

## THE PRINCIPLE OF VARIABILITY IN TEACHING AN ASTRONOMY COURSE

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### Abstract:

The article provides information on the use of the principle of variability when teaching students an astronomy course. It was suggested that students learn course material based on their abilities, interests and capabilities.

**Keywords:** astronomical observations, the idea of integrity, the idea of consistency (continuity), the idea of variability, matter, the laws of dialectics.

### ПРИНЦИП ВАРИАЦИОННОСТИ В ПРЕПОДАВАНИИ КУРСА АСТРОНОМИИ

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### АННОТАЦИЯ:

В статье представлена информация об использовании принципа вариативности при обучении студентов курсу астрономии. Было высказано предположение, что учащиеся усваивают учебный материал с учетом своих способностей, интересов и возможностей.

**КЛЮЧЕВЫЕ СЛОВА:** астрономические наблюдения, идея целостности, идея согласованности (непрерывности), идея вариативности, материи, законы диалектики.

### Introduction

Today, throughout the world, education is seen as one of the main factors contributing to sustainable development. UNESCO's 2030 vision for international education identifies "creating access to quality education throughout life" as an urgent challenge. The quality of education depends on the professional competence of teachers. The rapid change in demand in the labor market around the world in recent years is due to the fact that employers focus not only on his knowledge, skills and abilities, but also on the personal qualities of the teacher. Professional and modern pedagogical ideas are implemented in the formation of professional skills of teachers. Therefore, the teaching staff should not remain the only source of knowledge for the student; they should be the organizer, consultant of the student's independent work process, and an active participant in the educational process. Based on the requirements of the time, the issues of training in-demand personnel striving for innovation, possessing professional knowledge, skills and abilities are relevant.



The astronomy course teaches students the movements of celestial bodies, their physical nature using astrophysical methods, as well as the astronomical picture of the universe based on the processes and phenomena associated with them. It also aims to develop students' knowledge of the basics of space flight, as well as skills in working with basic astronomical instruments.

The astronomy course is organized by students according to a curriculum enriched with the results of relevant scientific research, has a methodological basis, based on the content of which it becomes possible to implement the general educational and educational and developmental objectives of the astronomy course in a systematized and holistic form.

In addition, it is important to study the basics of an astronomy course, given that astronomy in the 21st century is developing rapidly, as well as the need to provide knowledge about its fundamentals (including the evolution of point nebulae in the solar corona, exoplanets and their discovery, the discovery of gravitational waves, black holes, etc.).

Taking this into account, pedagogy becomes important in the study of astronomy courses in higher educational institutions at two levels, in the formation of graduates' knowledge, skills and abilities, in the study of teaching in accordance with the requirements of state educational standards, in the formation of students' interest in scientific research.

Pedagogy makes a great contribution to the development of scientific research work, when in higher educational institutions the course of astronomy is taught in interlude with the academic subject of General Physics, Higher Mathematics, and Information Technology. The teaching of this course is aimed, first of all, at developing students' scientific worldview and increasing their interest in research work. The content of the astronomy course teaches students to look at the course and nature of all astronomical phenomena from a dialectical point of view, forming a holistic, scientific astronomical picture of the Universe [1].

## LITERATURE ANALYSIS AND METHODOLOGY

The astronomy course also equips students with the ability to navigate according to the positions of celestial bodies (stars, sun and moon), ideas about the solar system, the structure of the universe, scientific theories of the origin and evolution of celestial bodies, and knowledge related to their physical nature. This subject is aimed at developing students' skills in using star maps, including sliding sky maps, star atlases and globes, as well as school astronomical instruments (binoculars, telescope, theodolite, etc.), with the help of which they can observe celestial bodies (the Sun, Moon, planets and stars) and apply them in teaching activities. At the same time, the content of the astronomy course also involves the formation of logical and methodological knowledge in students, the development of their ability to independently work with literature, creative and logical thinking skills [2].

Based on this goal, the program of the proposed astronomy course sets itself the task of forming in students this necessary knowledge, skills and abilities in the basics of astronomy [3].

