

FACTORS FOR IMPROVING LABORATORY TRAINING IN THE DEVELOPMENT OF PROFESSIONAL COMPETENCES OF FUTURE PHYSICS TEACHERS

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Abstract. *This article focuses on the factors of improving laboratory training in the development of professional competences of future physics teachers. Through the competence approach, pedagogy serves to improve the methodology of teaching physics in higher education institutions, to bring the training of future physics teachers to a new level, and to increase the quality of education. The current state of the problem of the competence approach to the educational process is an important factor in the training of future physics teachers.*

Keywords: *knowledge, competence, skill, competence, competence approach, professional competence, demonstration experiment, frontal laboratory work, physical practicum.*

INTRODUCTION

Currently, the processes of change observed in the life of the society are reflected in its activities in all aspects, including in the field of education, which is the main organizer of the formation of a person's worldview. The rapid development, uncontrollable and unpredictable changes in the life of society, changes in the landscape of world geopolitics, scientific research and their application to life have led to a change in the demands placed on the educational system in the last decade.

It is no secret that the expansion of the scope of information in the education system, the introduction of advanced pedagogical technologies in the physics education system, and the rapid development of science and technology require a competent approach to the educational process (1). The future physics teacher will be able to effectively use complex situations in the course of the physics lesson and be able to get out and make decisions. Through the competence approach, pedagogy serves to bring the training of future physics teachers to a new level, to improve the quality of education, and to solve the priority issue of training competitive personnel in improving the methodology of teaching physics in higher educational institutions.

The times require us to raise our work to a new level aimed at creating modern workplaces for our children, ensuring that they occupy a decent place in life [1, 2, 3, 4, 5, 6].

It should be noted that it is possible to train future high-level physics teachers in pedagogical higher education institutions only on the basis of the Competency approach in improving the quality of physics teaching and achieving high efficiency. In doing so, the factors of future physics teacher competence development will be developed to increase the quality of education through the Competency approach, which covers the modern achievements of physics teaching methodology in training.

Research materials and methodology.

In complex pedagogical situations, when there is insufficient information to come to a clear solution, drawing conclusions and making decisions through a scientific-creative approach is one of the manifestations of the Competence approach.

The use of advanced ideas and technologies in the educational system, improvement of the scope of general theoretical questions that make up the content of physics didactics, due to the use of statistical ideas and concepts, requires a special approach to physics teaching methodology. In education, there is one side of teaching-learning, and the rest - active learning and assimilation of acquired knowledge, assessment, creative activity - is the other side.

Our ongoing research shows that competence development begins with the teaching of a physics course in secondary schools. Although physical practicum is often used in comprehensive schools, in higher education institutions, physical practicum is considered the basis of laboratory training, and physical knowledge serves as the basis for the development, generalization, deepening, and repetition of experimental skills and skills for its organization and conduct. The development of the future physics teacher's competence, his worldview is achieved by expanding the scope of the specified norms for performing the specified laboratory exercises. Based on the analysis of the literature, the main signs of professional competence were identified:

In order to increase the level of professional training of future teachers, to develop their competence, in addition to deep knowledge of theoretical and practical aspects of educational science, it is necessary to have methodological competence. The current state of the problem of a competent approach to the educational process is considered an important factor in the training of future physics teachers and includes the following factors:

1. Identifying the main categories of the competent approach and strengthening it through regulatory and legal documents;

2. To create a national Uzbek model of the Competency Approach in general education schools today, to develop a clear and promising plan for the training of future teachers, and to implement it in the educational process;

3. To improve the basics of educational management that ensures the productivity of future physics teachers in the training of future physics teachers;

4. In training mature, competitive physics teachers in the future, developing their interests, skills in working with technical equipment and devices during laboratory training;

5. Ensuring the priority in the educational system for the professional training of future physics teachers, in addition to the level of learning the harmony of theory and practice, formation of technical knowledge competence;

6. By characterizing the student's professional competence in the complex of competence development pedagogical institutions, relying on the knowledge, skills and abilities of the student in psychological and pedagogical processes in society, he can independently express his attitude to changes in nature and society;

7. Along with the training of future physics teachers, introducing the mechanism of providing them with additional specializations;

SEARCH RESULTS

Competence is an individual quality of a person and implies having certain competencies. Competence is a person's readiness for effective activity in a concrete life situation, knowledge, skills and external resources. Competence - unlike knowledge, skills and competence, is manifested in the time of its use or response to the situation. [7,8,9].

