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ORGANIZATIONAL AND PEDAGOGICAL CONDITIONS FOR IMPROVING COMPUTER MODELING SKILLS OF FUTURE ENGINEERS

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ABSTRACT

In this paper studied pedagogical and organizational conditions for developing computer modeling skills in context of digitalization of future engineers in technical universities.

Keywords. Condition, pedagogical technology, organizational condition, pedagogical condition, pedagogical effect, meaningful, integrative.

INTRODUCTION

In a philosophical sense, "conditions" appear as a set of objects necessary for the emergence, existence, and change of this object in interaction and influence.

Pedagogically, the following are shown:

- the influencing role of the conditions on the progress of the pedagogical process and the achievement of the given result;
- the organizational role reflecting the filling of the pedagogical system with internal and external elements;
- a developing role aimed at the activity of stable links of the educational process.

Studying the conditions affecting the flow of the pedagogical process allows us to observe the main positions:

- Pedagogical conditions as a set of pedagogical influence measures through adequate pedagogical technologies, taking into account the possibilities, organizational forms, tools and methods of the educational environment
- pedagogical conditions as a meaningful characteristic of the components of the pedagogical process that provide external and internal effects on the subjects of the educational process
- Pedagogical conditions aimed at ensuring that the results of the educational impact are checked through a hierarchical structure
- pedagogical conditions aimed at ensuring controllability, coordination, and regulation of the educational process in achieving educational results, in interaction and complementing each other, and in the implementation of organizational functions.

Summarizing the above-discussed scientific views on the research of pedagogical conditions, their influence on the flow of the pedagogical process, we use the opinion of M. M. Potashnik, who identified the organizational and pedagogical conditions aimed at organizing the educational process and expressing the idea of our research. M. M. Potashnik emphasizes the inclusion of an organizational component aimed at introducing the level of organization, the order of the educational process, along with pedagogical conditions into the organizational-pedagogical conditions.

Based on the above, we consider organizational as a set of pedagogical situations aimed at achieving the educational result by using sufficient pedagogical technologies, organizational forms, tools, methods and taking into account the nature of the interaction of the subjects of

the educational process and the characteristics of the content. and pedagogical conditions form the understanding of its components.

In the process of justifying the organizational and pedagogical conditions of formation of computer modeling skills in the educational process of a higher educational institution, a number of authors should be given special attention. They paid special attention to the following shortcomings of engineering training: lack of systematic organization, lack of interdisciplinary connections with professional cycle sciences. Therefore, it is appropriate to take into account the possibilities of systematic organization of engineering-graphic training, which includes the formation of professional and personal qualities of future engineers, based on modern approaches to teaching engineering graphic sciences, while knowledge and skills are the only means of transformational activity. serves as content.

The systematic organization of multi-professional training, as a certain concept, is based on the general concept of "system", the study of which is given below.

From the point of view of the systems approach, a system is an organized set of tools aimed at achieving a common goal and making significant changes. System (from the Greek system - a whole made up of parts; a combination), a set of elements that are in relationship and connection with each other, forming a certain wholeness, unity.

The conceptual apparatus of the system phenomenon consists of the concepts of system, structure of the system, structure, operation of system elements, which allows to understand the phenomenon under consideration and to use it in the design of the educational system for students.

A system is a set of interrelated elements that form a stable unity and integrity with integrative properties and patterns. From a pedagogical point of view, the system is a dynamic open controlled learning.

The composition of the system is a list of its elements, and the invariant of the relations between the elements of the composition of the system is its structure.

The operation of the system implies the availability of technologies that will be implemented as the final result of the goals.

When considering the problems of building an engineering-graphic teaching system, we relied on the research of V. P. Alekseyev, G. A. Berulav, V. V. Krayevsky, M. N. Skatkin, N. N. Cheremnykh and other scientists.

