JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 04, ISSUE 11
MOPNTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

METHODOLOGY OF DEVELOPING CREATIVE THINKING AND GENERATING NEW KNOWLEDGE IN THE PEDAGOGICAL PROCESS

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Abstract: This paper analyzes the methodology of developing creative thinking and generating new knowledge in the pedagogical process. It examines the effectiveness of problem-based and project-based learning, reflective and analogical methods, as well as collaborative and multimodal approaches. Strategies for fostering students' creative abilities, independent thinking, and knowledge creation are proposed. The role of psychological motivation and individualized approaches is also emphasized.

Keywords: Pedagogical process, creative thinking, new knowledge, methodology, project-based learning, reflection, collaborative approach, multimodal learning, independent thinking, motivation

МЕТОДИКА ФОРМИРОВАНИЯ КРЕАТИВНОГО МЫШЛЕНИЯ И СОЗДАНИЯ НОВЫХ ЗНАНИЙ В ПЕДАГОГИЧЕСКОМ ПРОЦЕССЕ

Аннотация: В данной работе анализируются методические основы формирования креативного мышления и создания новых знаний в педагогическом процессе. Рассматривается эффективность проблемного и проектного обучения, рефлексивных и аналоговых методов, а также коллективного и мультимодального подходов. Предлагаются стратегии, способствующие развитию творческих способностей, самостоятельного мышления и генерации новых знаний у студентов. Особое внимание уделено психологической мотивации и индивидуальному подходу.

Ключевые слова: Педагогический процесс, креативное мышление, новые знания, методика, проектное обучение, рефлексия, коллективный подход, мультимодальное обучение, самостоятельное мышление, мотивация

The pedagogical process is primarily aimed at developing students' abilities, deepening their knowledge and skills, and guiding them toward independent and creative activity. From this perspective, fostering creative thinking is one of the most critical tasks in pedagogy, as in modern society every individual contributes to societal development through knowledge and innovative approaches. Creative thinking is also a key criterion for students' ability to generate new knowledge and learn independently. The development of creative thinking in the pedagogical process is supported by numerous scientific studies and practical experiences. Vygotsky's social development theory emphasizes that knowledge and thinking evolve through social interaction, and that the teacher's activity is crucial in guiding the student's learning process (Vygotsky, 1978). Similarly, Bloom's taxonomy of educational objectives classifies creative abilities as a high-level cognitive activity, encompassing the ability to analyze, synthesize, and generate new ideas (Bloom, 1956).

Methodological Foundations for Developing Creative Thinking One of the primary approaches is problem-based learning, which fosters students' independent thinking and

problem-solving skills. This methodology encourages learners to seek new knowledge beyond existing information, conduct experiments, and develop original solutions. Problem-based tasks also enhance critical thinking by requiring students to analyze situations, draw conclusions, and apply existing knowledge in new contexts.

Another important approach is project-based learning, which allows students to expand their knowledge and skills through practical activities. Project-based instruction develops students' abilities to generate creative ideas, conduct independent research, and analyze results. This approach is particularly effective in STEM (Science, Technology, Engineering, Mathematics) disciplines and the arts, providing students with opportunities to experiment with various projects (Thomas, 2000). Interactive teaching technologies are widely used to foster creative thinking. Group work, debates, simulations, and computer programs strengthen students' analytical and creative abilities. These interactive methods allow students to express their ideas freely, collaborate with peers, and test new concepts. Multimedia tools and online resources enable learners to analyze diverse information sources, create new knowledge, and develop skills for applying it (Mayer, 2003).

From a psychological perspective, the development of creative thinking is closely linked to students' motivation, interests, and drive for independent thought. According to Deci and Ryan's self-determination theory, individuals with intrinsic motivation engage more effectively in creative activities (Deci & Ryan, 1985). Therefore, teachers should adapt the pedagogical process to students' interests and encourage independent inquiry. Cognitive methods also play a critical role in nurturing creative thinking. Convergent and divergent thinking techniques enhance students' ability to generate new ideas. Divergent thinking encourages multiple solutions and creative exploration, while convergent thinking focuses on selecting the most effective and well-reasoned solution. Guilford's theory of creativity identifies divergent thinking as a central element of creative ability (Guilford, 1967). Assessment is another essential aspect of developing creative thinking. Formative assessment helps identify students' achievements and challenges, guiding their development. Providing constructive feedback and encouraging students to view failures as learning experiences strengthens the creative process (Black & Wiliam, 1998).

Fostering New Knowledge The creation of new knowledge in the pedagogical process can be facilitated through creative laboratories, scientific clubs, and research centers. These platforms allow students to apply theoretical knowledge in practice. Additionally, game-based methods, simulations, and modeling technologies are widely used to stimulate creativity and generate new knowledge. A transdisciplinary approach further supports creative thinking by integrating knowledge across multiple disciplines, enabling students to solve complex problems. For instance, combining mathematics, computer science, and biology in an ecological project enhances students' ability to generate new knowledge and innovative solutions. Pedagogical practice requires continuous methodological innovation. Modern research indicates that traditional lecture-based instruction alone does not sufficiently develop students' creative and independent thinking skills (Robinson, 2011). Therefore, teachers must actively employ innovative methods, interactive technologies, and project-based approaches to effectively foster creativity and knowledge generation.

