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Development of socio-pedagogical competence of future teachers of physics

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Annotation. The relevance of the problem stated in the article is due to the fact that in the framework of the transition to state educational standards and the new professional standard of the teacher, the task of training teachers who have a certain breadth of knowledge in their subject area, the formation of skills to apply new educational technologies in their future professional activities is of particular importance. The scientific and technical level of development of modern society requires the teacher to have the skills to actively use information and communication technologies at all stages of the learning process. The purpose of the article is to reveal the possibility of using an online course to develop the ICT competence of a future physics teacher.

Key words: educational institution, teacher, teacher training, competencies of the future physics teacher.

T from who, referring to the old,
able to discover new
able to be a teacher.

Confucius

At the moment, the main principle of education is the development of the personality of a student, who has ways of action that enable him to study productively, self-determine, realize his cognitive interests and future professional needs. The main task of the school is to create an educational environment conducive to the development of the student's personality.

One of the solutions to this problem is the growth of the teacher's professional competence. The "Professional standard of the teacher" says: "The teacher is a key figure in the reform of education. In a rapidly changing open world, the main professional quality that a teacher must constantly demonstrate to his students is the ability to learn.

At present, universities take into account the needs and interests of students by introducing a multi-level system of preparation for professional activities, variable and flexible curricula and programs, using developing educational technologies, which gives students new opportunities to adapt to dynamically changing conditions in the education system. Thus, in a competitive environment, the success of a graduate of a bachelor's degree in professional activity is determined by the level of formation of his professional competence based on personal experience.

Today, in general educational institutions, the teacher must implement the standards of general education of the second generation when organizing the educational process in his subject, for this he needs to focus on the achievement of personal, meta-subject and subject learning outcomes by students. However, if the approaches to the formation of personal and subject learning outcomes, including physics, are more or less familiar and understandable to the subject teacher, then the formation of meta-subject educational learning outcomes causes difficulties.

The meta-subject results of teaching physics include knowledge of general scientific concepts

(phenomenon, fact, law, pattern, problem, hypothesis, model, conclusion, measurement, error), possession of theoretical and experimental methods of scientific knowledge (analysis, synthesis, abstraction, idealization, comparison, systematization , classification, generalization), readiness and ability to independently search for ways and means of solving the tasks.

In pedagogical universities, under the conditions of the standard of higher education of the third generation, the professional competence of a future physics teacher, along with general cultural and professional competencies, should include special competence, which will be primarily aimed at achieving by students the meta-subject results of teaching physics through mastering universal learning activities (personal, regulatory, communicative, cognitive).

The formation of the special competence of the future teacher of physics should be manifested in mastering the conceptual and theoretical foundations of physics, the system of knowledge about the physical essence of phenomena and processes of nature and technology, about fundamental physical laws and theories, about the place of physics and its methodological role in the general system of sciences and values; methods of organizing and staging a physical experiment (laboratory, demonstration, computer) and theoretical analysis of the results of observations and experiments; theory and practice of teaching physics at different levels and stages of education, taking into account the ideas of a system-activity approach in teaching, the need to implement the worldview, meta-subject orientation of the methodological system of teaching physics.

Based on theoretical studies of the competence-based and student-centered approach in education (V. A. Bolotov, V. V. Serikov and others), the humanization of physical education (V. I. Danilchuk , V. V. Serikov, V. M. Simonov etc.), the system-activity approach in physical education (I. A. Krutova, L. A. Proyanenkova , N. S. Purysheva , G. P. Stefanova, etc.) under the special competence of the future teacher of physics we will understand the integration of different types of its readiness for students to achieve meta-subject educational results in teaching physics [4]:

1. *Methodological readiness* - mastering the definitions of such concepts as a physical phenomenon, a physical object, a physical quantity, a physical device, a scientific fact; knowledge of the provisions of physical theory and laws, the ability to conduct their scientific and methodological analysis, compare them with the texts of problems, identify the connection between theory and practice; the ability to compose explanatory drawings or codes for physical texts, to build schematic diagrams for experimental facilities, graphs for tasks, to choose a formulaic notation for a physical text; analyze qualitative and quantitative patterns, reflect them in a tabular and graphical representation, compare them with each other; evaluate them;
2. *Experimental readiness* - the formation of skills: to determine the purpose of an experimental, research or design task; draw up a plan for the implementation of work, incl. with drawings and diagrams; rationally select the instruments and materials necessary for the experiment; predict the possible outcome of the work; think over possible circumstances for reducing the accuracy of the result of the experiment and reduce their influence; evaluate the results obtained and draw conclusions about the correlation of physical theory and experiment;
3. *Methodological readiness* - gaining experience in implementing the ideas of a system-activity approach, worldview, meta-subject orientation in teaching physics: when setting goals and

