

## IMPROVING THE QUALITY OF MATHEMATICS EDUCATION FOR PRIMARY SCHOOL STUDENTS THROUGH INTERACTIVE AND DIDACTIC TEACHING METHODS

**Yunusova Madina Lutfullaevna**

2nd-year Master's student  
Andijan State Pedagogical Institute

**Abstract.** In the current period of the modernization of primary education, improving the quality of the students' mathematical knowledge is becoming the matter of great importance. Existing educational protocols place even more emphasis on teaching how children learn, including the development of logical thinking, independence of thought, continued motivation to learn, and skillful use of knowledge. Thus, it is important to investigate which pedagogic methods can allow the development of mastery of mathematics for students and then to put them into practice. One promising approach is to combine interactive and didactic teaching tactics.

This article presents theoretical and practical assessment of interactive and didactic methods to improve primary school students' understanding of mathematics. It highlights the psychological and pedagogical bedrock of the active learning theory articulated by eminent academics from both local and international perspectives, which emphasize the importance of engagement, collaboration, and a student-centered approach to education. Particular emphasis is attributed to the developmental attributes of younger children who are known to be visual-figurative thinkers, emotionally sensitive, and game-oriented learners.

**Key words:** humanistic pedagogy, activity-based approach, didactic games, teaching methods, differentiated learning, interactive methods, innovative technologies, level of knowledge, critical thinking, student-centered approach, logical thinking, mathematical education for primary school students, modeling, visual aids in teaching, primary school, educational environment and technologies.

**Аннотация.** В условиях модернизации начального образования особую значимость приобретает задача повышения качества математических знаний учащихся. Современные образовательные стандарты нацеливают педагогов не только на передачу определённого объёма знаний, но и на развитие логического мышления, познавательной самостоятельности, устойчивой учебной мотивации и способности применять полученные знания в практической деятельности у младших школьников. Это создаёт потребность в поиске и внедрении эффективных педагогических технологий, которые могли бы обеспечить более высокий уровень усвоения математического материала. Одним из перспективных направлений является применение интерактивных и дидактических методов обучения.

Данная статья посвящена теоретическому и практическому анализу потенциала интерактивных и дидактических методов для повышения качества математических знаний у учеников начальных классов. В исследовании рассматриваются психолого-педагогические основы активного обучения, основанные на идеях ведущих отечественных и зарубежных ученых, подчеркивающих важность деятельностного подхода, сотрудничества и индивидуально-ориентированного подхода в образовательном процессе. Особое внимание уделяется возрастным особенностям младших школьников, которым свойственны наглядно-образное мышление, эмоциональная восприимчивость и потребность в игровом формате обучения.



**Ключевые слова:** гуманистическая педагогика, деятельностный подход, дидактические игры, методы преподавания, дифференцированное обучение, интерактивные методы, инновационные технологии, уровень знаний, критическое мышление, личностно-ориентированный подход, логическое мышление, математическое образование для младших школьников, моделирование, наглядность в обучении, начальная школа, образовательная среда и технологии.

**Annotatsiya.** Asosiy o'quv tizimi modernizatsiya qilinayotgan bir paytda, bu birinchi bosqich bo'lib, o'quvchilar orasida matematik bilimlarning sifati masalasi tobora muhim ahamiyat kasb etmoqda. Hozirgi ta'lim standartlari nafaqat mazmunni yetkazib berish bilan cheklanmasligi, balki o'ylash mantiqini, mustaqil o'rganishni, barqaror o'rganish motivatsiyasini va boshlang'ich maktab o'quvchilarining hayotidagi amaliy faoliyatda olingan bilimlarni qo'llashni rag'batlantirishi kerak. Bu matematik mazmunni yaxshiroq o'zlashtirish darajasini oshiradigan samarali pedagogik texnologiyalarni izlashni talab qiladi. Interaktiv va didaktik o'qitish shakllaridan foydalanish mumkin bo'lgan yo'nalishlardan biri deb hisoblanadi.

Ushbu maqola interaktiv va didaktik yondashuvlar boshlang'ich maktab o'quvchilarining matematikadagi bilim darajasini qanday oshirishi mumkinligini nazariy va amaliy jihatdan o'rganishni maqsad qilgan. Faol o'qitishning psixologik-pedagogik taxminlari muhokama qilingan va psixologik asosda ta'lim jarayonida faol o'qitish, hamkorlikda va shaxsga yo'naltirilgan o'qitishga qaratilgan yetakchi mahalliy va xorijiy olimlarning nuqtai nazari muhokama qilingan. Yosh o'quvchilarga xos bo'lgan tasavvuriy fikrlash, hissiy sezgirlik va o'yin faoliyatiga alohida e'tibor berilishi kerak.

