin to be interested in arithmetic. I think that any person has arithmetic innately as Socrates proved using it as an ignorant young man to understand the anamnesis in "Meno"[1] If anyone has arithmetic, how exactly should we educate? In the interview survey of my student's mother, they draw their own arithmetic from getting absorbed in the childhood play. The woman who did not understand the consumption tax calculation cried gladly understanding arithmetic. Also, the EAR-HAND-MATH seems to have raised interest in people's arithmetic by using colorful felt balls or making it interesting. Is it necessary something that stimulates our senses to educate arithmetic within us? It may be a crazy play, a gentle touch, a beautiful color, a good sound. I have the arithmetic textbooks for elementary school students written 85 years ago in Japan. [2] It is called "Green cover" that gained global evaluation at the time. That for the first grader of elementary school is all the picture that shows their life and play. I asked a 6-year-old child, sometime. Even though it is an arithmetic textbook, why only pictures? He said, "because I have arithmetic". It seems that the time has come to change the way of arithmetic education.

Reference

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