



PRACTICAL SIGNIFICANCE OF METHODS OF INNOVATIVE DEVELOPMENT OF STUDENTS' TECHNICAL CREATIVITY

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Annotation. *The article examines the practical significance of methods for innovative development of students' technical creativity in the context of modern education. Particular attention is paid to pedagogical, psychological, and technological approaches that foster creative thinking, engineering skills, and problem-solving abilities among learners. The study analyzes contemporary innovative methods such as project-based learning, design thinking, STEM/STEAM integration, digital modeling, and the use of information and communication technologies (ICT). The practical value of these methods is revealed through their influence on students' motivation, professional orientation, and readiness for innovative activity. The article also discusses the role of teachers, educational environments, and interdisciplinary integration in enhancing technical creativity. The findings may be useful for educators, curriculum developers, and policymakers aiming to modernize technical and vocational education.*

Keywords. *technical creativity, innovative development, project-based learning, STEM education, design thinking, digital technologies, student creativity.*

Annotatsiya. *Maqolada zamonaviy ta'lim kontekstida talabalarning texnik ijodini innovatsion rivojlantirish usullarining amaliy ahamiyati ko'rib chiqiladi. O'quvchilar o'rtasida ijodiy tafakkur, muhandislik ko'nikmalari va muammolarni hal etish qobiliyatiga xizmat qiladigan pedagogik, psixologik va texnologik yondashuvlarga alohida e'tibor qaratilmoqda. Tadqiqotda loyihani o'rganish, dizayn-fikrlash, STEM/STEAM integratsiyasi, raqamli modellashtirish va*



axborot-kommunikatsiya texnologiyalaridan foydalanish kabi zamonaviy innovatsion usullar tahlil qilinadi. Ushbu usullarning amaliy ahamiyati ularning talabalarni rag'batlantirish, kasbga yo'naltirish va innovatsion faoliyatga tayyorligiga ta'siri orqali namoyon bo'ladi. Maqolada, shuningdek, texnik ijodkorlikni oshirishda o'qituvchilar, ta'lim muhiti va fanlararo integratsiyaning roli muhokama qilinadi. Natijalar texnik va kasb-hunar ta'limini modernizatsiya qilishga intilayotgan pedagoglar, o'quv dasturlarini ishlab chiquvchilar va siyosatchilar uchun foydali bo'lishi mumkin.

Kalit so'zlar. *texnik ijodkorlik, innovatsion rivojlanish, loyiha ta'limi, STEM-ta'lim, dizayn-tafakkur, raqamli texnologiyalar, talabalar ijodiyoti.*

Аннотация. *В статье рассматривается практическая значимость методов инновационного развития технического творчества студентов в контексте современного образования. Особое внимание уделяется педагогическим, психологическим и технологическим подходам, которые способствуют творческому мышлению, инженерным навыкам и способностям решения проблем среди учащихся. В исследовании анализируются современные инновационные методы, такие как проектное обучение, дизайн-мышление, интеграция STEM/STEAM, цифровое моделирование и использование информационно-коммуникационных технологий (ИКТ). Практическая ценность этих методов раскрывается через их влияние на мотивацию студентов, профессиональную ориентацию и готовность к инновационной деятельности. В статье также обсуждается роль учителей, образовательной среды и междисциплинарной интеграции в повышении технического творчества. Результаты могут быть полезны для педагогов, разработчиков учебных программ и политиков, стремящихся модернизировать техническое и профессиональное образование.*

Ключевые слова. *техническое творчество, инновационное развитие, проектное обучение, STEM-образование, дизайн-мышление, цифровые технологии, студенческое творчество.*



In the conditions of rapid technological progress and global digital transformation, the development of students' technical creativity has become one of the key priorities of modern education systems.

Society increasingly demands specialists who are not only capable of reproducing existing knowledge but also able to generate new ideas, design innovative products, and solve complex technical problems. Therefore, the introduction of innovative methods aimed at developing technical creativity among students is of great practical importance.