The astronomy course equips students with knowledge about celestial coordinates and the movement of celestial bodies, determining the geographical coordinates of a place by the height of the pole of the Universe and the apparent movements of celestial bodies, the basics of time measurement and calendars. Also in this section, students develop knowledge about the



heliocentric system of the structure of the Universe, calculated from the main ideas of the course, the ability to measure distances to celestial bodies and calculate their linear dimensions, about Kepler's laws and methods for calculating the masses of celestial bodies on their basis [4].

The astronomy course program in pedagogical higher education institutions is also aimed at strengthening the astrophysical content of the course, taking into account the dramatic development of astrophysics in the following decades. The content of the program also included information about the methods and devices of modern wide-wave astronomy, about the role of the astronomy course in the development of physics, technology, astronautics, as well as about the study of celestial bodies using rocket and space technology in the development of science and the national economy.

The astronomy course ends with concepts and theoretical knowledge of the physical nature of solar system bodies, stars and their large-scale structures—star clusters and galaxies. The content of work with students under the guidance of a teacher and independent astronomical observations, calculation of such quantities as the magnification and brightness of school telescopes, determining the latitude of a place by the height of the pole of the Universe, studying the spectra of stars, the laws of the red shift of galaxies are also included in the program. Also in the program, during the course reading, for each section there is a list of demonstrations that need to be carried out. This allows you to select the necessary tools for organizing and conducting demonstrations, as well as the location of the demonstration by the teacher himself. Organizing some demonstrations, whenever possible, of computer software products or astronomy ventures, as described above, ensures their effectiveness [5].

## RESULTS

Some of its astronomical invariant parts, studied in the context of an astronomy course, are based on such important ideas as integrity, consistency, variability:

1. The idea of integrity. It is aimed at developing ideas about the simplest and most general, comprehensive laws of motion of matter in the Universe, knowledge about the material unity of the Universe and its physical picture. This idea, aimed at the formation of such ideas and ideas about astronomy, is manifested in the study of the evolution of cosmic objects and the Universe, considered as a single whole.
2. The idea of consistency (continuity). This idea implies predictive training received by students of higher educational institutions of general secondary education, secondary specialized education and pedagogy in integrative courses “the world around us”, “natural sciences”, “Astronomy”, “astronomy course”, as well as knowledge obtained from other scientific and natural disciplines, as well as the phased construction of the course.
3. The idea of variability. This idea, taking into account the abilities, interests and capabilities of students, involves organizing the assimilation of educational material in at least two stages: 1) minimal (basic stage) and 2) in-depth in the areas of scientific research, i.e., taking into account the fact that its main the content is presented as developed in the system of fundamental



concepts of the astronomy course, and then the curriculum is formed around them. materials are summarized.

## DISCUSSION

Thus, on the basis of pedagogical higher educational institutions, students will be equipped with astronomical knowledge and their interest in research work.

From sections of the physics course taught in parallel with astronomy, materials such as the laws of radiation, the speed of light, its pressure, the structure of the atom and nucleus, the wave scale of electromagnetic radiation, elementary particles and invisible radiation and methods of their registration, spectral analysis and its applications, thermonuclear synthesis will become the basis for studying the section of astrophysics.

In the aspect of worldview, when generalizing and assimilating the achieved astronomical knowledge, matter, its main manifestations and forms of life, the laws of dialectics and their universal nature are studied.

## CONCLUSION

The teacher needs to make extensive use of the significant humanitarian potential of the astronomy course. The content of the astronomy course in this aspect should not forget about the worldview of students, that it is a powerful tool in the formation of their humanistic ideas. It is necessary to make students understand that our dwarf planet-Earth, where the living conditions of man and living being in the Universe are natural, on the scale of the entire being, the Universe, is the rarest and rarest phenomenon and, therefore, the mission of man who came into the world to to live and function on it is aimed only at goodness, kindness, humanity. Because the astronomy course is a science with rich motivational content that can evoke emotions and improve the mentioned human qualities.

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