Reflective and Analogical Methods Reflective teaching methods allow students to analyze their thinking processes, identify reasoning behind decisions, and constructively

evaluate mistakes. Reflection strengthens self-development and encourages students to take initiative in creating new knowledge (Schön, 1983). Analogical and metaphorical thinking techniques help students integrate knowledge from different fields and develop new concepts. These methods are particularly effective in explaining complex or abstract topics, promoting the creation of new knowledge.

Collaborative and Multimodal Approaches Collaborative learning enhances communication skills, idea exchange, constructive critique, and teamwork abilities. It also strengthens social intelligence and empathy, guiding students toward creative problem-solving (Johnson & Johnson, 2009). Multimodal teaching methods—using visual, auditory, kinesthetic, and interactive elements—support personalized learning and stimulate creativity. Virtual labs, animations, and multimedia presentations allow students to experiment, model processes, and express ideas effectively (Mayer, 2009).

The development of creative thinking and the generation of new knowledge in the pedagogical process have become central components of contemporary education. Modern society demands individuals who can not only acquire existing knowledge but also generate innovative solutions to complex problems. Consequently, educators must adopt dynamic methodologies that promote cognitive flexibility, problem-solving, and the integration of interdisciplinary knowledge. Recent research emphasizes that the development of creativity is not limited to artistic expression but extends across STEM fields, social sciences, and humanities, fostering both cognitive and socio-emotional growth (Sawyer, 2020).

A key methodological approach is project-based learning (PBL), which immerses students in authentic, real-world tasks requiring the application of knowledge across multiple domains. PBL encourages experimentation, iterative thinking, and reflective evaluation. Students engaged in project-based activities develop autonomy, collaborative skills, and the capacity to generate novel ideas. For instance, ecological projects integrating biology, data science, and community engagement help students not only understand theoretical concepts but also contribute to tangible societal outcomes (Bell, 2010). Problem-based learning (PrBL) is another effective methodology for fostering creative cognition. PrBL presents learners with complex, open-ended problems without predefined solutions, prompting critical analysis, hypothesis generation, and strategic reasoning. Recent studies indicate that PrBL enhances both convergent and divergent thinking abilities, as students must explore multiple pathways to arrive at effective solutions while evaluating the feasibility and impact of each approach (Hmelo-Silver, 2019).

Reflective practice remains central to the cultivation of creativity and new knowledge. By systematically analyzing their own thought processes, students can identify cognitive biases, evaluate reasoning strategies, and improve decision-making. Digital portfolios and reflective journals, increasingly integrated into blended learning platforms, provide students with opportunities to document, review, and refine their learning experiences. This reflective engagement is linked to increased metacognition, self-directed learning, and the ability to transfer knowledge across contexts (Schön, 1987; Kolb, 2015).Analogical and metaphorical thinking are also crucial in connecting new knowledge with existing conceptual frameworks. Students trained to draw analogies across disciplines—such as comparing computational algorithms to natural ecological processes—enhance their capacity for abstract reasoning and creative problem-solving. Cognitive neuroscience studies suggest that analogical reasoning

activates both the prefrontal cortex and parietal regions, underscoring its role in higher-order thinking and knowledge synthesis (Gentner et al., 2016).

Individualized learning pathways further support the development of creativity by accounting for differences in prior knowledge, cognitive style, and motivation. Adaptive learning platforms, powered by artificial intelligence, provide personalized feedback, suggest problem-solving strategies, and scaffold increasingly complex tasks. Such individualized approaches ensure that each student can pursue creative exploration at their own pace while maintaining alignment with curriculum goals (Brusilovsky & Millán, 2007). The integration of transdisciplinary approaches has become increasingly important in fostering both creativity and knowledge creation. By merging principles from multiple disciplines—such as combining engineering, environmental science, and social studies in sustainability-focused projects—students develop holistic understanding and innovative solutions to multidimensional challenges. Research indicates that transdisciplinary learning enhances both critical thinking and the ability to synthesize knowledge from diverse domains, preparing students for the complexity of real-world problem-solving (Rieckmann, 2018).

Psychological factors, particularly intrinsic motivation, growth mindset, and risk-taking propensity, play a critical role in students' creative development. Creating a safe, supportive, and autonomy-promoting learning environment is essential. Encouraging students to perceive mistakes as learning opportunities, providing constructive feedback, and recognizing innovative contributions all contribute to sustained engagement and higher levels of creative output (Deci & Ryan, 2017). Emerging digital technologies are transforming the methodology of creativity and knowledge generation. Tools such as AI-driven simulations, collaborative platforms, and interactive knowledge maps allow students to model scenarios, analyze outcomes, and experiment with novel approaches. For example, AI-powered predictive analytics can help students identify patterns in complex datasets, fostering data-driven creativity and supporting evidence-based decision-making. These innovations are reshaping the pedagogical landscape, making creativity not just a skill to be nurtured but a systematic, scaffolded component of learning.