Technical creativity refers to the ability of students to apply scientific and technical knowledge creatively in order to design, model, improve, and implement technical solutions. Innovative development methods in education contribute to the formation of such abilities by creating learning environments that encourage experimentation, critical thinking, and independent problem-solving.

The purpose of this article is to analyze the practical significance of innovative methods for developing students' technical creativity and to identify their impact on the quality of education and professional training. Technical creativity is a complex pedagogical and psychological phenomenon that integrates intellectual abilities, technical knowledge, creative thinking, and practical skills. Researchers emphasize that creativity in technical fields develops most effectively when students are actively involved in meaningful and problem-oriented activities.

From a pedagogical perspective, the development of technical creativity is based on constructivist learning theories, which consider learning as an active process of knowledge construction.

Psychological theories highlight the importance of motivation, imagination, and divergent thinking in creative activity. Together, these theoretical foundations justify the use of innovative teaching methods that move beyond traditional reproductive learning. Project-based learning (PBL) is one of the most effective methods for developing technical creativity. It involves students in long-term projects that require identifying a problem, designing a solution, implementing it,



and evaluating the results. In the process, students develop technical thinking, teamwork skills, and responsibility for outcomes.

The practical significance of PBL lies in its close connection with real-life technical tasks. Students learn to apply theoretical knowledge in practice, which increases their motivation and understanding of professional contexts. Design thinking is an innovative approach that focuses on user-centered problem solving. It includes stages such as empathy, problem definition, idea generation, prototyping, and testing. This method develops students' ability to think creatively, consider alternative solutions, and iteratively improve technical products.

In educational practice, design thinking enhances students' flexibility of thinking and encourages experimentation, which is essential for technical creativity.

STEM (Science, Technology, Engineering, Mathematics) and STEAM (with the addition of Arts) education models integrate multiple disciplines into a unified learning process. This interdisciplinary approach allows students to see the connections between different fields and apply knowledge holistically. The practical value of STEM/STEAM education is reflected in the development of analytical, engineering, and creative skills, as well as in preparing students for future professions in high-tech industries.

Modern digital tools such as computer-aided design (CAD), simulation software, virtual laboratories, and robotics platforms significantly expand opportunities for technical creativity. These technologies enable students to model complex systems, test ideas safely, and visualize abstract concepts. The integration of ICT into education increases learning efficiency and provides students with competencies that are highly demanded in the labor market. The practical significance of innovative methods for developing technical creativity can be observed in several key aspects.

Improvement of Learning Motivation: Innovative methods make learning more engaging and meaningful, which increases students' intrinsic motivation.



Development of Professional Competencies: Students acquire practical skills and competencies relevant to modern technical professions. Formation of Innovative Thinking: Creative problem-solving and critical thinking become integral parts of students' cognitive activity. Adaptation to Real-World Challenges: By working on real or simulated technical problems, students become better prepared for professional practice. Enhancement of Collaboration Skills: Many innovative methods emphasize teamwork, communication, and interdisciplinary cooperation.

The successful implementation of innovative methods largely depends on the teacher's role. Teachers act not only as knowledge transmitters but also as facilitators, mentors, and organizers of creative activity. Their professional competence and readiness to use innovative technologies are crucial factors.

An educational environment that supports technical creativity should include modern equipment, access to digital resources, and a culture that encourages experimentation and tolerance for mistakes. Such an environment promotes continuous learning and innovation.

Despite their advantages, innovative methods face certain challenges, including insufficient material resources, lack of teacher training, and rigid curricula. Addressing these issues requires systemic reforms, investment in infrastructure, and continuous professional development of educators. Future prospects involve the wider use of artificial intelligence, virtual and augmented reality, and adaptive learning systems to further enhance technical creativity development.

Innovative methods for developing students' technical creativity have significant practical importance in modern education. They contribute to the formation of creative, competent, and adaptable specialists capable of innovative activity. The integration of project-based learning, design thinking, STEM/STEAM education, and digital technologies creates favorable conditions for the holistic development of students' technical creativity.

The results of this study confirm that the systematic application of innovative methods enhances the quality of technical education and aligns it with the demands



of the contemporary labor market. Therefore, their widespread implementation should be considered a strategic priority in educational development.

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