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# THE ROLE AND ROLE OF ASTRONOMY LABORATORY TEACHERS IN THE TRAINING OF HIGHLY QUALIFIED TEACHERS IN PEDAGOGICAL HIGHER EDUCATION INSTITUTIONS

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## ANNOTATION

This article describes the role of laboratory work in the training of highly qualified teachers of astronomy in pedagogical higher education institutions.

**Keywords:** Students general astronomy course, experimental skills, equipment, instruments, astronomical program, equipment and device.

## INTRODUCTION

Observations and experiments show that after completing the course of general astronomy for future teachers studying at the bachelor's degree in pedagogical higher education institutions "Physics and astronomy", their creative approach to implementation is difficult. An analysis of the causes of such difficulties shows that the experimental training, skills and competencies of astronomy teachers are not satisfactory. As a result, it cannot be said that astronomical experiments are carried out satisfactorily in the process of astronomy education in a secondary school, academic lyceum. This leads to a low level of formation of experimental skills and competencies in students.

As a result of experimental work, the organization of astronomy workshops in pedagogical higher education institutions revealed the following shortcomings:

1) Level 1 prospective teachers have theoretical knowledge and experimental insights from astronomy, most know astronomical instruments, but cannot conduct an independent experiment using them because they do not have practical competence;

2) Have difficulty in determining the errors of measuring instruments in the experiment of astronomy;

3) Teachers in secondary schools are limited to laboratory work and experiments in the program;

4) The budget of time does not correspond to the perfect study of all laboratory works in the curriculum of astronomy in secondary schools of future teachers in pedagogical higher educational institutions;
5) There is a lack of coherence between the topics of the general astronomy workshop of pedagogical higher education institutions and the content of the experimental course in astronomy teaching methods, the experimental organizers of the astronomy course in secondary schools;
6) Students are not able to apply the experimental knowledge, skills and abilities acquired in the course of general astronomy in the course of laboratory work in the course of methods of teaching astronomy;
7) During the pedagogical practice, future teachers find it difficult to conduct and demonstrate the experiment independently;
8) Insufficient competence to conduct virtual laboratory classes on the basis of astronomical programs using computer capabilities in educational institutions that do not have laboratory equipment;
9) Lack of skills in the organization of laboratory classes in educational institutions, which are poorly equipped with laboratory equipment, based on manual capacity.
These shortcomings show that the didactic problems of experimental training of astronomy teachers with theoretical, practical and experimental training, creative approach to their profession are not sufficiently solved, there are gaps between the objective requirements of the educational process in secondary schools and the level of experimental competence of astronomy teachers.
Overcoming these problems is one of the urgent scientific and methodological tasks. It is necessary for future teachers to study the experimental content of astronomy education independently, creatively, to improve the existing laboratory work, to improve the competence to put new work. In this case, the general course of astronomy, in particular, in its laboratory practicums, based on the characteristics of professional activity, it is expedient to determine the content of the experimental skills and abilities of the future teacher, to develop methods of their formation.
Today, along with the acquisition of professional skills armed with modern knowledge, economic indicators play an important role in the research of future teachers to serve the development of our country. To do this, it is necessary to abandon the traditional laboratory training and move to an improved system, which is enriched with advanced pedagogical and information technologies, which can be the basis for the formation of inventive skills and competencies in the future teacher. In practical classes, which are an integral part of the learning process, the future teacher is formed, acquires experimental skills and competencies.
The main issue on the agenda is the effective use of a certain number of hours allocated for laboratory classes in the model curriculum for pedagogical higher education institutions "Physics and astronomy", as well as the development of their aspirations for discovery. Therefore, after the group (if the number of students in the group exceeds 12) is divided into subgroups, the laboratory work is divided by the future teachers into 2 groups and begin to perform, and as a homework is given a related laboratory work.

During the laboratory classes, prospective teachers are given 4 hours of science, of which 2 hours are to get acquainted with the procedure of laboratory work, to receive theoretical information, to conduct experiments, and the remaining 2 hours are to mathematically process the results and prepare reports. In this case, Task 1 in front of the future teacher is allowed to perform task 2 after getting acquainted with the purpose of the work, the necessary tools and equipment, theoretical information, the order of work, preparation for theoretical questions. After the future teacher gets the result in the group, she is given the task to find the answers to the theoretical questions given in the mathematical processing laboratory development and the report is presented to the teacher. After making sure that the laboratory work performed by the professor or assistant is done correctly, a one-on-one question and answer session is held and the reliability of his reports is checked and the laboratory work is considered completed. After that, the next laboratory work is allowed to be done and the work done is evaluated.

