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Methods of Directing Students Toward Scientific Research

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Abstract: This article analyzes effective pedagogical methodologies such as problem-based learning, project-based learning, research-oriented education, interactive and interfaol methods, as well as the traditional "mentor-student" system. Their role in integrating theoretical knowledge with practical research, fostering creativity, and preparing competitive specialists is highlighted. The study emphasizes the importance of improving these methodologies for enhancing students' research competence and innovative thinking.

Keywords: Students, research activity, methodology, problem-based learning, project-based learning, research-oriented education, interactive learning, interactive method, mentor-student tradition, higher education, innovation.

Introduction: In today's context of globalization, one of the main tasks of the education system is to engage students in research activities, broaden their scientific outlook, and develop independent inquiry skills. This is because the progress of modern society, scientific and technological achievements, and innovative ideas are closely linked, first and foremost, to young people's interest in scientific activities and their effective organization.

Directing students toward research not only strengthens their theoretical knowledge but also develops their ability to solve problems they may encounter in practical activities. In this process, interactive methods, innovative technologies, and creativity-supporting approaches play an important role.

One of the most effective ways of involving students in research at higher education institutions is to encourage them to conduct independent scientific investigations, prepare scientific articles, theses, and projects. Moreover, through scientific circles, conferences, and practical seminars, students gain the opportunity to demonstrate their scientific potential.

From this perspective, improving methods of engaging students in research activities, organizing them in harmony with theoretical and practical knowledge, and increasing their interest in scientific creativity are among the most pressing issues of today.

THE MAIN PART

In Uzbekistan, a number of decrees have been adopted with the aim of directing students towards scientific research. For example, Presidential Decree No. PQ-3365 of November 1, 2017 (https://lex.uz/docs/-3398528) "On measures to strengthen the infrastructure of research institutions and develop innovative activities." This decree is aimed at strengthening the scientific research base in higher education institutions and legally ensuring the involvement of students in scientific work. Meanwhile, Cabinet of Ministers Resolution No. 36 of January 20, 2024 (https://www.lex.uz/uz/docs/-6766958) defines the procedure for organizing competitions, scientific-practical conferences, and media projects to orient students and pupils towards social activity, scientific potential, and socio-intellectual competencies.

The PQ-3365 (November 1, 2017) and No. 36 (January 20, 2024) decrees complement each other: the former focuses on creating research infrastructure and strengthening the legal-material base, while the latter directs students towards direct scientific-creative activity through practical processes, competitions, and conferences. If, based on PQ-3365, a modern research infrastructure is established in higher education institutions, and the system for supporting innovative

activities is properly developed, and at the same time, according to Resolution No. 36, regular scientific-practical conferences, competitions, and media projects are organized for students, then:

- students will be more widely involved in scientific research, and their scientific potential will grow,
- young people's creative thinking, socio-intellectual competencies, and practical experience will be enhanced,
- graduates of higher education institutions will be formed as competitive specialists prepared for innovative projects and startups,
- the process of applying scientific results to the economy and social life of the country will accelerate.

Thus, the effective implementation of these decrees will serve as a comprehensive mechanism that directs students not only towards scientific research but also towards social and intellectual activity, thereby contributing to Uzbekistan's innovative development.

In order to involve talented students in research activities in Uzbekistan's higher education institutions, scientific circles and centers have been established. Gifted students are attached to scientific supervisors under the "mentor-student" tradition, through which they jointly engage in research activities, conduct experiments and analyses, and prepare and publish scientific articles based on their results, as well as participate in scientific-practical conferences.

The efforts being made to involve gifted students in research activities in Uzbekistan's higher education institutions are yielding effective results. Through the activities of scientific circles and centers, students are engaging in scientific inquiry based on their interests, while the mentor-student tradition creates opportunities for them to work directly in collaboration with scientific supervisors.

