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POSSIBILITIES OF USING INNOVATIVE TECHNOLOGIES IN TRAINING MODERN ENGINEERS IN THE EDUCATIONAL PROCESS

Axmedova Aziza
Basic Doctoral Student, Karshi State University
https://orcid.org/ 0009 - 0006 - 2974 - 9340
Tel: (88) 949 - 72 – 77, ahmedovaaziza349@gmail.com

Abstract
In this article, the development of “technological approaches” to solving the problem of preparing engineers for competitive activity in modern conditions of the education system has great theoretical and practical importance. The use of innovative technologies contributes to improving the quality of engineering education in the educational process, developing students' practical skills, and strengthening their professional training. The possibilities of using innovative educational technologies in training modern engineers are discussed.

Keywords: Education, competitiveness, modern, technological approach, innovative technology, preparation for professional activity.

Introduction

At present, there are opportunities to increase the effectiveness of education through the formation of a digital education system, the widespread introduction of distance learning systems, and the use of interactive methods. In the context of globalization, higher education plays an important role in the development of society, contributing not only to providing knowledge and skills in the training of qualified specialists but also significantly to the innovative development of industries and economic growth. In the modern world, where technological innovations continuously change production processes and personnel requirements, educational institutions are required to adapt their programs to new challenges. This is especially relevant to the training of engineering personnel, who play a key role in innovative and technological processes. As the main institutions for training highly qualified engineering specialists, higher education institutions must constantly review and update their curricula to meet modern professional fields and economic needs. This requires revising and adapting curricula, integrating the latest technological achievements and teaching methods, and strengthening cooperation between educational institutions and industrial sectors. This review emphasizes aspects such as interactive education, interdisciplinary programs, integration of technological safety, and professional development of students, and presents strategies that can be applied to optimize the educational process in engineering. Studies have shown that the training of future engineering personnel in higher education institutions currently faces a number of problems and areas requiring improvement.

Main part

The use of innovative technologies in training modern engineers in the educational process is considered one of the main factors. Online management of education quality is based on monitoring the technology of preparing graduates of technical specialties of higher education institutions for innovative professional activities. Currently, pedagogical monitoring has become a mandatory mechanism for managing the quality of education.

The main principles of monitoring are as follows:

- consistency;
- objectivity;
- scientific approach;
- systematicity;
- transparency;

Main functions are – diagnostic, guiding, motivational-stimulating, normative-informational, educational, evaluative, analytical, corrective, and prognostic. The main positions of monitoring implementation are observation and evaluation of results.

Observation of results is – a description of how the achievement of goals is progressing, that is, an extended control over time of activities aimed at achieving goals. Evaluation of results is the comparison of obtained results with expected or initially set results, the correlation of observation results with criteria, and qualitative analysis of activities in relation to goals. At present, monitoring is considered an independent effective technology for improving the qualifications of engineers. Monitoring consists of continuous, scientifically grounded diagnostic and predictive observation of both the quality of the educational process and the state of its subject or object. In order to design and adequately organize a "result-oriented" pedagogical process, the developer of the technology must clearly understand what the result should actually be, how it will manifest itself, and how it can be recorded and measured. Only then can an appropriate and effective methodology be found. A clear vision of the real result makes it possible to timely adjust pedagogical activity, introduce necessary changes into the pedagogical process, and improve its quality.

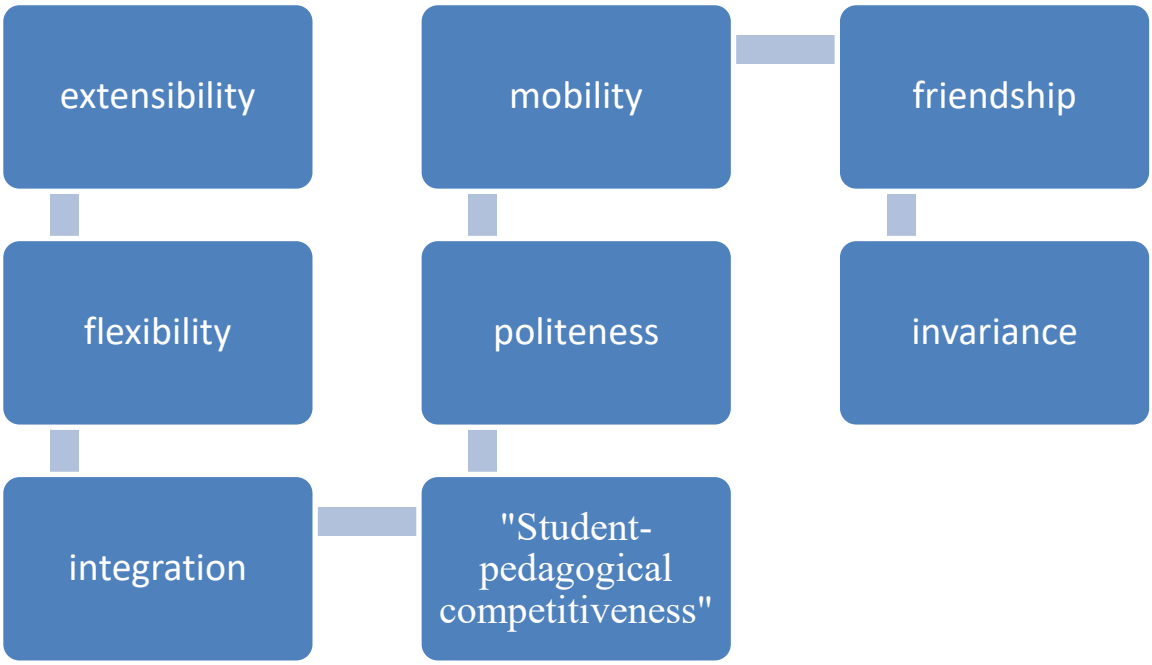
Pedagogical activity is – a multifaceted and multi-purpose activity. Therefore, it is important to initially form an understanding of different types (aspects, components) of results and their interconnected set. The life and professionally oriented activity of future engineers require information not only about final results but also about intermediate (operational) results that can be continuously obtained and recorded at each specific action of pedagogical reality. The problem of training efficiency and its evaluation is related to the issue of measurement in the pedagogical process. The task is to find an assessment tool that allows determining exactly what needs to be evaluated in each particular case. Criteria for evaluating only final results do not meet modern requirements, since in the continuous education process it is necessary to develop and use criteria that allow "tracking" the dynamics of personal development.

