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# Issues of Innovative Development of Cognitive Activity in Primary School Students

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**Abstract:** *This article analyzes the theoretical and methodological foundations of the innovative development of primary school students' cognitive activity within the primary education system. The study highlights the significance of practice-oriented approaches, the 4C model, STEAM education, project-based learning, digital technologies, and the principles of Universal Design for Learning (UDL) in fostering students' independent thinking, problem-solving abilities, creativity, and collaboration skills. In addition, the paper substantiates the impact of innovative pedagogical technologies on the quality of education and the cognitive development of primary school learners.*

**Key words:** *primary education, cognitive activity, innovative pedagogy, practice-oriented education, 4C model, STEAM, project-based learning, Universal Design for Learning (UDL), digital educational technologies, competency-based approach.*

## INTRODUCTION

In the modern education system, one of the priority tasks is not only to equip students with theoretical knowledge, but also to develop their skills in effectively applying knowledge in real-life situations, solving problems, thinking critically and creatively, collaborating, and making independent decisions. In particular, the cognitive and innovative competencies formed in students at the primary education stage serve as an important factor for success at subsequent educational levels.[1][2]

In recent years, innovative pedagogical concepts such as the competency-based approach, the 4C model (creativity, critical thinking, communication, and collaboration), STEAM education, project-based learning, and Universal Design for Learning (UDL) have been recognized as effective tools for improving the content of education. These approaches enable the innovative development of students' cognitive activity, the expression of individual abilities, and the assurance of inclusive education.[3][4]

The purpose of this article is to analyze the methodological potential of practice-oriented pedagogical approaches and innovative educational technologies in the innovative development of cognitive activity in primary school students.[5]

## RESEARCH METHODOLOGY

During the research, methods of studying scientific sources on pedagogy and educational theory, comparative and systematic analysis, generalization, and pedagogical observation were employed. In addition, the didactic potential of innovative technologies applied in primary education practice was analyzed, including Project-Based Learning, problem-based learning, interactive methods, STEAM elements, digital educational materials, and UDL principles.[6][7]

The methodological foundation of the research consisted of competency-based, student-centered, systemic-activity, and inclusive pedagogical approaches. The specific goals and principles inherent in each of these in organizing the educational process were examined.[8]

Competency-based approach – a pedagogical approach aimed at developing in students the competencies to effectively apply knowledge, skills, abilities, and personal qualities in real-life situations. The main focus is not only on acquiring knowledge, but on developing the ability to apply it in practice. Its main principles include the integration of theory and practice, education aligned with real-life situations, active student participation, outcome- and process-oriented learning, and the development of core subject-specific competencies. [9]

Student-centered approach – a pedagogical approach based on organizing the educational process taking into account the individual characteristics, abilities, interests, needs, and developmental pace of each student. In this approach, the student is regarded as the central subject of education. Its main principles include recognizing the individuality of each student, supporting free choice and independence, creating an individual learning trajectory, and fostering collaborative and communicative processes between teacher and student. [10][11]

Systemic-activity approach – an approach that views education as an integrated system of interrelated components and assumes that students acquire knowledge through active practical activity. According to this approach, knowledge is not given in ready-made form; rather, students acquire it through inquiry, analysis, and problem-solving. Its main principles are manifested in the systematicity and consistency of education, learning by experience, creating problem situations, reflection and self-assessment, and the gradual development of student activity. [12]

Inclusive pedagogical approach – a pedagogical approach aimed at ensuring that all students, including children with special educational needs, receive quality education on the basis of equal rights and opportunities. This approach accepts individual differences among students as a natural condition and provides for adapting the educational environment to their needs. Its main principles consist of equal opportunity and fairness, openness and flexibility of education, consideration of individual needs, application of Universal Design for Learning (UDL) principles, and ensuring the partnership of family, school, and society. [13]

**Integration table of these approaches**

| **Approach** | **Main objective** | **Student's role** | **Outcome** |
|---|---|---|---|
| **Kompetensiyaviy** | Developing the competency to apply knowledge in practice | Active participant | Core and subject-specific competencies |
| **Student-centered** | Supporting individual development | Central subject | Realization of personal potential |
| **Systemic-activity** | Acquiring knowledge through activity | Explorer and researcher | Independent thinking and problem-solving skills |
| **Inclusive pedagogical** | Ensuring equal and quality education for all students | Collaborative and equal participant | Inclusive, flexible, and equitable learning environment |

## RESULTS

International experience and innovative technologies were considered as primary tools for developing students' cognitive activity. These included project-based learning (Project-Based Learning), problem-based learning technologies, interactive methods and small group work, STEAM education elements, digital and multimedia technologies, game-based and inquiry-oriented activities, and Universal Design for Learning (UDL) principles. [14]

The analyses showed that an educational process organized on the basis of practice-oriented and innovative pedagogical technologies has high effectiveness in developing students' cognitive activity and creative potential.

In particular, project-based learning develops students' skills in conducting independent research, analyzing information, and creating practical products. Projects such as "Water is Life," "Clean Air," and "World of Professions" serve to form communicative, social, and research competencies.

In lessons organized on the basis of problem-based learning technologies, students acquire skills in analyzing problematic situations, reasoning, comparing, and drawing independent conclusions. This develops their critical thinking and decision-making abilities.[15]

The STEAM approach ensures interdisciplinary integration and helps develop students' scientific, technological, and engineering thinking. Through constructing simple structures, conducting ecological projects, and organizing experiments, students develop creativity and practical problem-solving skills.

The use of digital educational technologies creates an interactive learning environment and allows for organizing individual learning trajectories and implementing a differentiated approach. Virtual laboratories, electronic textbooks, and educational mobile applications increase students' learning motivation and cognitive activity.

The analysis results also showed a significant improvement in the participation, learning achievement, and independent activity of students with various educational needs in educational processes organized on the basis of UDL principles.

## DISCUSSION

The obtained results confirm the priority of practice-oriented approaches in the innovative development of cognitive activity in primary education. Research shows that involving students in the educational process as active cognitive subjects serves to increase their learning motivation and creative potential.

When the components of the 4C model – creativity, critical thinking, communication, and collaboration – are integrated with project activities, interactive methods, and the STEAM approach, they create a favorable pedagogical environment for developing students' complex competencies. At the same time, the application of UDL principles makes the educational process open and flexible for all students, enabling the effective organization of inclusive education.

The effectiveness of practice-oriented education largely depends on the teacher's innovative competence. The teacher, as a tutor, mentor, facilitator, partner, and mediator, must support students' independent activity, differentially organize the educational process, and effectively use modern digital tools. It is also advisable that the assessment system be oriented not only toward measuring the volume of knowledge, but also toward identifying students' practical activities, creativity, and problem-solving competencies.

## CONCLUSION

The innovative development of cognitive activity in primary school students is one of the priority directions of modern education. The integrated application of practice-oriented approaches, the 4C model, STEAM technologies, project-based learning, digital educational tools, and Universal Design for Learning principles effectively develops students' independent thinking, creative approach, communicative culture, and problem-solving competencies.

From this perspective, the widespread introduction of innovative pedagogical technologies in primary education practice, the enhancement of teachers' professional competence, and the development of an inclusive and collaborative learning environment based on UDL principles serve as one of the important factors for improving the quality of education.

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