In some cases, the student completes individual assignments alone. In the laboratory classes, dividing into small groups (consisting of 3-4 students), each group familiarizes itself with the laboratory development on a separate topic, after getting acquainted with the conditions specified in the instructions for the work to be performed, the procedure for performing the work, they verbally tell the teacher that they have prepared theoretically, and the sequence of performing the work they explain on the basis of questions and answers and, with the permission of the teacher, begin to perform the specified laboratory exercise. In this, a small group works together as a team to obtain results using a device or equipment. Then the students of the group correct the shortcomings of the completed work, complete their mutual knowledge, and submit the work in the form of a report after mathematical processing of their conclusions. Formation of the competence of a physics teacher is a multifaceted, multiplanned process, and its one-sided assessment is a complex issue. [7, 8, 9].

Pedagogical research conducted in higher educational institutions of pedagogy leads to some difficulties in the fact that the students studying physics do not have sufficient competence in organizing training sessions from the physical practicum. One of the main reasons for this is the lack of physics teaching hours, including laboratory hours, in secondary schools. Pedagogical studies and observations show that in the groups conducting laboratory training, students with different preparation in physical and mathematical sciences and competence in the development of initial experimental skills show a lack of competence in working with modern measuring devices, low professional competence. In addition, there are always students in groups who are not inclined towards experimental work. Nevertheless, a graduate of the physics-astronomy education field of the pedagogical higher educational institutions preparing the future physics teacher should have the competence to conduct laboratory experiments in physics, as well as the skills, abilities, and skills to assemble equipment by hand, and the competence to apply it to the educational process. the education system demands.

Current research shows that students neglecting laboratory studies, as well as copying their results using mobile devices, are happening today. The use of modern science and technology achievements by students for their own benefit, among them, the technical possibilities of information exchange through mobile communication tools have peaked, and the method of not only copying laboratory results from one another, but also "taking" them using mobile communication is developing. Of course, such methods do not affect the quality of laboratory training.

In the training of the future physics teacher, it is achieved by in-depth mastering of the scientific basis of physics courses in school and academic lyceums, knowledge of historical stages, formation of pedagogical competence. For this, they should know well how to apply the didactic consistency principle in physics teaching at different levels. However, it cannot be said that pedagogy pays enough attention to this issue in the process of teaching in higher education institutions. Many students find it difficult to apply the competencies they have acquired in pedagogical higher education institutions to teaching school physics courses. The main reason for this is that in the process of teaching physics in general schools, academic lyceums, students show insufficient competence in organizing and conducting physical experiments. The main place in their physical worldview is occupied by dynamic laws, and there is almost no place left for probabilistic statistical laws.