Remote monitoring of the quality level of students' activity results is carried out in the "student-teacher" system in an "online" communication mode and helps to activate students' independent personal activity aimed at improving the quality of learning outcomes. In this case, the time spent by both the student and the teacher (on monitoring) can approach the time provided for standards. The results of modern scientific research show that the development of open and distance independent education of students in technical specialties of higher education institutions creates promising incentives for increasing the level of technology for preparing engineers for professional activities.

Open independent education is

A system of managed self-learning carried out in the conditions of students' motivational and creative activity. Within the framework of open education, students are taught according to individual plans corresponding to their educational needs. In the system of open education, interdisciplinary "student-teacher" feedback is actively used, which helps to activate students' independent work and improve the quality of their results. The system of distance independent education makes it possible to activate the creative, personality-oriented activity of students studying according to the general curricula of a particular educational institution.

According to researchers studying the possibilities of using innovative educational technologies, open and distance education should provide the following:



Unfortunately, to date, in the pedagogical technologies used in the traditional educational process, there is no "mechanism" that allows personalized control of the quality of each student's educational activity results in each lesson. However, such monitoring, as a systematic process of obtaining information (in each lecture, each seminar, each laboratory lesson, and each individual lesson in distance mode), processing, analyzing, and synthesizing it, allows us to design possible trajectories of student development and choose one of them in the process of interaction with the student. This type of monitoring should ensure optimal management of the

process of developing motivation for students' professionally oriented educational activity, within which self-training skills are formed and their level increases from lesson to lesson.

In an integrated information-pedagogical system, the emergence of predicted emergent properties can be expected by taking into account the characteristics of all system components and ensuring their compatibility. For example, the effectiveness of using high-tech and information-computer support in the joint activities of teachers and students in the educational process requires, first of all, transforming descriptive approaches to presenting educational content into formalized approaches. Solving this problem makes it possible to direct the process of studying technical disciplines towards forming self-training skills in students when obtaining functionally complete results of their personal activity – automated design objects. If teachers create conditions for activating students' independent creative activity, developing motivation to use acquired knowledge, skills, abilities, and mastered methods of creative thinking for joint project implementation in real educational time, then the professional training of future engineers becomes a process of mutual enrichment. However, to date, in the traditional education system, such a reserve for improving the quality of engineering education as the development over time of coordinated interaction of subjects of the educational process, allowing the joint formation and support of virtual and material objects of intellectual activity throughout their life cycle, has been used only to a limited extent.

All technical objects are artificial systems, and their consumer (operational) properties depend on many interdisciplinary factors. The specificity of the emergent properties of technical objects depends on which interdisciplinary factors and their combinations the developer focuses on when designing and producing the product. Technical tasks are multi-parameter and, in most cases, do not have a single solution. The choice of a specific solution implemented by the developer is determined by their competence, moral position, level of responsibility, customer requirements, as well as existing technical, economic, and other possibilities.

Conclusion

In conclusion, the use of innovative technologies in training qualified engineers in the educational process is an important and necessary factor. If the level formed in the process of professionally oriented (contextual) training of a future engineer corresponds to their readiness to independently and qualitatively solve real multi-criteria production problems, it is possible to ensure the competitiveness of a young specialist in the modern labor market. High-quality problem solving implies achieving a scientifically grounded compromise between the requirements of the customer (in the educational process – the teacher) and the capabilities of the developer (student). To ensure the reliability of preparing graduates of technical specialties of higher education institutions for successful innovative engineering activity, it is necessary to diagnose ("track") the dynamics of their competence level and manage the process of its improvement using the capabilities of flexible pedagogical technologies. The predicted high effectiveness of personality-oriented innovative teaching aimed at the joint design, testing, and support of objects of intellectual engineering activity by educational subjects encourages teachers to solve the urgent task of engineering pedagogy – the development of adequate pedagogical technologies.

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