The principle of consistency means the result of the educational process, the principle of systematicity and consistency allows to consider general professional training in the system in a certain order, in the internal logic of educational subjects, the next one is based on the previous one and makes it possible to master the new one. The considered principle of systematicity and consistency is combined with the principle of continuity aimed at organizing general professional training in the process of forming computer modeling skills, taking into account interdisciplinary relations.

Based on the consistency of engineering-graphic training, we determine its features:

-first of all, the engineering-graphic education system should be integrated, that is, the continuity of education, the continuity of the formed knowledge, skills and abilities of design and construction activities, organic interdisciplinary communication based on the final system of engineering education should be observed ;

- the integrity of the engineering-graphic training of future engineers is related to functionality and is manifested in the presence of a functional organization that quantitatively and qualitatively connects the educational goals with control effects.

Functional organization of general professional training means its division into levels corresponding to hierarchical academic disciplines, their restructuring;

- the hierarchical division of general professional training into levels corresponding to academic disciplines shows the features of distinguishing its parts and structure and is interconnected with interdisciplinary relations that determine its structure;

- implementation of the integrity, functionality and structure of the engineering-graphic preparation - refers to the ability to manage, that is, the ability to develop the engineering-graphic education system in the direction of the set goals;

- the development of the engineering-graphic education system should be dynamic, because the characteristics and quality of the engineering-graphic education system, as well as its components, should change;

- the realization of the nature of the emergence of competence in general professional training is related to the introduction of changing professional relations and modern forms of education - preparation of group projects, research laboratories, distance education, etc.

Preservation of the considered features of the engineering-graphic teaching system is related to its inertia, that is, the ability to exist in the conditions of changing external influences, including the external environment and resources. The parameters of the external environment are determined by the development of techniques and technologies, the requirements for the qualification of engineers in the professional team, the demand for expert engineers in the labor market, and the availability of certain skills and abilities. The consistency of the engineering-graphic education system requires future engineers to adapt to changing professional, technical and technological conditions.

Understanding the theory of organizational-pedagogical conditions discussed above and the systematic organization of computer modeling leads to the search and study of meaningful and organizational forms, tools and methods that take into account the impact of modern information and communication technologies in the educational and professional environment.

At the same time, in the process of development of computer modeling, correct filling of the potential opportunities of general vocational training subjects requires a meaningful part of it, which is considered a pedagogical and educational task.

In the science of pedagogy, the content of education is considered as a systematic unity of knowledge, skills, competencies, and practical experiences aimed at personal transformation of the student. At the same time, enrichment of educational content increases transformational opportunities by deepening and expanding knowledge, skills and competencies.

There are two types of enrichment in the field of pedagogy: horizontal, that is, it includes additional academic subjects and interdisciplinary courses integrated into the educational process of a higher education institution; includes vertical, divergent, and convergent types of tasks. Tasks of the convergent type direct the student to consistent, logical cognitive activity,

and tasks of the divergent type direct the student to the activity of independent knowledge, work in the developing information space.

The establishment of organizational and pedagogical conditions aimed at enriching multi-professional subjects with a professionally oriented component on the basis of modern information and communication technologies requires the digitization of construction production and education, the introduction and development of computer-aided design systems, and improvement.

At the same time, it is appropriate to consider enriching the computer modeling skills of the future engineer in the process of digitalization in the following two directions: meaningful; interdisciplinary.

Recognizing the need to enrich the content of general professional subjects with a professionally oriented component based on modern information and communication technologies, it is important to note that the introduction of the above technologies does not reduce the main importance of traditional "manual" design.

The study of pedagogical technologies aimed at the development of computer modeling skills of future engineers allows to determine their focus: the personal nature of education, efficiency through the construction of an individual educational trajectory, communication of subjects of the educational process through feedback, collective interaction, allows students to motivate themselves, cognitive initiative, independence and self-reflection, taking into account the context of professional training, the long-term process of engaging future engineers in activities is the third organizational-pedagogical is a must. The implementation of this condition will help to form future engineers in the educational process of the higher educational institution.

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