

The Role of Mental Arithmetic in the Mental Development of the Pupil

Abdishkurova Guzal^{1*}, Narmanov Ulugbek², Narmanov Otabek³

^{1,2}National university of Uzbekistan,

³Tashkent University of Information Technologies.

Abstract: *In the modern world, children can easily cope with gadgets, computer programs, but at the same time they cannot boast of good academic performance. Psychologists note that some children have a lack of concentration, attention and motivation to learn. Because of which, it is difficult for parents to interest the child in the study of a subject and recognize his inclination to any sciences. Surprisingly, but the basic problem of attention and curiosity is solved by classes in mental arithmetic, which develops the child's mental and creative abilities, makes him memorize, learn, understand.*

Keywords: Teaching method, arithmetic calculations, mathematical development, master classes.

Introduction

Mental arithmetic as a science originated in Japan two thousand years ago. This method was invented to develop both hemispheres of the brain. At first glance, it may seem close to fantasy, but the development of this education has proven to be not fiction. As a result of children practicing a certain methodology, their memory was strengthened and their attention was increased, their ability to produce various mathematical calculations in the mind was realized at a rapid pace, which amazed even scientists.

Mental arithmetic was invented about 5 thousand years ago. The technique was used in Ancient Greece, India and Rome to teach children to count. It is based on the ability to calculate on ancient abacus.

Probably not a parent who doesn't want their child to grow up to be a prodigy. To this end, many take their children to various educational activities from an early age. One such teaching method that is becoming more common today is mental arithmetic. A natural question arises, so what is mental arithmetic itself? Does it really help a child's mental development or is it just one of the simplest teaching methods? Questions like these are naturally on the minds of many parents.

Mental arithmetic is a way of comprehending mathematical operations (multiplication, addition, division and subtraction, as well as calculating square and cube roots) without using paper, pen, calculator or computer. While teaching this method, the use of stone "abacus" (counting) is allowed, but then they become only "imaginary" and are used in the mind, representing them.

The success of the state in the world arena largely depends on the creation of innovative technologies, the rational development of resources, the ability to build a long-term strategy of economic development. The achievement of such characteristics is directly related to the level of mathematics in general and the mathematical literacy of society in particular. It is teaching mathematics that is the most effective means of developing intelligence[1].

The start of teaching mental arithmetic took place in 1993. To date, the technique is effectively used on the territory of 50 states. The technique was most widely used in the countries of the Middle East, Japan, China, Thailand, Australia, Canada, Austria and the USA. In Japan and China, mental arithmetic is a compulsory subject of the school curriculum. In Russia, the methodology is innovative and is just beginning to be used in the educational process.

Why is it called mental arithmetic?

Mental arithmetic is a technique for the harmonious development of the intellect, which uses Asian computing technology using a variety of accounts - abacus (soroban). The mental arithmetic program consists of mechanical exercises with fingers on abacus, mental arithmetic and exercises for concentration, attention and logic. Helps to significantly increase the speed of thinking and the ability for creative disciplines. Suitable for children and adults.

The main task of mental arithmetic is not only to teach a child to count. Namely - calculating multi-digit numbers "in the mind", without notes and a calculator. Also, both hemispheres of the brain develop, their work is stimulated. Left side: logic, memory, IQ level. Right hemisphere: imagination, intuition, creativity.

It is a matter of common experience and observation that life presents many uses for mental arithmetic in arriving at quick solutions to arithmetical situations [5].

It is a unique program that allows a person to develop intellectual and creative activity. This makes it easier to perform special calculations in the brain. In this method, the age of education is set from 4 to 16 years. Today, this method, which develops both hemispheres of the brain, is used in 52 countries around the world.

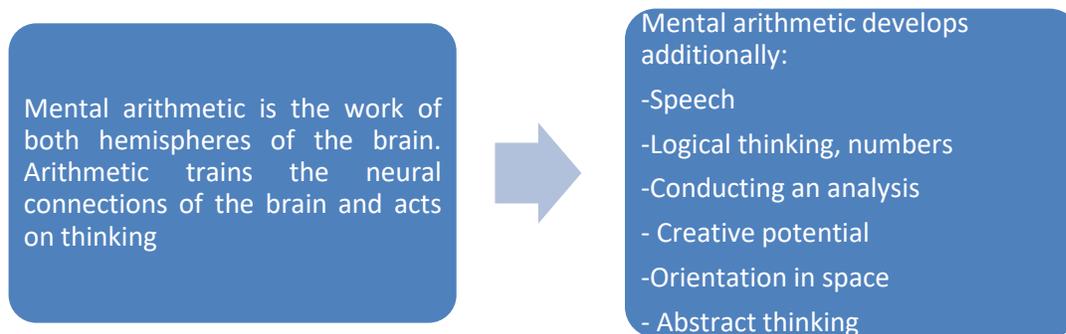
Mental arithmetic is a method of developing intelligence for children and adolescents, which allows them to learn how to count quickly without a calculator. Also, this program is aimed at developing information processing skills, thinking, logical abilities and creative inclinations. It is based on knowledge of the basics of working with the ancient Asian abacus - abacus, and teaching this technique can be divided into two main stages:

- calculations on the accounts for beginners and improving the skills of working with them. Children first need to learn how to add and subtract using counts, and then hone those skills. Only when the child can count without hesitation, it will be possible to move on to the next stage of the class.
- transition to oral counting. Now the lessons are aimed at learning to count mentally. To do this, you need to get used to imagine the abacus in your imagination and learn to count on it. This step can take a long time, but the resulting abilities will meet expectations.

Mental arithmetic - what is it?

Under thinking arithmetic, it is common to understand a program for developing thinking skills and creative instincts because of arithmetic calculations in calculations. The method of mental arithmetic is given to students for four to sixteen years. It was founded two thousand years ago and today operates in fifty-two countries around the world. Mental arithmetic helps children develop both halves of the brain.

Figure 1. Mental arithmetic trains the brain!



The main goals of mental arithmetic are concentration of attention, the ability to focus on the task at hand, the development of photographic memory and creative thinking, logic and imagination, hearing and observation. With a professional approach and successful achievement of goals, the child can perform complex arithmetic tasks in his head. The program not only covers the mathematical area, but also helps the child in other educational areas. She gives him confidence. And here it is not the effective indicators in the oral account that are important, but the formation of the necessary qualities of the student[2].

Why is mental arithmetic needed?

To make an important decision, parents need to understand the essence of mental arithmetic. With the help of the child:

- study of creative thinking;
- development of memory, thinking, logic and reason;
- demonstration of creativity;
- improving school performance;
- calculate complex equations in mind.

Thanks to such activities, the student can develop logic and learn mental arithmetic. In addition, the child develops an interest in new knowledge and skills. Lessons like this are always fun and exciting: mathematical examples can be replaced with dances, songs, and poems. Work is being done on diligence, attention, communication, imagination and intuition.

Applying mental arithmetic

Psychological mathematics is taught in special schools. For the entire period of education, children must pass from ten to twelve levels. Each such degree does not last more than four months. Classes should be attended once or twice a week. In a year and a half, the child is able to perform various calculations with a 4 or 5 digit number. Training is done using a special tool similar to abacus points. First, children need to learn how to work with it, filling the bones with their fingers.

According to scientists, the human brain has enormous potential. This primarily concerns the right hemisphere, which provides the characteristics of visual memory, imagination and creativity. This potential is practically not used by most people [3].

What can be achieved by studying it?

By mastering this arithmetic, creative thinking develops, the child learns to find the only real solution in non-standard situations. Thinking processes are conscious and rely on advanced memory. Children's creative ability comes to the fore (this applies not only to mathematical knowledge, but also to other areas).

Such sessions, designed to take place in the classroom, are not always based on mental calculation. In doing so, children are taught to interact with each other, dance and sing. In short, on the basis of all this type of exercise, the continuous development of both hemispheres of the brain is observed. Teaching children the basics of mental arithmetic has a positive effect on their thinking. However, it should be borne in mind that such training should be carried out by a specialist.

The mathematical development of primary schoolchildren is one of the main tasks of the school, since it is the basis for the full-fledged intellectual development of children, and not only in the field of exact sciences, but also in the humanities. Mathematical development is a kind of tool for the development of a child's mental abilities, a way to train the brain[4].

Mental arithmetic is a high-quality program that teaches the brain to perform mathematical operations faster than a calculator. A mental arithmetic program will help your child develop the following skills.

- concentration;
- logic;
- imagining;
- analytical thinking;
- creative thinking.

At what age should I start training?

It is more effective to start training at the age of 5-6. According to scientists, by the age of 12, brain activity is in intensive development. The main goals of the mental arithmetic methodology are: the ability to focus on tasks and concentration of attention, the development of creativity, creative thinking and cognitive skills, visual and auditory memory, logic, observation, imagination[6]. During this period, students experience brain plasticity, which leads to an increase in brain cells and the formation of neural connections between them. It is possible to practice after the age of 12, but the development will be slower.