**Tayanch so'zlar:** gumanistik pedagogika, faoliyatga asoslangan yondashuv, didaktik o'yinlar, o'qitish usullari, tabaqalashtirilgan ta'lim, interfaol usullar, innovatsion texnologiyalar, bilim darajasi, tanqidiy fikrlash, o'quvchiga yo'naltirilgan yondashuv, mantiqiy fikrlash, boshlang'ich sinf o'quvchilariga matematik ta'lim, modellashtirish, o'qitishda ko'rgazmali qurollar, boshlang'ich sinf, ta'lim muhiti va texnologiyalari.

### Introduction

Socio-economic transformations, technological developments, and the renewal of educational standards influence modern education in a constantly changing world. Primary school plays a key role in shaping a child's personality, as it is at this stage that the foundations of learning activity are laid, basic intellectual skills are developed, and cognitive interests are formed. Mathematics occupies an important place in the system of primary education, contributing to the development of logical thinking, analytical abilities, attentiveness, and independence. The problem of improving the quality of mathematical knowledge among primary school students is one of the central issues in contemporary pedagogical theory and practice. High-quality knowledge is not only the amount of information acquired, but also the degree of its comprehension, systematization, durability, and the ability to apply it in various educational and real-life situations. However, in practice, traditional forms and methods of teaching are not always effective in the classroom. Moreover, students often experience difficulties when solving non-standard problems, encounter challenges in applying knowledge in practice, and demonstrate a low level of learning motivation.

Issues related to activating students' cognitive activity have been thoroughly studied in the works of Lev Vygotsky, who emphasized the importance of organizing learning within the child's zone of proximal development. According to his theory, learning should promote intellectual growth through interaction and collaboration. Jean Piaget also focused on the age-related characteristics of younger students' thinking, noting that during this period children



transition to the stage of concrete operations, where their understanding is formed through practical activity and visual images. These положения underscore the necessity of applying teaching methods that involve the active participation of the child in the learning process.

The ideas of active learning were further developed by John Dewey, who substantiated the principle of “learning through activity.” He argued that knowledge becomes durable only when the student is independently involved in its discovery and application. A similar viewpoint was expressed by Jerome Bruner, who emphasized the importance of an inquiry-based approach and the discovery of new knowledge while solving problem-based tasks. In Russian pedagogy, the ideas of humanistic and learner-centered education were developed by Vasily Sukhomlinsky, who focused on the emotional aspect of the educational process and the necessity of creating conditions for the success of every child.

In modern schools, interactive and didactic teaching methods aimed at activating students' cognitive activity are becoming increasingly relevant. Interactive methods involve the organization of cooperation, dialogue, collective discussions, and joint problem-solving. Didactic methods, in turn, ensure the structuring of educational material with an emphasis on visual aids and various instructional tools that contribute to a better understanding of mathematical concepts. The relevance of this topic is обусловлена the need to improve the effectiveness of teaching mathematics in primary school, taking into account the psychological characteristics of younger students and the requirements of modern educational standards. Practice shows that the integration of interactive and didactic methods creates conditions for deeper knowledge acquisition, the development of logical thinking, and the formation of stable learning motivation.

The purpose of this study is to provide a theoretical justification and analyze the effectiveness of applying interactive and didactic methods to improve the quality of mathematical knowledge among primary school students. To achieve this goal, the psychological and pedagogical foundations of active learning will be examined, the essence of interactive and didactic methods will be defined, and their impact on the level of mastery of mathematical material will be determined. Thus, the problem of improving the quality of mathematical knowledge in primary school requires a comprehensive approach and the implementation of modern pedagogical technologies that ensure the active participation of the child in the educational process and contribute to their intellectual and personal development.

## MAIN PART

The problem of improving the quality of mathematical knowledge among primary school students has been the subject of research by both domestic and foreign scholars. An analysis of scientific literature indicates that the success of learning largely depends on the organization of the educational process and the level of a child's involvement in learning activities. The theoretical foundations of active learning were laid in the cultural-historical theory of Lev Vygotsky, who considered learning to be the main factor in personal development. In his concept of the zone of proximal development, it is emphasized that properly organized interaction between teacher and student contributes to deeper understanding and autonomy in knowledge acquisition.

