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这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examines tecnical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

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学费心算的特点
FEATURES OF TUITION MENTAL ARITHMETIC

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注解。 最近，使用创新的口头计数技术，特别是“心算”的可能性具有很大的科学意义。

本文分析了在KFU的Elabuga研究所的基础上，以6-13岁的儿童为基础，以额外的教育形式引入心算的经验。

根据孩子的年龄，考虑三个级别的学习。 尽管心算中有各种各样的程序，但它们通过构建心算教学系统的主线统一起来。

关键词：口头计数，心算，算盘，soroban，额外的教育

Annotation. *Recently, the possibility of using innovative oral counting techniques, especially “Mental arithmetic”, is of great scientific interest.*

The article analyzes the experience of introducing mental arithmetic for children 6-13 years old in the form of additional education on the basis of the Elabuga Institute of KFU.

Three levels of study are considered, depending on the age of the children. Despite the variety of programs in mental arithmetic, they are united by the main lines of building a system for teaching mental arithmetic.

Keywords: *oral counting, mental arithmetic, abacus, soroban, additional education*

Mental arithmetic is a rather young and at the same time very ancient method. The beginning of its existence can be considered the invention of the counting board (suanpan) in China more than 5 thousand years ago. This invention is also called the first wooden computer. Those ancient abacus consisted of a plate with special symbols and sand, divided into lines. They were used for addition, subtraction, multiplication, division, calculation of fractions and even square roots. A little later in Egypt, Ancient Greece and Ancient Rome, similar devices for arithmetic calculations appeared. They were more like modern abacus, because the counting was done on a board, not with the help of sand, but with the use of stones

or stones. Despite the fact that the abacus was invented in China, they received the greatest use in Japan. There they were modernized and received the name Abacus (Soroban), which in translation Chinese means a computer board. Soroban was not popular in Japan until the 17th century, but there is no doubt that he was familiar to merchants 2 centuries earlier. When this convenient computing tool became widely known, it was thoroughly and thoroughly studied by many mathematicians. As a result of research, the forms and methods of practical calculations on the abacus were getting more and more improvement [1, p. 13-14]. It is also worth noting that training in the Abacus in Japan is still mandatory for 3 - 4 classes.

The word "Abacus" comes from the Latin word "abacus" (board) - a counting board into which special indentations were made in the form of lines, and stones or stones were moved in these cavities [3, p.3-4].

The oral account training system, based on the use of the Abacus account, has been around for more than one millennium, so it has been tested by the time and practice of many generations. The modern Abacus is a rectangular wooden abacus, in which there are 13 (or more, but always an odd number) of vertical knitting needles, divided across the longitudinal plank. On each row of spokes are stitched bones, which allow the child to visualize the basic decimal system. By manipulating these bones, the child produces complex arithmetic operations. Despite the proliferation of practical and affordable pocket calculators, it is believed that, compared to learning to counting on paper and, especially, on a calculator, training in the Abacus has a number of undeniable pedagogical advantages [1, p. 10-11]. On each spoke there are five stones in one row: four ("earthly") of them mean one by one, and the fifth ("heavenly") corresponds to the number "five". Such an arrangement (4 + 5 = 9) makes it possible to represent on the ruler all the numbers from 0 to 9. Significant are the bones, moved to the middle bar. Rulers are not arranged horizontally, as in Russian accounts, but vertically. For a decimal positional system, this is important, since it corresponds to the form of writing numbers from left to right, and calculations on the Abacus are also conducted from left to right, starting with the higher digits. Abacus eliminates confusion in the calculations, as it gives a unique representation of the numbers. No number can be put on the accounts in two ways, which makes arithmetic operations easy to understand. Abacus are the most accessible accounts for human visual perception [4]. The program of mental arithmetic is considered an ancient Chinese technique for brain coordination and body development using the Abacus. It is also positioned as a highly effective program for the development of children's mental abilities.

It is advisable to start learning oral counting according to the method of mental arithmetic no earlier than from 4 to 6 years. By this time, the children already know the numbers from 1 to 10 at least, which will allow them to get acquainted with their location on the accounts and to perform basic operations. In the period

from 4 to 12 years, the most active development of the brain occurs in humans. Therefore, the acquisition of basic skills should be carried out during this period. Therefore, experts recommend at the specified age to learn children foreign languages, to master the playing of musical instruments and other activities. Mental arithmetic also fits harmoniously into this list. Stimulation of the work of the brain of this kind contributes to easier and more productive further learning.