Does the result from mathematics in school go up?

Since the name is mental arithmetic, the training course does not consider its main purpose to teach students the calculation or methods of solving a mathematical problem. Basic mental arithmetic models include the processes of adding, multiplying or deleting and dividing information in the child's mind that do not fit into the framework of the previous model[7]. The first task of the course on Mental arithmetic is the comprehensive formation of the brain, while the formed or developed brain achieves success in solving various issues, which leads to the effective assimilation of various sciences in school.

Can adults also learn this methodology?

Yes, it is possible. In European countries, this method is used to prevent Alzheimer's disease, to prevent the stagnation of memory in old age. This program can be taken as a fitness exercise for the brain. Adults will have to deal with a lot and long. Just like in sports, the earlier the headless the higher the results are achieved. In this regard, physical fitness exercises with switching attention at the beginning, middle and end of the lesson were introduced into the mental shield training classes[8].

What is mental arithmetic different from simple Preschool Development Programs?

The peculiarity of the methodology is the hormonal development of two hemispheres of the brain. 15-20 minutes of training per day will give a great result throughout the day. The developed brain is the basis of further successful functioning: it is easy to master classes in school, the effectiveness of mastering is increased, and the reader increasingly learns to draw conclusions by thinking independently.

How long should you study?

Each reader assimilates the program at his own pace, the methodology itself is unique — there is no equalization, comparisons. The study of the actions of addition, subtraction, multiplication and division on the account will take an average of 2 — 5 years. Training will take from 1 to 90 minutes once a week, as well as daily homework from 15 minutes.

What else is involved in the training?

This technique has its advantages and disadvantages. However, not all parents know what mental arithmetic teaches. The advantages of the technique are as follows:

- The child quickly learns to take into account.
- Due to the stimulation of good motor skills, schoolchildren develop in the left hemisphere.
- Schoolchildren improve their performance in many school subjects.
- Children develop the ability to succeed in many things.

Not all parents can positively influence arithmetic on the schoolboy. Among the negative observations:

- At school, the child hurries, makes many mistakes.
- It is difficult for certain examples to be confused with the mind, the reader cannot think logically, it is difficult for him to solve equations.

Many teachers and parents become aware of the benefits of such activities. Thinking is due to the lessons of mathematics:

- Develop good motor skills.
- The child may develop memory. With this method, the student can quickly learn poems, songs, foreign words.
- The reader quickly learns to take into account. Such a method of thinking arithmetic is useful for a child not only in school, but also in the future, for adults.

Conclusion

In 2016, psychologist David Barner conducted a similar study in India with a group of scientists, but the children had been followed for three years. Mental arithmetic has helped some students learn better, but the result may also depend on the abilities of a particular student. Most other studies also tested arithmetic skills.

Mental arithmetic should not solve all the problems set for a school math course! It is easier for a child to understand the structure of numbers not only decimal, but also octal, binary. And it is easier to count in the decimal system, since the program has counting rules with a transition through five, ten, one hundred.

Scientists have done quite a bit of research to prove the benefits of learning mental arithmetic. But the unequivocal conclusion that it improves something was made only in relation to the ability to quickly calculate in the head. The main point where cognitive psychologists and neuroscientists agree is that more research is needed. And conclusions from the experiments already obtained should be drawn with caution.

Before teaching the child this method, parents try to find out what kind of intelligent arithmetic is and determine if there are risks for the pupils. The concept of rational mathematics at the cost of classification. All loving parents do not pay money for the education of the child in a special school. In addition, moms and dads, after such lessons, the child stopped thinking logically and often in high school hurries and makes mistakes. Experts argue that it is better to use the methodology for children with mathematical abilities.

Learning mental arithmetic isn't just about adding numbers in your mind. This is a huge amount of work. If a child is not very happy with mathematical formulas and does not have an appropriate mindset, there is no need to forcefully drag him to lessons in this science. It is unlikely that this will bring any benefit to the child himself. On the other hand, even if a child wants to study this science, it is not worth putting pressure on the part of the parents on this process, forcing him to study through force. This can provoke overwork of the child's brain and a loss of interest in the mentality itself. If you are parents, whose children are happy to comprehend the heights of this exact science, then you can only kindly envy you. There will definitely be nothing wrong with learning mental arithmetic. The main thing is to treat it wisely.

