PROFESSIONAL TRAINING OF STUDENTS IN TECHNOLOGY EDUCATION

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Abstract: This article analyzes innovative approaches to vocational training based on modern requirements in technological education. Modern methods are highlighted that serve to form students' practical skills, independent decision-making in problem situations, creative thinking, and the development of professional competencies. In particular, the STEAM approach, project-based learning, digital technologies, robotics, artificial intelligence, and 3D technologies are considered in the educational process. The article reveals approaches aimed at increasing the effectiveness of innovative methods in technological education.

Keywords: technology education, vocational education, innovative approaches, digital technologies, modern teaching methods, STEAM education, project-based learning, practical skills, robotics, artificial intelligence, 3D technologies, virtual reality (VR), digitalization in education, competency-based approach, labor market requirements, pedagogical innovations, creative thinking, student-centered education, modern pedagogy, interactive methods.

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In today's era of rapid globalization and digital transformation, the demands on the education system are changing dramatically. Especially in the field of technology education, providing students with modern knowledge and skills and preparing them for practical work has become an urgent task. Traditional approaches to training professionals who meet the needs of the labor market are losing their effectiveness and are being replaced by innovative pedagogical methods.

In the world, much attention is paid to scientific research aimed at increasing the effectiveness of introducing national crafts into the educational process, identifying components for developing the professional qualities of future technology teachers, improving the methodological support of technology, and ensuring that the quality of future technology students meets the requirements of customers [1..,5 b] .

Modern technologies — such as artificial intelligence, digital devices, 3D printing, robotics, and virtual reality (VR) — are rapidly entering the educational process. This requires new approaches to teaching technological subjects. This article analyzes innovative methods that help increase the effectiveness of vocational training and their role in technological education.

Modern technological progress requires a higher level of innovation and flexibility from the education system. Traditional teaching methods are being replaced by modern, interactive and innovative approaches. The inherent determinism of computers significantly undermines the effectiveness of information technology teaching, studies show that students prefer hypertext

and multimedia, electronic textbooks and manuals, which only increase the quality of teaching by 15-20% at the introductory level, and their effect is not noticeable when solving typical and non-standard problems [2..,40b]. One of the most important tasks in the process of vocational education is to increase students' practical experience, preparing them to work independently and solve real-life problems.

Innovative approaches, in particular:

The STEAM approach (Science, Technology, Engineering, Arts, Mathematics) provides interdisciplinary integration and develops systematic and creative thinking in students.

Project-based learning teaches students to work in teams, solve problems, and conduct results-oriented activities.

Digital technologies and multimedia tools create a visual and interactive learning environment, increasing student motivation and attention.

Robotics and 3D technologies - develop the skills of working with real technical tools and increase students' technical thinking.

Artificial intelligence-based learning platforms allow for an individual approach and automation of the quality of education.

Such methods not only make the learning process interesting and effective, but also adapt students to the real conditions of the labor market. This, in turn, strengthens the practical orientation of technological education.

In educational institutions around the world, creative-modular technologies for the formation of technological competencies in students based on innovative approaches have been implemented in the educational process. Within the framework of the UNESCO International Project "Scientific and Technological Literacy for All" , systematic work is being carried out [1] to implement the global tasks of education, form a technological worldview, technological literacy, technological competence, and effectively implement innovative approaches in practice [3…5 pages].

Literature review

The issue of modernizing vocational and technological education and implementing innovative approaches to it has been widely covered in scientific and pedagogical literature. Research conducted in recent years shows the high effectiveness of using such methods as digital technologies, robotics, the STEAM approach, and project-based learning in the educational process.

The research of Uzbek pedagogical scientists M.X.Shomirzayev, M.G.Mirzayeva, and F.X.Mukumova emphasizes the role of innovative methods in technological education in the

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[1] Scientific and technological literacy for all. Materials from the UNESCO-ICASE-CSEC Delhi Workshops.

formation of professional skills in students. In their work, they show ways to develop digital competencies, use interactive methods, and increase the effectiveness of practical training.

