

THE IMPLEMENTATION OF STEM APPROACH IN TEACHING PHYSICS IN INSTITUTIONS OF GENERAL SECONDARY EDUCATION

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Intensive society development presupposes the education system development. The education focused on memorizing subject knowledge and mastering elementary skills is gradually being replaced by the education based on the development of abilities and thinking, proactive personal activity. To this end, in the educational process there is a need to develop and apply new approaches to its organization and modern educational technologies.

One of the modern ways of learning improvement is the implementation of STEM (Science, Technology, Engineering, Mathematics) educational approach (educational technology), which is an integrative strategy for its implementation, in which educational (practical, technical and technological) tasks are considered at the interdisciplinary level in the context of real life and are solved in the form of student project activity.

The STEM approach in education is widely used in many developed countries, such as Australia, Great Britain, Israel, China, Korea, USA, Singapore and Finland with the introduction of STEM disciplines into the educational process. In the education systems of these and other countries, the use of STEM is represented by different variations. Teaching is carried out in different ways depending on their capabilities, the focus of education. This indicates that currently in practice there is no consensus on how to implement this technology.

Therefore, there is a need for scientific substantiation of the STEM approach application in teaching disciplines of the natural science cycle in secondary school. This fully applies to physics. [1, 3]

Material and methods. Physics is a natural science discipline that studies the structure of matter and the simplest forms of its motion and interaction. Matter in physics is represented in two forms: substance and physical field.

Motion in natural science is considered as a change in the material system state. The simplest forms of matter motion include mechanical, thermal, electromagnetic motion and mutual transformations of elementary particles and the physical field.

The change in the material system state occurs as a result of its interaction with other systems. All interactions observed in the reality surrounding an individual consists in four main types: gravitational, electromagnetic, weak and strong.

Other natural science disciplines study more complex types of matter motion. Therefore, physics can be considered the foundation of modern natural science. At the junction of physics and other natural sciences, new scientific disciplines, such as agrophysics, astrophysics, biophysics, chemical physics and petrophysics, have appeared.

Physics as a science allows a person to learn about the world around and at each stage of its development forms a physical picture of the world. This is the way of forming the mechanical, electromagnetic and modern physical pictures of the world. This is the cognitive potential of physics.

The achievements of physical science are extensively used in the technical device creation and the modern technologies development. Due to the success of physics in the study of solids, gas discharge, the structure of atoms and the interaction of optical radiation with a substance, it became possible to create lasers that are used in modern technics and technologies. So, lasers are used as a surgical scalpel, monitor the degree of atmospheric pollution, ensure the production of highly pure substances, transmit information over distances and manage chemical processes and nuclear reaction. The nuclear physics development resulted in the creation of nuclear power engineering.

The development of technics, in turn, affects the development of physics. This is manifested in the emergence of new problems for research in physics and the creation of conditions for the intensification of their implementation. This is the essence of the technical potential of physics.

Findings and their discussion. The peculiarity of physics lies in the fact that it explores the world around on models. This is fully reflected in the educational knowledge in physics. Therefore, when studying physics in institutions of general secondary education, it becomes possible to convince students that all physical concepts and theories only approximately reflect objective reality.

Physics also has a high humanitarian potential. Thus, the principles of relativity and correspondence, which are used not only in other sciences, but also in human practical activity, and the probabilistic nature of many processes were discovered and proved. This corresponds to a deeper stage in the process of knowing the world.

The role that physical science plays in the life of modern society determines the importance of physics in general secondary education. [2]

Conclusion. The analysis of the content and structure of physics as a science allows to draw a conclusion that physics has great potential for implementing the STEM approach when teaching students in general secondary education institutions. When creating didactic support for the application of this approach in teaching physics, it is necessary to be guided by the following principles of its implementation:

1. When organizing the educational process in physics, it is necessary to organize the student project activities.
2. It is necessary to use practice-oriented tasks, tasks with technical and technological content as educational tasks in physics.
3. To solve such tasks, it is necessary to use the knowledge of other natural science disciplines.

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