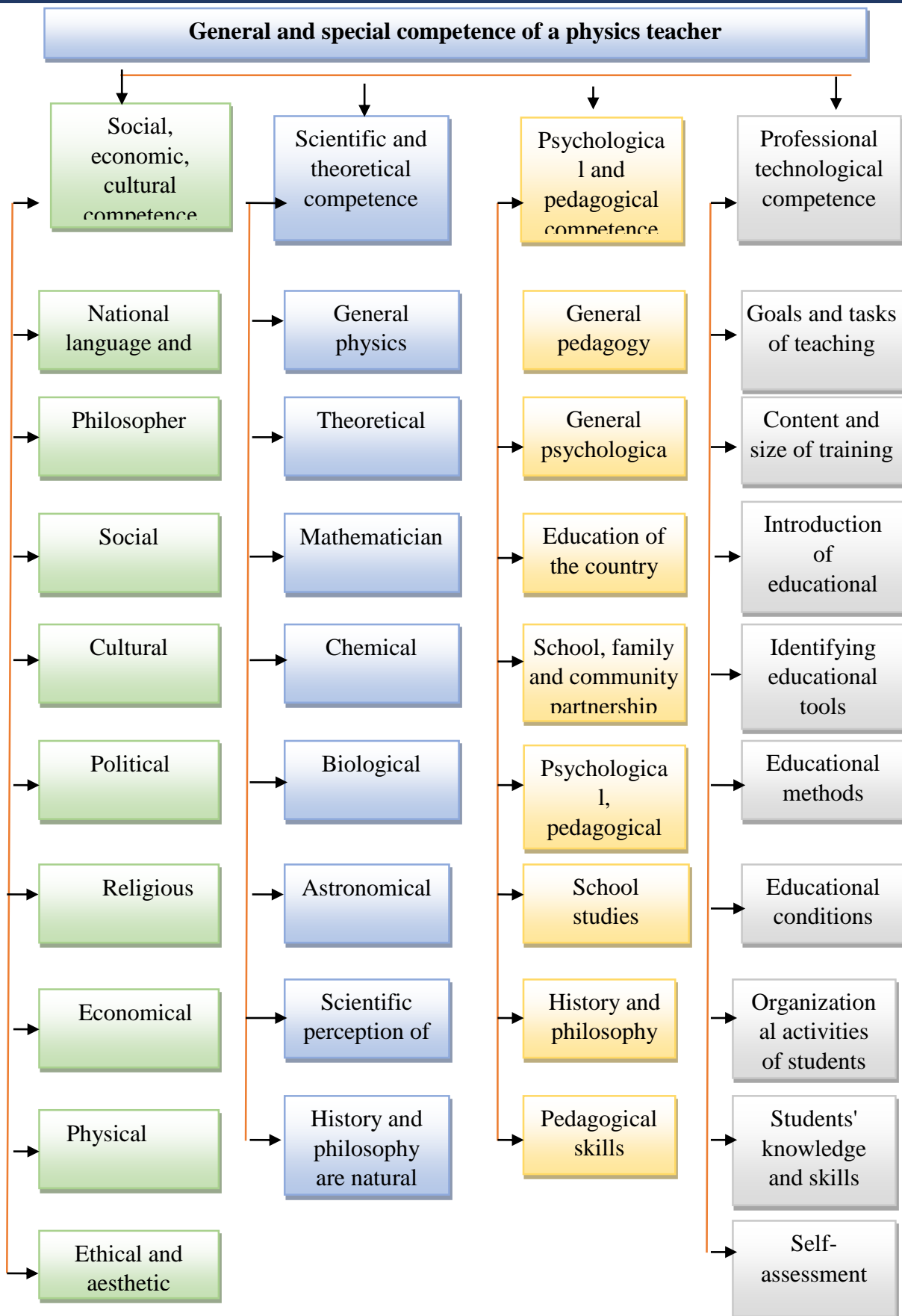


Figure 1. General and special competence of a physics teacher

The reason for this is the lack of follow-up among the courses of general physics, theoretical physics and physics teaching methodology taught in higher education institutions. The

creation of new textbooks by transitioning to improved programs in educational institutions of the general education system leads to an increase in its scientific level. The above-mentioned ideas remain relevant in the teaching of physical science, the problem of raising the laboratory training in the model curriculum to the level of today's requirements. We believe that if we can develop students' interest in invention and discovery during practical training, it will naturally be a worthy impetus for the rapid development of our country's science and technology, technology and industry, as well as our economy.

On September 30, 2016, President Sh.M. Mirziyoev, in his greetings to the teachers and coaches of Uzbekistan, said, "At the same time, we all understand that today we have more important and urgent tasks ahead of us. In this regard, to further strengthen the material and technical base of science and education, to ensure that it is not only in sync with the times, but also ahead of the times, to make extensive use of advanced methods of training and retraining of pedagogic personnel, to carry out these works in cooperation with prestigious centers abroad. , implementation of the tasks related to the introduction of modern technologies in the field, the all-round stimulation of the hard and responsible work of teachers and teachers, in short, all opportunities will be mobilized by our state for the development of our new generation, which is entering our lives as a great force", he emphasized [1, 2, 3, 4, 5, 6].

Educating a healthy, well-rounded generation depends on the level, training and dedication of the pedagogue working in the continuous education system, and his attitude to the work of teaching and educating the young generation. Therefore, the teacher should meet certain socio-political, pedagogical, psychological requirements in the preparation of mature specialists in all respects. A teacher believes in the idea of independence, has a well-rounded, scientific mindset, and professional knowledge, that is, he must be a deep expert in his subject, master of pedagogical communication, possess pedagogical-psychological, methodological knowledge and skills, and be able to quickly identify, learn and evaluate various pedagogical situations. . Therefore, it is necessary to change the structure of laboratory training, which includes modern educational technologies, to instill a modern spirit into it, and to ensure the quality of education.