Methodology: This study used a comprehensive research methodology to determine the role and effectiveness of innovative approaches in technology education. The main methods are as follows:

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1.Analytical method-existing scientific and pedagogical literature, national and foreign experiences, and educational

2. Comparison and synthesis method - the differences between traditional and innovative teaching approaches were identified and their advantages were summarized

3. Expert evaluation method - advanced approaches were evaluated based on the feedback of technology teachers, methodologists, and industry experts

4. Practical observation and diagnostics - lessons where innovative methods were used in the educational process were analyzed, and student activity, interest, and skills were studied.

5. Statistical analysis - the results obtained on the basis of experience were evaluated through numerical indicators and the level of effectiveness was determined

The research examined the impact of innovative methods on students' professional preparation, their role in increasing motivation, and their impact on the level of readiness for the labor market. When selecting methodological approaches, the practical orientation of the topic, adaptability to technological changes, and modern pedagogical trends were taken into account.

Methods used in the study

1. Project-Based Learning

This method encourages students to develop projects based on real-life problems, either independently or in groups. It helps develop professional skills, teamwork, problem-solving, and creativity.

2. STEAM approach

It develops students' systematic and analytical thinking through the integrated teaching of science, technology, engineering, arts, and mathematics. This method is especially effective in technology and vocational education.

3. Interactive methods (problem-based learning, discussion, brainstorming)

It ensures students' active participation in the lesson process and develops independent thinking, discussion, and decision-making skills.

4. Use of information and communication technologies

Knowledge can be conveyed in a visual and interactive way by involving video lessons, simulations, educational applications, and artificial intelligence-based platforms in the educational process.

5. Robotics and 3D modeling techniques

Engaging students in practical training within the framework of technological disciplines helps develop their professional skills by working with real devices.

6. Demonstrative methods (demos, mockups, visual models)

It is very effective in explaining complex technical processes to students and helps them easily master educational materials in technological subjects.

7. Integrated learning method

By connecting technological disciplines with other disciplines (mathematics, physics, computer science), it allows for strengthening the system of knowledge and forming interdisciplinary thinking.

Table of innovative methods

No.	Method name	Purpose	Tools used	Expected result

1	Project-based learning	Working on real problems and developing practical skills	Project assignments, team work, presentations	A student who can work independently and creatively
2	STEAM approach	Developing systems thinking through an interdisciplinary approach	Mathematics, technology, art, experimental instruments	A student who thinks holistically and understands integration
3	Interactive methods	Improve activity, thinking, communication and decision-making skills	Q&A, discussion, brainstorming, interactive whiteboard	An enterprising, active, critical-thinking student
4	Use of digital technologies	Developing digital competencies, creating flexible education	Computer, AI platforms, simulations, mobile applications	A technologically literate student who can work in a digital environment
5	Robotics and 3D modeling	Ability to solve technical problems and work with devices	Arduino, LEGO, 3D printers, Tinkercad, sensors	A student with a practical, technically-minded approach
6	Demonstrative methods	Making complex concepts understandable	Layouts, graphic models, video tutorials	A student with strong visual perception understands the subject better
7	Integrated approach	To show the connection between disciplines and consolidate knowledge	Integration with physics, mathematics, computer science	An interdisciplinary thinker who understands knowledge as a whole

Conclusion

Today, the technological education system is undergoing modernization, and innovative approaches to vocational training play an important role in it. There is an increasing need to use digital technologies, the STEAM approach, practical project development, virtual laboratories, and interactive methods in the educational process to train specialists who meet the requirements of the modern labor market.

Innovative approaches help students combine theoretical knowledge with practical skills, develop independent thinking and problem-solving skills, which in turn prepares them for a real production environment and increases their professional competitiveness.

Therefore, it is of utmost importance to improve vocational training in technology education based on modern requirements, improve the skills of teachers, and introduce innovative pedagogical technologies.

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