METHODS OF ENSURING INTEGRATIVE APPROACH TO TEACHING PHYSICS

Nortojiyev Abror Muhammadaliyevich
National University of Uzbekistan
Independent researcher of the Faculty of Physics
E-mail: a.nortojiv86@gmail.com.

Annotation. The article discusses the methodological features of the teaching process of physics in higher education institutions in the field of construction. Given the introduction of a credit-module system in the educational process, the role of physics in the training of future civil engineers and its integration with other special general engineering disciplines will be discussed. There are guidelines and recommendations for the effective organization of the teaching process and independent learning.

Key words: credit module, physics, classes, interdisciplinary integration, inertial damper, buildings and structures, vibrations, construction, career guidance, civil engineer.

According to the Resolution of the President of the Republic of Uzbekistan dated March 19, 2021 "On measures to improve the quality of education in physics and the development of scientific research" from 2021/2022 academic year The issue of implementation has been identified. Therefore, the authors intend to pay special attention to the direct application of the topics of lectures, practical and laboratory classes in the field of construction in order to ensure the implementation of the tasks set out in this resolution. These aspects are taken into account in the development of science curricula and syllabi.

It is known that many universities now have a credit-module system in the educational process. In the credit-module system, the amount of credit allocated for general physics in areas not trained by physicists is 5-7. It turns out that there are more hours for independent study in general physics than for hours for lectures, practical and laboratory classes. This means that a large amount of information needs to be delivered to students in a short period of time. This is due to the fact that the number of hours allocated for classroom training has decreased by an average of 1.6 times. How can this problem be solved? In our opinion, the best way to solve this problem is to organize classroom classes and independent study correctly and effectively. It is important to consider what the student will be an expert in in the future. That is, we need to ensure an integrated approach.

An integrated approach to the training of construction professionals is used to ensure the integrity of professional knowledge, methods of action and personal qualities and attributes.

The integrative approach is used to integrate content-bound, interrelated, logically interdependent and deepening and expanding disciplines that combine holistic logic, knowledge, action, and personal qualities. For example, students majoring in Building and Civil Engineering (industrial and civil engineering) will become civil engineers in the future. Students in this field of study are directly related to the science of physics: building mechanics, building materials and materials, engineering communications of buildings, wooden structures, metal structures, reinforced concrete and stone structures, building physics and energy efficiency of buildings they are required to master subjects such as engineering for 4 years. Knowledge and skills in physics are essential for mastering the above disciplines. Because without knowing the simple laws and laws of physics, it is impossible to explain the physical phenomena and processes that take place in buildings.

The physics of building physics and building energy engineering studies the physical processes that take place in a building and its parts and the effects of these processes on a building and a person. That is, on the one hand, to create the indoor air temperature and humidity inside the building, which is suitable for human habitation and certain activities and on the other hand, to create conditions to ensure the long-term service of parts of the building. There are three types of physical processes that take place in a building and its parts: *heat; light and acoustic. Thermal engineering* is the study of the movement of *heat energy* in a

building and its parts and the processes of mass transfer consisting of water vapor. *Lighting technology* is the study of the creation of natural light inside a building and its effect on human activity [1]. Acoustics is the study of the laws of propagation of sound waves inside a building and its devices[2].

For a thorough study of the Department of Thermal Engineering, the basics of physics: the basics of thermodynamics, irreversible and irreversible thermal processes, the laws of thermodynamics, relative and absolute humidity, migration phenomena, the basic laws of optics, photometric concepts and units and in the acoustics section: the propagation of oscillating motion in an elastic medium, the equations of flat and spherical waves, the interference and diffraction of waves, stationary waves, sound waves, etc. they are required to be well versed in the topics. For full mastery of disciplines such as reinforced concrete and stone structures, metal structures, wood structures, students in physics - density of materials, types of deformation, elastic forces, mechanical stress, absolute and relative elongation, Yung modulus, elongation and compression they must have a good understanding of concepts such as the strength of substances, the coefficient of linear expansion, and quantities. Otherwise, the expected results will not be achieved.

