

PEDAGOGICAL MECHANISMS FOR DEVELOPING PROFESSIONAL COMPETENCE AND CREATIVITY IN FUTURE ENGINEERS

BADALOV UTKIRBEK NOMOZ OGLI.

Jizzakh Polytechnic Institute, assistant, independent researcher

Orcid: [0000-0003-4983-6805](https://orcid.org/0000-0003-4983-6805)

Abstract: The dynamic landscape of engineering demands a paradigm shift in educational approaches to nurture the professional competence and creativity of future engineers. This article explores the fundamental principles that underpin pedagogical mechanisms aimed at preparing engineers for the challenges of the ever-evolving technological world.

Keywords: competence, pedagogical mechanisms, professional mentoring, cooperative education, mastered education, projects.

Active learning is the foundation of effective engineering education. Encouraging students to actively participate in the learning process through hands-on experiences, problem-solving exercises, and interactive learning helps deepen theoretical support. The interdisciplinary approach in education involves integrating knowledge and methodologies from multiple disciplines to address complex problems, promote a holistic understanding, and encourage innovative solutions. In the context of engineering education, the interdisciplinary approach plays a crucial role in preparing students for the diverse and dynamic challenges they may encounter in their professional careers. Manufacturing helps future engineers apply knowledge in practical scenarios, building on the complexity of their real engineering problems, and while recognizing the interdisciplinary capabilities of manufacturing engineering, education programs should embrace multidisciplinary manufacturing [1]. This allows students to improve holistic problem-solving by emphasizing the interdependence of different manufacturing technologies. Exposure to different perspectives fosters capacity and creativity in approaching engineering problems. I would like to add that the integration of

accessible education has an important role in the decision-making and creative thinking processes of future managers. By participating in real-world projects, students gained valuable experience in teamwork, critical thinking, and leadership. Not limited to textbooks, but to provide support for practical applications of advanced theoretical knowledge.

Innovation and Technology Integration: Staying current with technological advancements and fostering an innovative mindset is imperative for future engineers. Integrating the latest technologies into the curriculum and emphasizing innovation prepares students to navigate the rapidly changing landscape of engineering. This principle encourages a culture of continuous learning and adaptation. **Mentorship and Industry Collaboration:** Mentorship programs and collaboration with industry professionals bridge the gap between academia and the professional realm. Exposure to real-world challenges under the guidance of experienced mentors enhances students' problem-solving abilities and provides insights into the practical application of engineering principles [2].

Customized Curriculum: Recognizing the diverse interests and learning styles of students, a customized curriculum allows for flexibility and specialization. This principle enables students to explore specific areas within engineering that align with their passions, fostering a deeper understanding and commitment to their chosen field. **Practical Experience and Internships:** Hands-on experience gained through internships and industry placements is invaluable. Practical exposure to professional work environments not only enhances technical skills but also cultivates adaptability, teamwork, and a contextual understanding of theoretical concepts.

Critical Thinking and Creativity: Promoting critical thinking and creativity is essential for preparing engineers to tackle complex problems. Encouraging students to think beyond established norms and explore innovative solutions fosters a mindset of continuous improvement and adaptability [3].

In conclusion, the principles outlined above serve as the foundation for effective pedagogical mechanisms in engineering education. By embracing these principles, educators can create an environment that not only develops the professional competence of future engineers but also nurtures their creativity, ensuring they are well-equipped to contribute meaningfully to the ever-changing landscape of the engineering profession.

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