Methodology for Conducting Practical Classes in Physics Through the Design Method

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ABSTRACT

The article outlines the methodology for conducting practical classes in Physics in technical higher education institutions through the method of design of objects of professional activity. In this case, a clear example is given of the specifics of the design method itself, the stages of its organization and its direct application in the preparation of specialists in the field of architecture and construction.

Keywords: Design method, Physical Science, Physical Training, competence, professional activity obeqts, heat transfer, convection, interdisciplinary integration.

Introduction. As a priority in the strategy of measures adopted by the president of the Republic of Uzbekistan, a special emphasis is placed on the construction sector, the construction of new buildings and structures, and the issue of training highly qualified personnel is established. In recent years, huge construction and construction work has been carried out in our country, and the demand for qualified personnel in this area is growing [5]. Therefore, it is one of the urgent tasks to effectively organize the training process of future builders and engineers, to improve the physical science in the acquisition of national subjects on the basis of specialization orientation, and through this, to develop professional competence of students on the basis of integrated educational and Design Technologies [1]

- Analysis of thematic literature (Literature review). V. V. Soboleva believes that it is advisable to effectively use the method of designing objects of professional activity in physical training to coordinate them with the topics of future diploma projects, and to take into account the physical and technical characteristics of the object, as well as the mechanical, acoustic, teplophysical, light parameters of the construction site. E.B.According to Shoshtaeva, interdisciplinary communication in itself represents the process of communication of educational sciences, reflecting the unity of professional activity, continuous and holistic phenomena. E.V.Perekhosheva defines interdisciplinary integration as the process of combining educational disciplines on the basis of knowledge and technological problems. A.V.Khutorsky, E.V.Perekhojeva, N.A.Following the concepts of Muslimov and other researchers, those who are engaged in this field, consider the professional competence of students of technical higher education institutions as the formation of a union of personality qualities, which will later help them in the successful implementation of their knowledge, skills and qualifications in engineering activities

-Research Methodology (Research Methodology). The integrity of the educational process for training specialists in the fields of architecture and construction in technical higher education institutions is achieved through interdisciplinary integration links [6]. The interdisciplinary approach to teaching allows students to independently acquire knowledge in various fields of Science and Production, Group them and direct them to solve a specific professional problem. In this case, the boundaries between courses and subjects are variable, which allows students to form an integral system of knowledge [3]. The fundamental essence of physical knowledge implies that the knowledge formed by students in physics classes in technical higher education institutions becomes the basis for the study of general technical and special subjects, for the assimilation of new techniques and technologies [4]. The content of the physics course should contribute to the formation of students ' ideas about the modern physical image of the world. In this case, physical knowledge is rounded up and combines the subjects taught with a general construction methodology focused on interdisciplinary communication [2]. The success of the implementation of the method of designing objects of professional activity in physics lessons depends on the cooperation of professors and teachers of natural and professional Sciences [7,8,10]. To ensure this, the physics professor must have a clear idea of the following [11,27,28]:

•knowledge of the content of the fundamental foundations of the sciences of the country;

•correct interpretation of physical laws, concepts, definitions used in universal science blocks.

This makes it possible to eliminate the ambiguity in the interpretation of the same physical concepts by professors from different blocks of science [18]. In the didactic model of the style of designing objects of professional activity, internal and external relations are distinguished. Internal communication is the result of the analysis of the general physics course with the aim of identifying the leading rules in its composition and the main connecting elements in it. External communication is a structural and logical analysis of the topics of special subjects in the curriculum, the content of which is determined by the Basic Laws of physics [12], distinguishing the degree of interdependence with the concepts and determining the basic interdisciplinary knowledge necessary to train specialists in the study of physics [13,14].

The organization of professionally oriented teaching of physics according to the method of designing objects of professional activity consists of four stages [17,20,21].

Stage I-when studying new material in lectures, the teacher forms a problem situation that occurs in professional activities and, together with students, separates the physical essence and sets out ways to solve this problem based on physical theories;

Stage II-the student accumulates skills in the implementation of the method of designing objects of professional activity in a certain form in various subjects of the physics course;

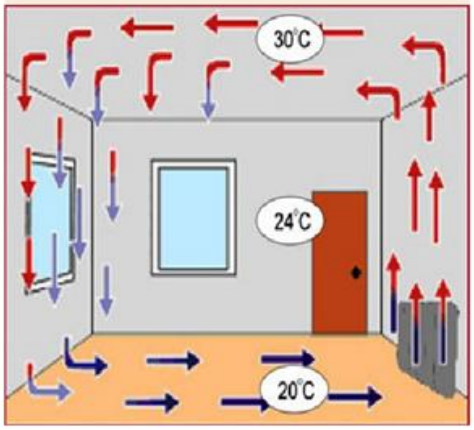
Stage III-the student, having already realized the need and importance of physical knowledge for his future professional activities, organizes his activities in all different forms of search, design, thinking activities;

Stage IV-forms the independent activities of students on the extensive use of this method in the performance of course and diploma work.

- Analysis and Results (Analysis and results). The transfer of the technique to students of higher education institutions through the design method of practical training in physics provides them with a direct direction to the construction areas and provides the basis for the formation of professional competence [19,22,23,24,25]. Also, as a result of the design method, its integration into the Universal Sciences is ensured [26].

The solution of a practical issue in physics, which is directly focused on construction areas through the design method, is shown in Table 1 through a specific example.

Table 1.

№	Implementation of common methods	Actions to be performed
Calculation of the teplophysical properties of buildings and structures		
1.	Issue insertion	*How much heat capacity is needed to heat a room with a height of 3 meters, the base of which is 20 m2, and how many sectional radiators(aluminum) must be installed for this? (Figure 1).*
2.	Highlight the object or its separately derived elements:	*medium teploisolated room.*
3.	Separation of the types of heat transfer affecting the object under consideration or its separately obtained elements:	*convection phenomenon*
4.	Show types of heat transfer and physical phenomena:	*thermal conductivity, convection*.
5.	Graphic representation of the model of the nature of the projected object or its separately obtained elements.	 *Figure 1. Graph of the movement of heat flow in the room.*
6.	. Determination of physical magnitudes representing the types of heat transfer under consideration:	*heat flow, heat capacity.*

7.	Description of physical laws expressing the nature of an object or some of its derived elements under given conditions.	*According to the construction norms and rules, panel houses need an average heat capacity of 41 W to heat 1 m3 of the pile.* $P = V \cdot 41$ Вт. *To find the number of Radiator sections:* $N = \frac{P}{170 \text{ Вт}}$.
8.	Solving the system of obtained equations and determining the values of the physical quantities being sought:	$P = 60 \cdot 41$ Вт $= 2460$ Вт. $N = \frac{2460 \text{ Вт}}{170 \text{ Вт}} = 15$ та. *(number of sects in the radiator)*
9.	Comparison of calculated sizes corresponding to the design rules and technical conditions:	*the calculated results fully comply with the norms and rules of construction.*
10.	As a result of design activities, integration is provided in which nationwide disciplines:	*Building Physics, teplophysics.*
11.	Types of competencies that are formed as a result of design activities:	*special competence; technological competence.*

Conclusions and suggestions (Conclusion/definitions). The technique is aimed at the development of independent educational activities of students in the training of specialists in the fields of architecture and construction in higher educational institutions, practical issues and the mechanism for the introduction of project-based methodology lead to the development of their professional competence through the adaptation of interdisciplinary project and information and didactic provision.

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