

INNOVATIVE APPROACH TO THE DEVELOPMENT OF TECHNOLOGICAL COMPETENCE IN STUDENTS

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ABSTRACT

The article contains suggestions and recommendations for the development of technological competence of students in the teaching of physics in higher education in the field of technology. It is also possible to use nanotechnology teaching materials in the teaching of physics on the basis of interdisciplinary links.

Keywords: Competence, nanotechnology, nanophysics, innovative approach, interdisciplinary communication, technological competence, design and creativity.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

In recent years, a large-scale practical work is being carried out in all higher education institutions to develop the competence of students, training highly qualified specialists. The effective use of theoretical knowledge in the teaching process, the ability to demonstrate a high level of professionalism, skill and talent has become one of the most pressing issues today. It is known that the formation of technological competence in students in the process of teaching special subjects in higher education institutions in the field of technology is of particular practical importance. Because technological competence is the mastery of advanced technologies, the use of modern tools, techniques and technologies that enrich professional pedagogical knowledge, skills and competencies. In the organization of educational processes in technical higher education institutions on the basis of innovative approaches, the main attention is paid to the development of technological competence of students.

In this article we want to describe some of the comments and suggestions on the formation and development of technological competence of students in the teaching of physics in technical higher education institutions. The current development of science and technology shows that the innovations in physics are becoming richer day by day, and there is a need to incorporate this information into the educational process. Therefore, one of the main solutions is to integrate data into science programs based on innovative approaches in the educational process. In order for the knowledge and skills acquired by students in physics to meet modern requirements, they are given the following suggestions and recommendations for the formation and development of technological competence:

- Regular acquisition of new information in the field of physics;
- Effective use of modern tools, devices and equipment in the experimental lessons of physics;
- Independent search for new information on physics;
- To be able to apply the acquired knowledge in physics in their professional activities.

In modern physics, the organization of the educational process using data based on the achievements of nanotechnology is of great practical importance. The main reason for this is that almost all research on the study of physical phenomena and processes is devoted to the

study of nanoscale particles, the nanoscience. However, in the curricula of physics developed in technical higher education institutions, the teaching materials on the elements of nanophysics are given very briefly. Due to the need for methodological and didactic processing of materials on the elements of nanophysics, presented in the programs of physics, the data are not yet fully reflected in the programs of science. In addition, the amount of data on nanophysics is increasing day by day. To do this, it is advisable to regularly introduce new teaching materials in physics programs [1, p. 275]. In conveying nanophysical concepts to students, they should use teaching materials related to modern technologies. Here are some suggestions and recommendations for innovative teaching approaches:

- Organization of the process of teaching physics through the use of advanced teaching systems of the world, teaching materials on the achievements of nanotechnology;
- Organization of educational practices developed in accordance with modern requirements in the formation of knowledge, skills and abilities of students in nanophysics in each field and direction of education;
- To pay attention to the fact that industrial enterprises, governmental and non-governmental organizations, enterprises and training facilities are provided with material and technical base for research based on nanotechnology, ie with separate modern innovative laboratory rooms, instruments and equipment;
- Development of procedures for assessing and monitoring the level of students' mastery of nanophysical concepts. (organization of regular processing practices with students who do not have sufficient nanophysical, nanotechnological knowledge, skills and abilities in the classroom);

In addition, the use of interdisciplinary methods and techniques of interdisciplinary communication, depending on the direction of specialization in further improving the content of teaching physics in technical higher education institutions, can also achieve great positive results [2, p. 44]. Interdisciplinary communication is also of great practical importance in the formation of modern concepts of physical science, the development of technological competence and the development of students' design and creative abilities. For this purpose, it is expedient to form and develop students' special and basic competencies in science. Table 1 below provides information on the formation of students' competencies in modern physics.

Table 1.

№	Physical competencies	Content and essence	Opportunities to improve the content of physics education on the basis of teaching materials on nanophysics
1.	Competence to identify, understand and interpret physical phenomena and processes related to nanotechnology	To be able to describe in detail the laws and laws of physics in accordance with nanotechnological processes, to be able to fully analyze the relationships between physical phenomena, processes, their basic parameters	Fundamental and practical concepts based on the achievements of nanotechnology, nanophysical concepts, explanation of the physical state of particles in nanoscale on the basis of physical laws. To describe the technical possibilities of using the achievements of nanotechnology, modern designs, prospects for their widespread use in all areas in the future.
2.	Practical experience in nanophysics, competence to conduct observations	Observation of physical phenomena and processes in nanoscale particles, laboratory work, research and practical experiments, obtaining results, generalization, development of conclusions and recommendations	Possibility to use the achievements of nanotechnology in everyday life, to justify the possibilities of the national economy and production. Conducting experiments based on the use of modern methods and techniques in nanotechnology and substantiating their effectiveness and advantages.

The table contains proposals for the development of special competencies in the formation of nanotechnology materials in physics education.

The following stages are important in the formation of modern knowledge, skills and competencies in nanotechnology in the process of teaching physics in higher education institutions in the field of technology:

- Identification of approaches to step-by-step teaching of teaching materials on nanotechnology and the application of these methodological developments in the educational process;

- Formation of knowledge, skills and abilities on the basis of didactic tasks and principles of teaching in the formation of fundamental and practical concepts of nanotechnology in physics education;

- Improving the content of teaching physics based on the use of educational materials covering the knowledge of nanotechnology: textbooks and electronic manuals, didactic materials, methodical developments;

- Development of scientific-creative, non-standard-logical thinking, constructive, independent work skills of students;

- The use of visual aids, demonstration models in working condition, based on the principle of demonstration of teaching in the formation of the concept of the elements of nanophysics in physics;

- The use of integrative teaching methods and approaches in the formation of knowledge, skills and competencies in nanophysics in the teaching of physics;

- Effective use of media education tools (virtual laboratory work, animations, models) in teaching nanotechnology materials in physics;

In general, the article provides methodological suggestions and recommendations for the formation and development of students' technological competence through the introduction of nanophysical elements in the teaching of physics in technical higher education institutions. In particular, the proposals on the introduction of information into science programs on the basis of innovative approaches, the formation of technological competence to ensure that the knowledge and skills acquired by students in physics meet modern requirements are of particular practical importance.

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