objectives of learning, planning ways to achieve them in an educational standard and "uncertain" situation in real conditions, taking into account the age of students, their abilities and personal qualities; determination of the elements of the content of teaching physics, taking into account the cognitive interests and cultural experience of students, as well as in accordance with the regulatory requirements of general education standards; selection of active and interactive teaching methods, incl. with the use of information and communication technologies, innovative forms and means of education, organizing independent creative, research educational activities of students in physics lessons in accordance with the methodology of scientific knowledge; assessment of students' achievement of subject, personal and meta-subject results.

One of the effective means of preparing students for pedagogical activities in order to achieve by students the meta-subject results of teaching physics is the fulfillment by future teachers of physics of tasks with a professional context.

Within the framework of this study, under the system of tasks with a professional context, we will understand an interconnected and interdependent set of tasks, purposefully and meaningfully constructed on the basis of the methodology of physical knowledge and skills, procedurally organized on the basis of subject, practice (G. A. Weiser , Yu. A. Saurov , G. P. Stefanova and others) and humanitarian (V. I. Danilchuk , V. V. Serikov, V. M. Simonov and others) oriented situations, the content of which correlates with a specific type of professional and pedagogical activity [5].

In the process of completing assignments with a professional context, the student attracts certain knowledge not only in the subject of physics itself, but also in the methodology of teaching it, as well as pedagogy, psychology; gains experience in analyzing and solving typical problems that arise in the professional activities of a teacher.

Analysis of the existing educational practice of preparing a future teacher of physics in a pedagogical university, research by Dammer M. D., Rogozina S. A., Purysheva N. S., Vazheevskaya N. E., Shamaeva T. N. and others in the field of development and application tasks with a professional context shows that mainly tasks are offered for the formation of general cultural and general professional competencies at the level of the discipline "Pedagogy", while the tasks for the formation of a special competence of the teacher, which is primarily aimed at achieving by students the meta-subject results of teaching physics, are not sufficiently developed, methodological aspects have not been identified the formation of such competence in the theory and methodology of training and education (physics).

When interviewing physics teachers of the first year of work in educational institutions, out of 70 respondents, only 19% conduct a special selection of practice-oriented and humanitarian- oriented training content aimed at achieving the meta-subject results of teaching physics by students; use it in the classroom learning new material about 11%; during control work - 1%; when repeating the studied - 16%; during the organization and conduct of various types of school physical experiment - 6%.

At the same time, the analysis of scientific research and methodological literature showed that there are prerequisites for solving the problem of developing a system of tasks with a professional context for the formation of a special competence of a future physics teacher, which is primarily aimed

at achieving by students the meta-subject results of teaching physics: the works of V. A. Bolotov, V. I. Danilchuk , I. A. Krutova , N. S. Purysheva , V. V. Serikova, V. M. Simonova, G. P. Stefanova and others (humanitarian, personality-oriented, activity-based, competence-based approaches in physical education) , G. G. Nikiforova, V. A. Orlova, A. A. Fadeeva and others (approaches to the systematization of tasks for the formation of universal educational activities in the primary school in accordance with the second generation standard), Yu. A. Gorokhovatsky , V. I. Danilchuk and others (approaches to the organization of classes in general physics based on competency-based tasks), E. V. Danilchuk , N. Yu. Kulikova, A. N. Sergeeva (educational interactive tasks, including using Internet resources , web 2.0 services, remote technologies), N. I. Odintsova, L. A. Proyanenkova , N. K. Khannanova (tasks based on control and measuring materials of the unified state exam), etc.

Organizationally, the formation of a special competence of a future physics teacher based on a system of tasks with a professional context is carried out within the framework of a methodological module that combines such disciplines as "Methods of teaching physics", "School physical experiment", "Workshop for solving physical problems". "Interactive Teaching Technologies", "Measuring Materials for the Unified State Examination in Physics", "Fundamentals of Research in Physics and Mathematics Education", "Radio Delo", as well as educational and methodological practices implemented in the preparation of a future physics teacher at the Pedagogical University.