On the basis of the Elabuga Institute of the Kazan Federal University, from November 11, 2017, the additional educational program "Mental Arithmetic" began its implementation. Three age categories of children are studied: 5-6 years, 7-9 years and 10-12 years [5].

The method of mental arithmetic harmoniously develops both hemispheres of the brain. Training takes into account the age characteristics of the child and helps to prepare for school, make decisions with lightning speed, memorize any information, successfully pass exams. There is a development of such intellectual abilities of children as speed of thinking, abstract thinking, quick oral counting, attentiveness, creative thinking. With the continuous development of oral counting with the help of a new method, imagination, hearing, observation, logic, memory develops [2, p.24].

The training program for mental arithmetic conditionally consists of two stages. On the first stage, children master the calculation technique on the Abacus accounts, and two hands are involved at the same time. Abacus or soroban is an analogue of Russian accounts, but it is much older, and is based on a five-fold number system. The second stage of the program involves moving to a mental account - the children represent the abacus in the mind and move the imaginary bones. This technique, which appeared in China more than 5 thousand years ago, is now conquering various countries of the world. In Japan, mental mathematics has become a compulsory subject of the school curriculum. The fact is that it contributes not only to the ability to quickly count in the mind, but also develops mental abilities, the creative potential of the child. Inclusion in the process of counting both hemispheres of the brain ensures quick execution and memorization of actions. The left hemisphere perceives numbers, the right - the picture of the bones of the bones. So, the child learns to make the proposed calculations in the mind. Now the numbers are perceived as pictures, and the calculation process is associated with the corresponding movement of the bones of the accounts.

Consider the main lines of learning mental arithmetic, the level of "addition and subtraction":

1) Simple addition and subtraction of numbers "easier than simple ES".

2) Adding numbers with the help of the formulas "help of brother HB":

$$+1 = +5-4,\ +2 = +5-3,\ +3 = +5-2,\ +4 = +5-1,$$

3) Subtraction of numbers using the formulas "help brother HB":

–1 = –5 + 4, - 2 = –5 + 3, –3 = –5 + 2, - 4 = –5 + 1,

4) Adding numbers using the formulas “help of a friend HF”:

+ 9 = + 10–1, + 8 = + 10–2, + 7 = + 10–3, + 6 = + 10–4, + 5 = + 10–5, + 4 = + 10–6, +3 = + 10–7, + 2 = + 10–8, + 1 = + 10–9.

5) Subtracting numbers using the formulas "help a friend HF":

–9 = –10 + 1, –8 = –10 + 2, –7 = –10 + 3, –6 = –10 + 4, –5 = –10 + 5, –4 = –10 + 6, –3 = –10 + 7, –2 = –10 + 8, –1 = –10 + 9.

6) Addition of numbers using the combined formula "Mix formula MF":

+ 6 = + 11–5, + 7 = + 12–5, + 8 = + 13–5, + 9 = + 14–5.

7) Subtraction of numbers using the combined formula "Mix formula MF":

–6 = –11 + 5, –7 = –12 + 5, –8 = –13 + 5, –9 = –14 + 5.

The classroom training in mental arithmetic for children takes place once a week for 1.5-2 hours. A considerable part of them is occupied by the game form of training and development, especially in the classroom for children 5-9 years old. Play activity helps children to escape from the painstaking counting, and all games are aimed at developing attention, concentration, speed of thinking, imagination, reaction and logic. The stage of studying a new topic is aimed at setting the fingers when working with accounts. The study of a new theme is fixed by fundamental exercises, independent work with the abacus, mentally, dictations are also written to determine how much the new material has been learned. All this work is carried out mostly in workbooks. Homework, which is also painted in workbooks, contains tasks for five days similar to the class work, but also supplemented with audio dictations, a mental solution, coloring bones. Here you can notice another feature of the method under consideration, which is the mandatory daily homework.

A daily abacus score and a mental score will help children reach their goal — learning how to perform simple and complex math tasks in their minds.

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