CONCLUSION

In order for students not to take laboratory work lightly and to keep the necessary equipment as an eyeball, as well as if it is allowed after the level of theoretical preparation is recorded by the teacher, we will increase their responsibility to perform laboratory work, which will serve to increase the quality of education. Approaching in this way calls students to constant sensitivity, while forming professional competence in them. It should be noted that the laboratory training would have served to increase the effectiveness of teaching if it was carried out in accordance with the direction and specialty.

If until the end of the 20th century, teaching was largely based on empirical facts, but at the beginning of the 21st century, the opposite, that is, deductive approaches, is required to be the priority. Today, it would be correct to say that the creation of physics educational content is on the agenda, taking into account the latest achievements of science without compromising the educational content and its historicity principle. It is necessary to recognize that the modern physics course reflects the latest achievements of physics in its content. This approach can be considered conceptual, and new developments in the world of methodology can be put on the agenda. We believe that it is necessary to integrate academic subjects, generalize educational

information, develop abstract thinking of students and young people, ensure the deductive method of teaching and its priority, and improve the abstract thinking of pupils and students.

As one of the main research methods in experimental science, physics is an object of study in teaching and therefore a co-teaching method. This leads to the existence of educational experiments in different forms: demonstration experiments, frontal laboratory work, physical practice. Each of them performs specific didactic tasks. Experimental training is one of the most important elements of competent training of future physics teachers in higher educational institutions of pedagogy. Demonstration experiment is conducted together with the explanation of new educational material, and one of its main goals is to demonstrate a physical phenomenon, to confirm the correctness of the conclusion derived from the studied law or theory. In addition, the purpose of the demonstration experiment is to introduce students to the unique aspects of the experiment as a scientific research method.

Frontal experiments are performed by students during training, usually it is planned for a short period of time. Carrying out frontal experiments develops students' observation, attentiveness, thinking while observing the progress of physical processes, storing information in memory, working with simple tools, performing separate mathematical operations related to measurements, and forming the competence to independently repeat the experiment demonstrated by the teacher. In some cases, frontal experiences are directed to the formation of competences to immediately apply the knowledge gained in the training, to check the correctness of the learned law. Competences of a relatively complex applied research nature are formed during frontal laboratory work. For example, in the process of performing laboratory work, such as determining the density of a substance, measuring the resistance of a conductor, studying the dependence of the current in the circuit on resistance and voltage, he assembled his tools and their connecting conductors based on the principle and equivalent circuits of temperature, atmospheric pressure, density, resistance, current, voltage measurement and electrical circuits. Competence of assembling an electric circuit is formed based on the output scheme [10, 11, 12, 13].

The knowledge of the requirements that the physical practicum is a scientific research method is summarized, it ensures a high level of independent work in performing experiments, it ensures a high level of independent work in performing physical experiments, complex physical devices used in scientific research work (electronic oscillograph, low and high frequency sound generators, electronic stopwatch, mirror galvanometer, ultra-short wave generators, spectrometers, laser devices, etc.) are formed. In this case, the issue of forming the competence of students to independently plan an educational laboratory experiment and perform sequential actions along with acquiring the necessary skills to conduct experiments that are part of the research elements can be solved by implementing a methodology consisting of the following:

- Clarify the purpose of experimenting;
- Formulation of hypotheses on which experiments can be based;
- Determination of the necessary conditions for testing hypotheses;
- Making an experiment plan;
- Choosing the necessary equipment, taking measures to replace the missing ones;
- Assembling the experimental device;
- Choosing the method of recording and recording the results of observation and measurement;
- Carrying out the experiment according to the plan in the prescribed manner;

Mathematical processing of the obtained experimental results;

Analyzing the obtained results in the form of graphs and tables, calculating errors and drawing conclusions;

Independent performance of tasks related to the topic of laboratory work.

A detailed look at the tasks of the educational experiment and the composition of the actions included in the system of experimental skills. The future physics teacher should be prepared to solve problems in the field of physical experiments during his studies at pedagogical higher educational institutions. He should have sufficient competence today. is demanding. A detailed review of the tasks of the educational experiment and the composition of actions included in the system of professional competences requires that the future physics teacher should be able to solve problems in the field of physical experiments during his studies at a higher educational institution of pedagogy.

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