Let us give an example of a system of tasks of three types - "Demonstration", "Situation modeling" and "Research" on the formation of a special competence of a future physics teacher within the framework of the discipline "School physical experiment".

The task "Demonstration" is aimed at ensuring that the student has mastered the experience of creating conditions for the development by students of such regulatory universal educational actions as goal setting, planning, forecasting. When performing these tasks, the future teacher of physics is brought to the understanding that the study of any device begins with its description, design and understanding of what phenomenon, concept, law underlies its work. So, when studying electrical measuring instruments - a demonstration ammeter and a voltmeter - updating of knowledge is required: about the magnetic field of direct current, magnetic induction, current strength, the interaction of a conductor with current with a magnetic field, parallel and series connection of conductors (formation of methodological readiness); about the purpose of the device, the principle of operation of the magnetoelectric system of the device, the price of division of the scale of the device, shunting and additional resistance, the ability to measure physical quantities, the ability to analyze the situation and compare it with the already known, independent search for ways or a solution method and argumentation for choosing the optimal one (formation of experimental readiness); about the features of the study of electrical measuring instruments in the school course of physics (the formation of methodological readiness).

Tasks: 1. Having studied the device and the principle of operation of the device (ammeter, voltmeter), select the correct statement: “This device works on the basis of a) an electromagnetic system, b) a magnetoelectric system, c) an electrostatic system”, write it down in the summary information card and explain why the rest of the answers are wrong.

2. Select an ammeter and a voltmeter for the demonstration "Ohm's Law for a section of a circuit"

(the principal diagram is provided by the teacher). Suggest a method for measuring the internal resistance of an electrical circuit power supply in the Ohm's Law for a Complete Circuit demonstration.

3. Prepare an interactive poster (based on an educational computer presentation) on the study of the theoretical foundations of the design of demonstration devices, which can be used in teaching students in the basic school and in the senior classes of the secondary complete school.

The task "Modeling the situation" is aimed at ensuring that the student has mastered the experience of creating conditions for the development by students of such regulatory universal educational actions as the correction of knowledge and skills, self-esteem, self-control.

Tasks:

1. When studying the demonstration ammeter and voltmeter of the magnetoelectric system, find errors in the reasoning and explain them: a) for the DC voltage mode.

The demonstration voltmeter is shunted, while the shunt is connected to the middle (common) and leftmost terminal of the device, b) to measure alternating current with a power of 3A, an additional resistance of 5V is connected to the far right terminal in the lower row of the device labeled "+".

2. Simulate the thought experiment of connecting a demonstration voltmeter to a lighting circuit. Rate your actions. Measure the mains voltage with the selected demonstration voltmeter.

3. Develop a fragment of the lesson on the study of the device and the principle of operation of the devices of the magnetoelectric system and suggest the possible reactions of the teacher to the mistakes of the students.

The task "Research" is aimed at ensuring that the student has mastered the experience of creating conditions for students to master such communicative universal educational actions as asking questions, expressing their thoughts, and the ability to convince partners. Tasks:

1. Explore the development of the electromagnetic theory of light and propose a possible dialogue between two physicists on the development of this theory.

2. In cooperation with your student colleague, assemble the proposed electrical circuit according to the scheme, take the readings of the instruments with an accuracy of integers and evaluate the error of the instrument. Analyze the difficulties that you encountered in your joint activities and how you overcame them.

3. Organize a study of the question of what measuring instruments are used in a particular area of human activity - the radio business; create a fragment of the lesson related to the discussion on the topic "Opportunities for the school radio circle in the patriotic education of youth."

The results of the experimental work carried out at the Pedagogical University showed that the

use of the developed system of tasks with a professional context contributes to the formation of the special competence of the future physics teacher.

Its formation is due to the need to implement the methodological principle of building physical knowledge; systematization of the studied theoretical material of the subject of physics for secondary school; taking into account the individual characteristics of each participant in the educational process, first at the university, then at the educational institution; the inclusion of a future physics teacher in a purposeful pedagogical activity when studying at a university, which can be judged by the results and reports on the teaching practice of students, according to the reviews of physics teachers in their lesson notes. Purposeful fulfillment of the entire system of tasks allows improving the dynamics of the professional development of the student - the future teacher of physics, who will holistically possess special competence in achieving the meta-subject results of teaching physics by students.

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