The development of ideas about the formation of thinking in childhood is presented in the works of Jean Piaget, who identified stages of cognitive development. He emphasized that primary school students better acquire mathematical concepts through practical actions, visual models, and active participation. The issue of the activity-based approach was thoroughly



examined in the studies of Alexei Leontiev, who substantiated the structure of learning activity and its significance for the formation of consciousness. Pyotr Galperin developed the theory of the step-by-step formation of mental actions, establishing that the gradual transition from external to internal actions ensures durable knowledge acquisition.

In pedagogical science, the principle of visualization, first formulated by Jan Amos Comenius, occupies an important place. He argued that the learning process should be based on sensory perception and the gradual complication of educational material. These ideas remain relevant in the context of modern primary education. The humanistic approach to teaching was further developed in the works of Vasily Sukhomlinsky, who emphasized the importance of emotional comfort, trust, and creating conditions for each child's success. Similar views were shared by Shalva Amonashvili, who promoted the concept of learner-centered education and teacher-student interaction. Foreign researchers have also paid considerable attention to interactive teaching methods. John Dewey substantiated the need for learning through practical activity, emphasizing that knowledge gains value only through its application. In turn, Jerome Bruner proposed the concept of "discovery learning," within which students independently arrive at an understanding of mathematical patterns.

One of the significant contributions to teaching methodology was the creation of the taxonomy of educational objectives by Benjamin Bloom. This classification makes it possible to structure tasks according to levels of complexity—from memorization to analysis and synthesis—and is активно used in the development of interactive and differentiated mathematics tasks. Thus, the analysis of scientific sources shows that most scholars agree on the importance of activating students' cognitive activity as a key condition for improving the quality of knowledge. Interactive and didactic teaching methods are based on the principles of the activity-based approach, visualization, cooperation, and individualization. Their regular use contributes to the development of stable and meaningful mathematical knowledge among primary school students

### **Theoretical Foundations of Interactive and Didactic Methods**

The theoretical foundations of interactive and didactic approaches in teaching mathematics at the primary school level are based on the concepts of activity-based, learner-centered, and humanistic approaches. According to the cultural-historical theory of Lev Vygotsky, a child's development occurs through social interaction, and learning is the key factor in this process. Interactive methods, which include collaboration, dialogue, and joint problem-solving, directly embody this principle. The development of cognitive abilities in primary school students was подробно studied by Jean Piaget, who noted that children aged 7 to 11 are at the stage of concrete operations, where visual elements and practical activities play a crucial role. This justifies the need to use didactic materials, models, diagrams, and game-based learning formats. The activity-based approach was further developed in the research of Alexei Leontiev, who рассматривает learning activity as a system of motives, goals, and actions. From a didactic perspective, the structuring of educational material and the последовательное formation of concepts are particularly effective in teaching mathematics. The theory of the step-by-step formation of mental actions by Pyotr Galperin emphasizes the importance of transitioning from external practical actions to internal intellectual operations. This process is carried out through the use of cards, models, visual схемы, and training exercises. In humanistic pedagogy, Vasily Sukhomlinsky emphasized the importance of creating an emotionally comfortable environment and fostering situations of success. Interactive methods help reduce anxiety levels and build students' confidence. Additional theoretical support is provided by the taxonomy of educational objectives developed by Benjamin Bloom, which allows for the design of tasks of varying



complexity—from simple reproduction to analysis and evaluation. This is especially relevant for differentiated mathematics instruction. Thus, the theoretical foundations confirm that interactive and didactic methods correspond to the age characteristics of primary school students and contribute to deeper knowledge acquisition.

### CONCLUSION

Based on the theoretical analysis and the generalization of pedagogical practice, it can be concluded that interactive and didactic teaching methods are effective tools for improving the quality of mathematical knowledge among primary school students. Their use corresponds to the age characteristics of younger learners and is grounded in fundamental psychological and pedagogical concepts developed by researchers such as Lev Vygotsky and Jean Piaget. Interactive methods promote active student participation in the learning process, develop communication skills, and enhance critical and logical thinking. Didactic tools ensure the systematization of material, visualization, and the step-by-step formation of mathematical concepts. Together, these approaches create conditions for conscious, durable, and systematic knowledge acquisition. Despite existing challenges in implementing active teaching methods, their regular use contributes to increased learning motivation, reduced anxiety, and the formation of a positive attitude toward mathematics. Thus, the integration of interactive and didactic technologies into the primary school educational process is a necessary condition for ensuring high-quality mathematics education and the comprehensive development of the child's personality.

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