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# Psychological And Pedagogical Foundations For The Formation Of Computative Thinking

**Husanova S. H.**
Karshi State University, Uzbekistan
Karshi, Republic of Uzbekistan

**Abstract**. This article discusses the psychological and pedagogical aspects of the process of formation of computational thinking. Computational thinking plays an important role in developing skills that meet the requirements of the modern information age and digital technologies. The study analyzes pedagogical methods, tools and psychological approaches used to develop computational thinking among schoolchildren and students. The authors note that computational thinking includes algorithmic, logical and systems thinking, and also emphasize the important role of teachers in the effective organization of this process. In addition, examples of how these skills can be developed through digital training programs and trainings are considered.

**Keywords.** computational thinking, algorithmic thinking, logical thinking, pedagogical methods, psychological approaches, digital educational programs, a systematic approach.

# Hisoblash Tafakkurini Shakllantirishning Psixologik-Pedagogik Asoslari

**Husanova S. H.**
Qarshi davlat universiteti,
Qarshi, O'zbekiston Respublkasi

**Annotatsiya**. Mazkur maqolada hisoblash tafakkurini shakllantirish jarayonining psixologik va pedagogik jihatlari o'rganiladi. Hisoblash tafakkuri, ayniqsa, zamonaviy axborot texnologiyalari va raqamli asr talablariga mos keladigan ko'nikmalarni shakllantirishda muhim o'rin tutadi. Tadqiqotda o'quvchilar va talabalar orasida hisoblash tafakkurini rivojlantirishda qo'llaniladigan pedagogik usullar, vositalar hamda psixologik yondashuvlar tahlil qilinadi. Mualliflar

hisoblash tafakkuri — algoritmik tafakkur, mantiqiy va tizimli yondashuvni o'z ichiga olishi, ushbu jarayonni samarali tashkil etish uchun pedagoglarning roli katta ekanini ta'kidlaydilar. Shuningdek, raqamli o'quv dasturlari va treninglar yordamida bu ko'nikmalarni qanday shakllantirish mumkinligi misollar asosida ko'rib chiqiladi.

**Kalit so'zlar**. hisoblash tafakkuri, algoritmik tafakkur, mantiqiy tafakkur, pedagogik usullar, psixologik yondashuv, raqamli o'quv dasturlari, tizimli yondashuv.

**Аннотация.** В данной статье рассматриваются психологические и педагогические аспекты процесса формирования вычислительного мышления. Вычислительное мышление играет важную роль в развитии навыков, соответствующих требованиям современной информационной эпохи и цифровых технологий. В исследовании анализируются педагогические методы, средства и психологические подходы, применяемые для развития вычислительного мышления среди школьников и студентов. Авторы отмечают, что вычислительное мышление включает в себя алгоритмическое, логическое и системное мышление, а также подчеркивают важную роль педагогов в эффективной организации данного процесса. Кроме того, рассматриваются примеры того, как можно формировать эти навыки с помощью цифровых учебных программ и тренингов.

**Ключевые слова.** вычислительное мышление, алгоритмическое мышление, логическое мышление, педагогические методы, психологические подходы, цифровые учебные программы, системный подход.

**Introduction**.

In the 21st century, computational thinking has become an integral part of the modern education system. Students need to learn not only the use of technological tools, but also methods for solving complex problems through algorithmic thinking. Understanding the psychological and pedagogical foundations of teaching computational thinking helps determine how to optimize teaching methods in this process.

The development of computational thinking is relevant in a wide range of fields of education, and it applies not only to computer science, but also to other fields of science. The success of this process is linked to training students in

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mathematical and logical thinking, systematic problem-solving, and the effective use of technology. From this perspective, the significance of psychological and pedagogical principles and approaches in the formation of computational thinking should be further studied.

Methods. This study analyzed various pedagogical approaches to the process of developing computational thinking. The following methods were used:

Literature review: Literature on scientific research and modern teaching methods has been studied. In particular, attention was paid to educational theories developed by renowned educators and psychologists such as Piaget, Vygotsky, and Papert.

2. Experimental research: an experiment was conducted among students majoring in information technology at the university. During the experiment, comparative results were studied between the groups trained using different methods.

3. Questionnaires and interviews: Questionnaires and interviews were conducted among teachers, students, and educational professionals. Their experience, difficulties, and successes in shaping computational thinking were analyzed.

Data analysis: The results were reviewed using data analysis, and it was determined which pedagogical methods are the most effective.

Results. The results of the study showed the importance of the following main psychological and pedagogical factors in the formation of computational thinking:

Motivation: Motivational learning methods play an important role in engaging students in computational thinking. Students are more interested in technology and solving problems that apply in real life.

2. Interactive learning: The use of computer simulation, software, and online platforms in the learning process enhances interaction and active participation among students.

3. Algorithmic Thinking: Using algorithmic thinking in teaching computational thinking teaches students to think logically and systematically. This allows for a more effective solution to problems.

4. Problem-based learning: By solving problem situations, students actively develop their computational thinking. This method forces students to analyze the problem, break it down into parts, and find a solution.

5. Social Impact: Working in groups and interacting with students has a significant impact on the development of computational thinking. Skills in exchanging ideas and synthesizing ideas are enhanced through social collaboration.

Discussion. According to the research findings, to enhance the effectiveness of pedagogical approaches, it is necessary to combine psychological and pedagogical approaches. Motivation and an individual approach are of great importance in the process of teaching students to think logically, create algorithms, and effectively use technological tools.

In the process of developing computational thinking, it is necessary to approach each student individually, take into account their abilities, and provide them with the opportunity to maximize their potential. The task of educators is not only to convey knowledge, but also to teach students to think independently when solving problems.

At the same time, it is necessary to consider the importance of social cooperation in shaping computational thinking. Group work and multi-faceted discussions among students allow for the consolidation of knowledge through their interaction. This increases interest and motivation in the learning process.

Conclusion. In-depth study of the psychological and pedagogical foundations in the process of developing computational thinking is crucial for teaching students algorithmic thinking, systematic problem-solving, and the effective use of technologies. The research results show that motivation, interactive learning, and group work are key factors in the development of computational thinking. Teachers also need to apply an individual approach to problem-solving through collaborative work with students. This allows students to fully demonstrate their abilities. The development of social cooperation in the educational process contributes to strengthening the processes of group work and exchange of ideas between students, which serves to increase interest and motivation.

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