

FORMATION OF PROFESSIONAL COMPETENCE OF FUTURE CIVIL ENGINEERS IN THE PROCESS OF STUDYING PHYSICS BASED ON MODERN PHYSICAL RESEARCH

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Abstract. *The research is devoted to the study of the competence approach in the context of training future civil engineers in the process of studying physics based on modern physical research and related concepts: "physical competence", "competence approach", "competence", "professional competence". It is proved that physical competence plays an important role in the formation of professional competence.*

It is established that in order to form an appropriate level of professional competence of future bachelors of civil engineering in the process of teaching physics, the following pedagogical conditions are necessary: the development of future bachelors of civil engineering abilities to take into account the influence of various natural factors on the properties of objects, buildings and structures, take into account various properties of building materials in different conditions, calculate the resistance of materials, seismic resistance, thermal conductivity and heat capacity, take into account acoustic and optical properties; improving students' skills in the use of ICT in the educational process; formation and development of cognitive independence of future bachelors of civil engineering.

Keywords: *civil engineering, competence, professional competence, physical research, seismic resistance.*

INTRODUCTION. The physics course at universities in the construction field is a special course, due to its special importance. A specialist in the field of industrial and civil engineering, when designing buildings and structures, it is necessary to take into account a variety of conditions formed by both natural and human factors. The most significant are natural phenomena such as earthquakes, tsunamis, volcanic eruptions, and crustal sinkholes. Taking into account that Uzbekistan is located in a zone of increased seismic activity, as well as some residential areas are located in areas prone to landslides and mudslides, studies focusing on seismic resistance and mudflow resistance are the most relevant. Let's consider what competencies a future builder needs to develop when studying a physics course.

METHODOLOGY. Studying seismic construction, it is necessary to know the behavior of buildings and structures under seismic influence in the form of earth's crust tremors, loss of soil bearing capacity as a result of landslides and mudslides. And today, qualifications are not only professional knowledge, skills and abilities, but also personal qualities demanded by this type of professional work. These are qualities such as accuracy in calculations, conscientiousness, the ability to use professional and reference literature, and an analytical mind. Therefore, it can be argued that modern higher education should be focused on the formation of a personality adequate to the content of professional activity. Such professional education can be realized only with the

widespread introduction of a personality-oriented concept of education into practice. The objects of professional development of a personality, as noted by many authors [1-6], are its integral characteristics: competence, socio-professional orientation, professionally important qualities and psychophysiological properties.

In the process of teaching physics, the following pedagogical conditions are necessary: the development of future bachelors of civil engineering abilities to take into account the influence of various natural factors on the properties of objects, buildings and structures, take into account various properties of building materials in different conditions, calculate the resistance of materials, seismic resistance, thermal conductivity and heat capacity, take into account acoustic and optical properties.

In accordance with this, it is necessary to develop methods for improving students' skills in the use of ICT in the educational process and the skillful application of competencies based on knowledge of physical laws; the formation and development of cognitive independence of future bachelors of civil engineering.

Such qualities and competencies are formed mainly when performing practical tasks in the form of conducting a specially oriented physical workshop, performing individual tasks, and project tasks.

The main tasks of earthquake-resistant construction:

- study of the processes of interaction between a construction object and an unstable foundation;
- assessment of the consequences of a possible seismic impact;
- design, construction and maintenance of earthquake-resistant facilities [1].

An earthquake-resistant structure does not have to be bulky and expensive

Before talking about earthquake-resistant construction with students, first of all it is necessary to find out the physical basis of an earthquake, to find out what kind of natural phenomenon it is. Why do earthquakes occur?

An earthquake is a consequence of the movement of the Earth's lithospheric plates, which sometimes collide or find themselves on top of each other, as a result of which a huge amount of energy is released, which is felt by people as shaking and tremors.

Micro-earthquakes in our region occur very often and go unnoticed by most people, but sometimes their intensity can reach a level at which houses and buildings can collapse from numerous vibrations if they were not built using the proper technology.

The strength of an earthquake is mainly characterized by the Richter scale.

Currently, the most necessary competencies in seismic construction are such as the ability to calculate equilibrium, vibration loads, horizontal loads from masses on flexible suspensions, temperature climatic influences, wind loads, dynamic effects from equipment and transport, braking and lateral forces from the movement of cranes are not taken into account.

When determining the calculated vertical seismic load, the weight of the crane bridge, the weight of the trolley, as well as the weight of the load equal to the lifting capacity of the crane should be taken into account.

To develop such competencies, a specially selected program should be available for a physics workshop at universities with a construction specialization.

The special course should include construction physics and teaching aids for this course.

Table 1. Richter scale of earthquake strength

Richter Scale	Visible Action
0-4.3	Only devices react vibrationally. It is felt only when standing on the stairs. There are slight fluctuations of objects in the room.
4.3-4.8	Creaking of doors, awakening of sleepers, pouring of water from a vessel
4.8-6.2	Instability when people walk, damage to windows, falling paintings from walls, tiles and plaster crumble on houses
6.2-7.3	Damage to chimneys and sewer networks, general panic, destruction of foundations, rivers overflowing
7.3-8.9	Bending of railway tracks, damage to roads, complete destruction, waves on the surface of the earth, changes in terrain, poor visibility.

RESULTS. Based on our proposed methodology, a program of a special laboratory workshop course on physics in educational institutions focused on industrial and civil engineering has been developed. To develop the competencies of university students with a construction specialization, a textbook on laboratory work on the subject of construction physics has been developed, which includes sections on mechanics, acoustics, optics, radiation physics.

DISCUSSION. Thus, the training of highly qualified civil engineers is directly related to the development of various competencies, and to a large extent such competencies depend on the successful completion of a special course in building physics. The emphasis in such a course should be focused on the study of physical phenomena, as well as on taking into account the influence of various natural factors on human-built objects. It is necessary to develop the ability to predict the possibility of various natural factors of destructive action, to know the properties of building materials capable of withstanding maximum permissible loads.

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