

INNOVATIVE APPROACH IN EDUCATION AND INCREASING THE EFFECTIVENESS OF EDUCATION IN MODERN TEACHING. AS AN EXAMPLE OF ROAD ENGINEERING

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Annotation: this article scientifically covers the introduction of modern pedagogical technologies in the training of specialists in the field of highways, the influence of innovative teaching methods on the educational process, and the application of digital solutions in the field. Recommendations are given on the advantages of integrating modern technologies into the educational process, the effectiveness of using scientific laboratories and artificial intelligence, as well as improving education based on international practice. Also discussed are the competency-based approach to the training of road construction specialists, the STEAM model, and teaching methods based on an innovative approach.

Keywords: modern teaching, educational effectiveness, road direction, engineering education, practical training, digital technologies, interactive methods, modern pedagogical approach, scientific laboratory, road design, industrial practice, dual education, road construction technologies, educational process innovations.

Login. In our country, special attention is paid to the development of the road construction industry and bringing roads up to international standards. The development of the draft law "On Roads" in a new edition is also an important step in the development of the sphere. The Research Institute of Highways is also carrying out a number of practical work on the further development of the road industry, the attraction of new innovative technologies, including the exchange of experience and the implementation of advanced projects with internationally developed countries.

Highways are one of the main branches of the economy. Road construction, repair, and operation require high technologies, accuracy, and modern engineering approaches. Therefore, when training a specialist in road construction, it is necessary to organize the educational process in an innovative, practice-oriented, and digitalized form. The construction and operation of highways is one of the main infrastructural directions of human development. Today, the effectiveness of transport and logistics systems directly depends on the quality of road infrastructure. Therefore, in Uzbekistan, as in many developed countries of the world, the road construction industry is being radically modernized, scientific approaches are being strengthened, and new technologies are being widely introduced.

In such conditions, students studying in this field, participants of bachelor's and master's programs are required to have modern skills, be able to work on digital platforms, and have a deep knowledge of international standards. This, in turn, necessitates the widespread use of innovative approaches and modern pedagogical methods in the educational process.

Literature analysis and methodology.

Today's education system should be student-centered, interactive, practical, and compatible with the digital environment. Since the specific complexities of the road sector are

associated with such comprehensive disciplines as geodesy, geology, mechanics, ecology, materials science, the theory of transport flows, and construction technologies, the organization of education based on innovative forms significantly increases efficiency. Road construction has reached a new level in recent years. In today's era of globalization and the development of digital technologies, training qualified specialists in the field of roads is one of the priority tasks of the education system. The rapid development of technologies, software products, geodetic devices, and monitoring methods used in the road construction process requires an innovative approach in the educational process. Modern teaching methods form students' activity, independent thinking ability, practical skills, decision-making potential, and creativity. The demand for specialists who know such technologies is growing worldwide. Therefore, the education system must meet the requirements of the updated labor market. Traditional knowledge alone is not enough. Specialist: must be able to work in practice, be able to analyze independently, have problem-solving skills. This requires training based on a competency-based approach.

An innovative approach is a method of developing and implementing new, creative approaches to existing issues, which serves to increase the efficiency of processes and strengthen competitiveness. Innovative approaches are applied in all spheres, including education, business, medicine, and manufacturing, creating new opportunities and conditions for development. The most important thing in an innovative approach is creative thinking and a new approach. This requires considering issues outside of accepted methods and testing new ideas. Problem-solving orientation: The innovative approach aims to solve problems in a practical way. Therefore, any new idea or technology is based on specific needs and requirements. The application of technologies is an integral part of the innovative approach. With the help of modern technologies, it is possible to automate processes, quickly and easily analyze data. In an innovative approach, it is important to quickly accept and adapt to changing conditions and requirements. Innovative approaches are an integral part of progress today. It serves not only to improve the quality of products and services, but also to create new opportunities in society and improve the quality of life. By applying an innovative approach, enterprises and organizations will be able to be competitive, support technological development, and adapt to the needs of clients.

Discussion and results.

Today's education system includes approaches based on modern technologies and innovations. Global competition and technological changes, as well as the development of information technologies, require the introduction of new technologies into the educational process. Innovative pedagogical technologies are an important tool for making the educational process more effective and interesting, ensuring the active participation of students in the learning process. Innovative approaches are used to improve the educational process, introduce new methods, and increase pedagogical effectiveness. These approaches introduce innovations into the educational process and support students in independently acquiring their knowledge. For example, the application of the STEAM (Science, Technology, Engineering, Arts, Mathematics) model in education forms analytical thinking and creative approaches in students. Innovative technologies introduce the following advantages into the educational process: - interactivity. The use of interactive technologies in education ensures the active participation of students; - individuality. The opportunity to impart knowledge is created in accordance with each student's abilities and learning speed. - teaching effectiveness. With the help of

technologies, teachers can monitor the level of students' knowledge and make timely analyses and edits.

The importance of innovative education in the direction of highways, such technologies as intelligent transport systems (ITS), 3D laser scanning, georadar diagnostics, and automatic monitoring are widely used in modern road construction. Therefore, it is important that curricula are updated based on new technologies.

Innovative teaching technologies in road education. Application of virtual and scientific laboratories: **z**the use of virtual and scientific laboratories in the modern educational process is one of the most important factors sharply increasing the effectiveness of teaching. Especially in technical fields, including road construction, geodesy, and transport engineering, the innovative form of laboratory classes provides students with deep knowledge, solid practical skills, and professional competence. The introduction of these laboratories into the educational process will give the following results: teaching mechanical engineering based on 3D models of real construction technology. Research shows that students trained on the basis of a virtual laboratory: have a higher level of mastery of the topic, a longer retention period in memory, a lower number of errors in practical work, an increased ability to analyze and formulate their own opinion.

The STEAM approach is a modern educational model that combines scientific analysis, engineering thinking, creativity, and applied technologies in technical fields. The application of this approach in such a complex and multi-stage process as road construction creates a number of positive results and new opportunities. The STEAM approach in road construction deepens engineering skills, such as working with project drawings, analyzing traffic flows, studying the properties of materials, and managing modern construction equipment.

Students learn theory not only by reading, but **also by viewing, modeling, and testing.**

The educational process, close to real projects, takes the main place in the STEAM method: layout, 3D modeling, virtual observations, geodetic measurement practices. This will teach all stages of road construction at the level of a real project. There are many problems in road construction: complex terrain, unfavorable soil, water regime, environmental restrictions, and increased transport demand. Through the STEAM approach, students:

- Correct problem identification,
 - propose a scientifically based solution,
 - creative approach,
 - use of mathematical and technical calculations
- develops skills. This will improve the quality of the project.

Conclusion.

The introduction of innovative educational technologies is the most effective way to train specialists with modern, competent, digital skills in the field of roads. Teaching subjects related to digital modeling, virtual laboratories, intelligent transport systems provides students with practical skills. Adapting the educational process to international standards will contribute to the modern development of Uzbekistan's road infrastructure. Innovative approaches and pedagogical technologies in the education system are very important for optimizing the educational process, directing students towards independent and active learning. This process requires the use of modern technologies, as they help improve the quality of education and provide teachers with new opportunities. Therefore, innovative approaches and pedagogical technologies are becoming an integral part of the education system.

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