References:

1. Maulesheva A., Syrlanova S "MENTAL ARITHMETICS AS A NON-TRADITIONAL METHOD OF TEACHING ORAL ACCOUNTING FOR PRESCHOOLERS", INTERNATIONAL SCIENTIFIC JOURNAL "SYMBOL OF SCIENCE" No. 12-2 , 2016.
2. Dobritsa P., Dobritsa I., Loktionova N., Atakischev O. "MENTAL ARITHMETICS AS A MEANS OF PREPARATION FOR COMPRESSIVE TRAINING", PEDAGOGICAL SCIENCES 2019.
3. Vostretsova N.S. "Intellectual development of children engaged in the technology mental arithmetic", Russian Journal of Education and Psychology, No. 10, 2019.
4. Ryutina K.F., Zakharova I.M. "FEATURES OF THE "MENTAL ARITHMETIC" TECHNOLOGY FOR THE DEVELOPMENT OF YOUNGER STUDENTS' MATHEMATICAL ABILITIES" Dialogue of cultures in the context of educational activities collection conference 2020.
5. Frances F. "Developing Ability in Mental Arithmetic", The Arithmetic Teacher Cover The Arithmetic Teacher, Volume 4: Issue 4, Page(s): 147–150.2019.

6. Galieva S., Pyankova I. "THE USE OF GAMING TECHNOLOGIES IN THE PROCESS OF TEACHING MENTAL ARITHMETIC TO YOUNGER SCHOOLCHILDREN", 2020.
7. Duysenbai G., Zhubanazarova N., Sadykova N., Sailinova K., Kairatova I." THE ROLE, MAIN DIRECTIONS AND METHODS OF MENTAL ARITHMETIC IN THE DEVELOPMENT OF LOGICAL THINKING OF GIFTED CHILDREN", 2021.
8. Gorelik V., Filippova S., Knysheva T. "FEATURES OF PHYSIOLOGICAL INDICATORS OF SCHOOLCHILDREN AGED 7-12 YEARS IN MENTAL ARITHMETIC CLASSES, INCLUDING PHYSICAL EXERCISES WITH ATTENTION SWITCHING", 2018.
9. Meindert B. "TWO TYPES OF MENTAL ARITHMETIC AND THE EMPTY NUMBERLINE" Informal Proceedings 17-1&2 (BSRLM).
10. Diana D., Jo-Anne LeFevre "The role of working memory in mental arithmetic", European Journal of Cognitive Psychology. Pages 353-354 .03 Jun 2010.
11. Rytina K., Zakharova I. "MENTAL ARITHMETIC AS A MEANS OF DEVELOPING MATHEMATICAL ABILITIES IN YOUNGER SCHOOLCHILDREN", 2020.
12. Tsarev S., Tsarev R. "TO THE PROBLEM OF PEDAGOGICAL RESOUESSES OF MENTAL ARITHMETIC IN PREPARING CHILDREN FOR SOCIAL INTERACTION", 2018.
13. Luchkina V. "THE PROSPECTS OF DEVELOPMENT OF MENTAL ARITHMETICS IN RUSSIA" Innovative technologies in modern education: a collection of articles based on the materials of the participants of the IV International Scientific and Practical Internet Conference, 2017.
14. AZHIMATOVA E. "PECULIARITIES OF STUDYING MENTAL ARITHMETICS IN ELEMENTARY SCHOOL", BULLETIN OF OSH STATE UNIVERSITY, article in the proceedings of the conference 2017.
15. MARISHINA A. "MENTAL ARITHMETIC", SOME QUESTIONS OF ANALYSIS, ALGEBRA, GEOMETRY AND MATHEMATICAL EDUCATION, 2017.
16. Poperechny A., Kulikova S., Mykalo Yu. "MENTAL ARITHMETIC", article in the proceedings of the conference 2018.
17. Novoselov Yu. "Method of mental arithmetic", article in the proceedings of the conference 2017.
18. Chernysheva D. ""POSSIBILITIES OF DEVELOPING THE CREATIVE POTENTIAL OF THE PERSONALITY OF YOUNGER SCHOOLS BY MEANS OF MENTAL ARITHMETICS IN THE CONDITIONS OF ADDITIONAL EDUCATION, article in the proceedings of the conference 2018.
19. Klinberzina Yu. "FORMATION OF MENTAL ABILITIES IN YOUNGER SCHOOL AGE WITH THE HELP OF MENTAL ARITHMETICS" article in the proceedings of the conference 2019.
20. Bainazarova T. "HISTORY OF DEVELOPMENT OF MENTAL ARITHMETICS" article in the proceedings of the conference 2018.