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REQUIREMENTS AND OPPORTUNITIES FOR THE INTEGRATION OF ENGINEERING EDUCATION AND INFORMATION TECHNOLOGY

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ABSTRACT
The article focuses on the requirements and possibilities of engineering education and information technology learning based on an integrative approach.

KEYWORDS
Museums, engineering, graphic literacy, information technology, mechanical integration, labor education, pedagogical demand, approaches, professional competence.

INTRODUCTION
Viewing the integrative approach in engineering education should be considered as one of the leading principles in updating the content of modern higher technical education. However, in this case, integration should not be understood as mechanical merging, but as a complementary process that studies the issue of integrating engineering education with information technologies.

In technical higher education institutions, the requirements of state educational standards (SES) and curricula of engineering disciplines together with information technologies are studied, and the possibilities of their integration are identified.

Teachers of engineering disciplines must possess sufficient graphic literacy.

In courses such as technical drawing, descriptive geometry, and projection of objects, it is required to have knowledge of graphical concepts such as projections of metal parts during design, as well as the rules of scaling and dimensioning on drawings.

In modern conditions, the strategic idea of developing an information civilization is promoted as the integration of education in general and lifelong learning in particular, with all the diversity of its manifestations. This means integration into the global educational space, assimilation of human educational needs at various levels (from preschool to doctoral studies), and assimilation of knowledge about both the studied topic and the methods of its study. For university teachers preparing future engineers, this implies a "rise" from everyday problems to the search for the fundamental principles of knowledge [1].

The first pedagogical requirement for the integration of engineering education and information technology is the selection of approaches through which such integration can be achieved. Pedagogy applies two approaches: multidisciplinary and interdisciplinary.

In the first case (multidisciplinary), the content of separately studied subjects is integrated. Importantly, the work is carried out based on the content corresponding to the program and textbooks of the subject. In this case, two tasks are set: first, selecting the subject content

applied in the systematic study of the discipline, and second, grouping the content of sections and courses according to a specific logic.

In the second case (interdisciplinary), the integrative nature of the course is determined by leading interdisciplinary ideas and a defined sequence of information. The number of interdisciplinary ideas, as well as the independent cognitive and educational value of separate subjects, is ensured.

One of the pedagogical requirements for the integration of engineering education with computer science courses is the leading idea that expresses the essence of the studied material, ensures internal unity and organic wholeness, performs the function of systemic connection within the content of the educational discipline, and serves as the "core" of this content.

In pedagogy, the category of "integration" reflects a product resulting from complex transformations of scientific consciousness. The historical aspects of this have been thoroughly analyzed by A.Ya. Danilyuk \[3].

The first practical attempts at creating an integrated education system were made in the 1920s in the USA by J. Dewey, in Russia by S.T. Shatsky, M.M. Rubinstein, and others. According to A.Ya. Danilyuk, this pedagogical experiment failed mainly due to its reliance on traditional subject-based approaches and the simultaneous presentation of complexity as two proportional principles \[4].

The second pedagogical requirement, in our opinion, is the identification of foundations for integration. As the basis of an integrative approach, the following are included:

similarity between engineering education and computer science courses;

proximity or correspondence of studied objects or phenomena;

use of similar or related methods in studying the object or phenomena

structure of integrating engineering education and information technologies based on general laws and theoretical concepts;

proximity of engineering education and information technologies;

unity of leading ideas in the curricula of engineering education and information technologies.

The third requirement for the integration of engineering education and computer science courses is to determine the long-term goals of the integrative course and set specific tasks aimed at its implementation.

The fourth pedagogical requirement for integrating information technologies with engineering education is the coordination of the teacher's instructional activities with the student's learning activities.

The fifth pedagogical requirement is the selection of an educational technology that expresses the teaching method based on the content of education, organizational forms, methods, abilities, and opportunities of students.

The sixth requirement is to encourage students toward creative and research activities using different cognitive methods and educational goals.

The seventh pedagogical requirement for integrating information technology with engineering education is the implementation of all the above requirements in a complex, organic, and interconnected manner. This requirement is realized under specially organized educational conditions.

The results of our research show that engineering disciplines and specialized courses taught on the basis of interdisciplinary tasks of a practical nature have significant didactic value in shaping students' professional competence.

According to K.K. Platonov, training is an integrative characteristic of personality, primarily related to knowledge, skills, and competencies \[5].

In our study, the main focus was on achieving classification of academic subjects, determining the level of integration between disciplines, and developing a technology for integrating subjects based on information technologies by introducing integration criteria.

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