Pedagogical research shows that meeting the current needs and requirements of future teachers is not limited to practical training in the training of world-class professionals. It is no secret that an individual approach to future teachers is more effective than a complex approach. Therefore, it is important to take into account the dynamics of development in the modernization of astronomy. It is not possible to form a sufficient amount of required professional skills or competencies by conducting practical or virtual labs.

It should be noted that the organization and conduct of laboratory classes in secondary schools, the lack of methodological guidelines, instructions, methodological recommendations for young teachers on the form of reporting and assessment have a negative impact on the quality of education. Also, young teachers approach the system in the same way as laboratory classes are organized in the higher education system and perform the lessons in the sequences they have learned.

The above-mentioned ideas, raising the level of laboratory training in the standard curriculum to the level of today's requirements, the problem of creating components for improving the competence of future teachers, is one of the most important issues in teaching astronomy, training highly experienced staff. Therefore, in the future, the transition to new models in the training of competitive astronomy teachers, the use of advanced techniques and technologies to improve the quality of education, the need for specialists with thorough and in-depth knowledge and scientific potential, able to cope with difficult situations. The proposed model serves to overcome the above shortcomings.

If the ability to form knowledge, skills and competencies for inventions and discoveries in future teachers in the laboratory and practical training, we believe that such competent personnel will make a worthy contribution to the rapid development of state science and technology, as well as the economy. In particular, laboratory classes in all departments of physics are traditionally taught in all universities and colleges of the higher education system. It should be noted that the sequence of laboratory methods used to date includes the following:

- The subject of laboratory work;
- Purpose of work;
- Equipment and devices;
- Brief theoretical part;

- Order of work performance;
- Mathematical processing of experimental results and calculation of errors;
- Theoretical questions about this laboratory.

Today's development requires a new approach to all subjects, the improvement of the experimental competence of the future teacher. Research on psychology and pedagogy shows that the level of mental development of today's teachers has changed dramatically compared to the 80s and 90s of the twentieth century, taking into account the economic development of science and technology, social growth, the level of study of information and communication technologies. In such an approach, the full use of the potential of future teachers, let alone the formation of experimental competence, can have a negative impact on quality improvement in the education system.

It should be noted that the role of experimental and virtual forms of laboratory training in the formation of innovative abilities of students, the creation of advanced innovative technologies, the modernization of existing techniques and technologies is invaluable.

One of the ways to achieve high efficiency in improving the quality of education through the use of the achievements of advanced foreign countries in the educational process in the training of future astronomy teachers, the formation of their competence. Therefore, it is necessary to change the structure of laboratory classes, which include modern educational technologies, to instill in them the spirit of the times.

The following is the procedure for performing modernized laboratory work: the name of the laboratory work; purpose of work; necessary equipment and facilities; practical significance of the work; technical characteristics and mode of operation of the device; order of work performance; mathematical processing of the obtained results and finding the error; provide information on the performance of related laboratory work; independent performance of related laboratory work, obtaining results and mathematical processing of results; search for answers to theoretical questions on the topic of laboratory; solving tests on a laboratory topic; preparation of reports and conclusions on the performed laboratory work.

In order to achieve the intended goal, future teachers must know the practical application of laboratory work, perform related laboratory work independently, learn to assemble an experimental device circuit in electronic form.

Carrying out laboratory work in such a sequence has an important practical, innovative pedagogical significance. In this case, the future teacher is prepared to perform independent laboratory work independently: takes an active part in the process, finds errors, as well as the student himself brings up the laws of astronomy.

Gives the prospective teacher an individual approach to the subject. This approach allows the future teacher to conduct independent laboratory work in laboratory classes and reinforce it with test questions, and to draw conclusions in the report on the work, taking into account the above. The importance of experimental devices for future teachers in the implementation of such a model, the degree of practical application, cost-effectiveness and direct linking with test questions, expands the capabilities of future teachers and increases the use of modern computer capabilities and responsibility:

1. As a result of the application of modern pedagogical technologies in the proposed model, the test will have a unique effect on improving the existing skills and abilities of future teachers and improving their inventive skills, as well as the competence to develop their professional training.
2. This approach is important in the organization of education, the choice of modern methods and techniques and forms, taking into account the individual psychological characteristics of each future teacher, the psychological processes associated with the personality of future teachers.
3. As an example of a new model of practical training based on research conducted in order to substantiate our opinion in practice, the sequence of reporting is shown in Figure 3. Preparing and submitting a laboratory report in such a sequence requires the student to take a responsible approach and systematic action.

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