Interdisciplinary integration should also focus on the organization of laboratory classes and independent study. For example, a laboratory exercise in physics called "Determining the acceleration of free fall using a mathematical pendulum" will strengthen students' theoretical knowledge in practice. At the same time, it is possible to provide vocational guidance to students. In the course of this laboratory work, we consider it expedient to provide information on the use of pendulums in earthquake resistance in modern construction buildings.

An example of this is the inertia damper used in the "***111 West 57th Street***" building under construction in the United States. It is the "thinnest skyscraper" (Figure 1), with a height of 438 meters and a width of 18 meters and is planned to be equipped with an inertial damper weighing 800 tons. Such dampers are used to balance the building's resistance to earthquakes and winds. The inertial damper consists of two superimposed loads, one suspended on a rope and the other attached to the base (Figure 2).

If the building tilts in a certain direction under the influence of external forces (wind or earthquakes), the damper tilts in the opposite direction and returns the building to its equilibrium position due to its weight and prevents the building from collapsing.

.

Figure 1.

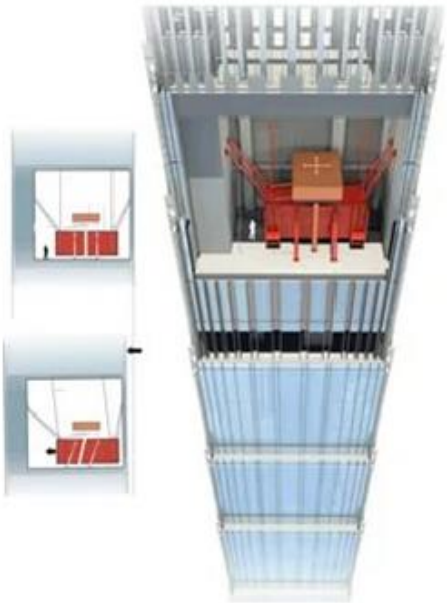

Figure 2.

There are many more such examples. The world's first **Taipei 101** building, more than half a kilometer long, used a pendulum with a total weight of 660 tons to withstand typhoons and earthquakes.

Proper and effective organization of classroom classes helps to improve the quality of students' fundamental knowledge and develops their ability to apply their knowledge in further education and future careers. This means that the integrative approach, like other didactic principles, never gives the teacher a ready-made recipe, but uses it to determine didactic and methodological solutions.

Integration of educational content as a didactic process is a multidimensional, multidimensional, systematic research object. The integration of sciences does not involve the synthesis of all their characteristics, but the synthesis of the most important and general ideas and problems. In general, physics is one of the most important fundamental disciplines in the successful acquisition of the specialties of future civil engineers in higher education institutions in the field of construction [5]. Therefore, it is important to take an integrated approach to teaching this subject.

References

1. Архитектурная физика: Учеб. для вузов: Спец. Архитектура /В. К. Лицкевич, Л. И. Макриненко, И. В. Мигилина и др.; Под ред. Н.В. Оболенского – М.: Стройиздат, 1998 – 448 с.
2. Ковригин С. Д., Крышов С. И. Архитектурно–строительная акустика, –М.: Высшая школа, 1986 г.
3. Nortojiev A.M. The role of integrative education in teaching physics. The role of talented young people in the development of physics. RIAK Republican Scientific Conference. National University of Uzbekistan 2020, May 19. 371-376 p.
4. Begmatova D.A., Nortojiev A.M. Integrative approach in general physics, scientific-methodical journal "Physics, Mathematics and Informatics", Tashkent-2020, No. 5, pages 28-33.
5. Мирзабекова О. В., Соболева В. В., Агафонова А. Формирование проектной деятельности при обучении физике студентов инженерно-строительных специальностей // Человек и образование. – 2013. –№ 1 (34). –113–116 с.