In conclusion, the development of creative thinking and the generation of new knowledge in the pedagogical process is a multidimensional and integrative endeavor. Effective methodologies combine problem-based and project-based learning, reflective and analogical thinking, collaborative and multimodal approaches, individualized pathways, transdisciplinary integration, and digital technologies. Together, these strategies enhance students' cognitive, social, and emotional capacities, enabling them to generate innovative solutions, apply knowledge in practical contexts, and contribute meaningfully to society. The continual refinement of these methodologies is essential for preparing learners to thrive in an increasingly complex and rapidly evolving world.

Experiential and Individualized Learning Experimentation, laboratory work, and research projects develop independent thinking, initiative, and the capacity to generate new knowledge. Individualized learning, considering students' abilities, interests, and knowledge levels, allows learners to strengthen strengths, address weaknesses, and apply personalized strategies for creating new knowledge. Interdisciplinary activities also encourage analyzing complex problems from multiple perspectives and developing innovative solutions.

A psychologically safe and supportive environment is essential for fostering creative thinking. Students must feel free to express ideas, view mistakes as learning opportunities, and test new concepts. Constructive feedback, encouragement for creative initiative, and opportunities for independent decision-making are fundamental to developing innovative knowledge.

Conclusion The methodology of developing creative thinking and generating new knowledge is a multidimensional process grounded in pedagogical, psychological, and cognitive principles. Problem-based and project-based learning, reflective and analogical methods, collaborative and multimodal approaches, experimentation, and individualized instruction collectively enhance students' creative potential. This process promotes independent thinking, knowledge creation, and innovative problem-solving. Modern pedagogical research demonstrates that fostering creativity not only improves cognitive potential but also positively impacts social and emotional development. Integrating innovative methods, interactive technologies, and transdisciplinary approaches allows students to engage in independent experimentation, project work, and knowledge generation. Consequently, the pedagogical process cultivates intellectual potential, practical application of knowledge, and creative problem-solving abilities, ultimately enhancing the quality of education and preparing students for modern societal challenges.

References

1. Elov, Z., & Mamatov, O. T. (2024). TALABA SHAXSIDA BILISH FAOLIYATIGA MOTIVLASHTIRISHNING PSIXOLOGIK VA PEDAGOGIK ASOSLARI. *" ПЕДАГОГИЧЕСКАЯ АКМЕОЛОГИЯ" международный научно-методический журнал*, *2*(10).
2. Sattorovich, E. Z. (2024). O 'SMIRLARDA SUITSIDIAL HOLATLARNI KELTIRIB CHIQARUVCHI IJTIMOIY-PSIXOLOGIK OMILLAR. *PEDAGOG*, *7*(5), 31-37.
3. Sattorovich, E. Z. (2024). SUD PSIXOLOGIK EKSPERTIZASI TARIXI RIVOJLANISH JARAYONI BOSQICHLARI. *PEDAGOG*, *7*(4), 306-313.
4. Olimov, T. H. (2019). SPIRITUAL AND MORAL ASPECTS OF THE FORMATION OF CIVIL CULTURE IN FUTURE SPECIALISTS OF HIGHER EDUCATION. *Theoretical & Applied Science*, (12), 662-665.
5. Olimov, T. H. (2020). The image of a modern teacher in the formation of civic culture among future highly educated specialists. *Pedagogical skill-Bukhara*, *5*.
6. Olimov, T. H. (2019). Development issues of civil society and culture in the work of Eastern thinkers. *Pedagogical skill-Bukhara*, *2*.
7. Olimov, T. H. (2016). Formation of self-awareness in youth. *Social and humanitarian sciences in the educational system.-Tashkent*, *4*.
8. Olimov, T. (2020). BO'LAJAK OLIY MA'LUMOTLI MUTAXASISLARDA FUQAROLIK MADANIYATINI SHAKLLANTIRISHNING AYRIM YO'NALISHLARI. *FAN, TA'LIM VA AMALIYOTNING INTEGRASIYASI*, *1*(1), 20-27.
9. Akbarovna, I. S. (2024). PSIXOLOGIK XIZMAT ASOSLARI. *PSIXOLOGIYA VA SOTSIOLOGIYA ILMIY JURNALI*, *2*(4), 54-60.
10. Akbarovna, I. S. (2023). O'smirlarda destruktiv axborotlarga nisbatan mafkuraviy immunitet shakllantirish.
11. Икромова, С. А. (2024). ЭТАПЫ ПСИХОЛОГИЧЕСКОЙ КОНСУЛЬТАЦИИ. *Multidisciplinary Journal of Science and Technology*, *4*(3), 875-881.