As a result of this process, students are acquiring skills in conducting experiments and analyses, mastering the practice of writing and formalizing scientific articles, and actively participating in scientific-practical conferences to present their knowledge and findings to a wider audience. Thus, the system of scientific circles, centers, and the mentor-student approach established in higher education institutions serves as an effective mechanism for engaging talented students in research, contributing to the development of their scientific potential, creative abilities, and independent research competencies

METHODOLOGY AND RESULT

There are numerous pedagogical methodologies aimed at directing students towards scientific research. Among them, such as "Problem-Based Learning," "Project-Based Learning," "Research-Oriented Education," "Interactive Learning," "Interactivity," and the "Mentor-Student Tradition," play a significant role in revealing students' scientific and creative abilities and integrating the educational process with scientific activities.

"Problem-Based Learning" Methodology

This methodology was first introduced in the mid-20th century by American philosopher and educator John Dewey, and later systematized in the 1970s by Russian pedagogue M.I. Makhmutov. In this methodology, a specific scientific problem is presented to the student, and they are directed to solve it through independent inquiry.

The main advantage of this methodology is that it develops students' skills in research, analysis, and logical reasoning. As a result, students acquire independent research competencies [1].

"Project-Based Learning" Methodology

The origins of this methodology go back to the 19th–20th centuries in the history of pedagogy. American philosopher and educator John Dewey introduced the theory of "experience-based education," and in 1918, American scholar William Heard Kilpatrick first introduced "Project-Based Learning" into pedagogy.

The main purpose of this methodology is for students to develop a small scientific project or startup and present it. Through this, students are trained to apply theoretical knowledge in practice, while developing skills to generate innovative ideas and conduct applied research [2].

"Research-Oriented Education" Methodology

This methodology was first developed in the 1960s–1970s by Joseph Bruner. In this approach, the learning process itself is directed toward scientific inquiry, where lectures, seminars, and practical sessions are conducted through active engagement with scientific sources.

The main advantage of this methodology is the development of students' scientific interest and methodological culture. As a result, students acquire skills in writing scientific articles, conducting analysis, and drawing conclusions [3].

"Interactive Education" Methodology

This method emerged at the end of the 20th century as a result of the development of information and communication technologies, democratic education principles, and collaborative pedagogy. In Uzbekistan, interactive methods began to be introduced into the

education system mainly after the 2000s, when major educational reforms were carried out after independence.

In this methodology, interactive techniques such as "Brainstorming," "Debates," "Discussions," and "Role-plays" are applied. As a result, students' activity, independent thinking, and creative approach are strengthened, while their critical thinking and ability to make scientifically grounded decisions are developed [4].

"Interactive" Methodology

This methodology was not "created" by a single scholar, but rather shaped on the basis of Dewey's philosophical concept of acquiring knowledge through experience and communication, Vygotsky's psychological concept of development through social interaction, and Freire's pedagogical concept of education based on democracy and collaboration.

The core essence of this methodology is to ensure the integration of education, science, and production, whereby students participate in scientific and innovative projects. The learning process is linked with production, and the results of scientific research are applied in practice [5].

"Master–Apprentice Tradition" Methodology

The "Master–Apprentice Tradition" methodology has very ancient roots in the history of Eastern spirituality and science. It was not developed by any modern pedagogue or methodologist but rather emerged as a pedagogical and cultural system that evolved over centuries. Based on this methodology, talented students are assigned to scientific supervisors and engaged in their research activities. Under the guidance of an experienced scholar, the student learns how to conduct scientific work, eventually becoming a young researcher capable of carrying out independent investigations [6].

It should be noted that in articles [7–8], particularly in "Problem-Based Learning," the history of this methodology, its practical implementation at McMaster University, and current applications are presented. In article [9], interactive methods and teaching aids used in conducting classes with students in higher education institutions are analyzed. Meanwhile, article [10] discusses how the modernization of higher education and the transition to new educational standards ensure a higher quality of graduate training.

CONCLUSIONS

Research shows that the methodologies of "Problem-Based Learning," "Project-Based Learning," "Research-Oriented Education," "Interactive Learning," "Interactivity," as well as the "Master–Apprentice" system, serve as important tools in integrating students' theoretical knowledge with practical research, fostering independent thinking, and encouraging the development of innovative ideas. The advancement of research-oriented methodologies and their broad implementation in the educational process represent the most effective means of improving the quality of higher education in Uzbekistan, enhancing the intellectual potential of youth, and contributing to national innovative development.

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