

### Methods for the Systematic Formation of Biology Teachers as Specialists

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#### ANNOTATION

*This article provides information on the methodology of teaching biology, the content of biological sciences, the forms of its teaching, methods and techniques for the interconnected administration of funds. It is also explained that the main task of the methodology of teaching biology is to provide students with in-depth knowledge of the biological sciences, the content of academic subjects, educational forms, tools and methods.*

At the present stage of the socio-economic development of society, fundamental changes have been made to the goals of personal development, which to a large extent led to the emergence of new categories, methodological approaches and goals in many areas of activity. Such concepts as new politics, new thinking, new educational paradigm are firmly rooted. Higher pedagogical education, in particular its professional and methodological block, as an integrating field of training specialists who will have a direct impact on the younger generation, cannot remain aloof from the above trends. Thus, it is legitimate to pose the question: do we need a new methodology for teaching biology in pedagogical universities?

Decree of the President of the Republic of Uzbekistan "On approval of the Concept for the development of the higher education system of the Republic of Uzbekistan for the period until 2030" dated October 8, 2019 No. UP-5847 is aimed at further improving the educational process, curricula and programs of higher education based on the widespread use of the latest pedagogical technologies and teaching methods, qualitative renewal and introduction of modern forms of organization of the scientific and educational process in order to steadily increase the level and quality of professional skills of teaching staff.

The most important educational task of higher education today is to prepare a personality that

adequately meets the requirements of the era of new information and pedagogical technologies, the most important function of which is the search, appropriation, analysis, processing and systematization of information. A fundamentally new approach to solving the problem of forming students' systemic thinking is opened up by modern pedagogical and information technologies, which, penetrating the education system, become active components of the learning process and, transforming the traditional principles of didactics, change the structure, organization, forms and methods of teaching.

The subject of biology can become a conductor of ideas and educational opportunities, introducing students to integrative, general scientific ideas, concepts, approaches, methods, which could qualitatively change the basis of graduates' thinking, focused on scientifically based integration of the necessary information. Biology, as an academic discipline of the natural science cycle, sets as the most important goal of the subject the formation of students' systemic thinking, which contributes to the creation of their understanding of a holistic picture of the world.

The modern picture of the practice of teaching biology in pedagogical universities of the Republic of Uzbekistan, supplemented by an analysis of scientific and pedagogical literature, leads us to the conclusion that consistency should not only be an integral property of students' teaching and thinking, but also be present in the process of applying modern pedagogical technologies.

In the fundamental study of J. O. Connor "Systems thinking", this concept is defined as a way of thinking in which the focus is on the relationship between parts, the interaction of which forms a purposeful whole.

Systemic thinking is a type of thinking that is characterized by a holistic perception of objects and phenomena, taking into account their interconnections.

Systems thinking allow you to navigate in the growing flow of knowledge, makes it possible to selectively choose knowledge and integrate it to form an indicative basis for solving problems with a new subject of study and a way to solve them. The system approach changes the method of highlighting the subject, the research program, the structure of knowledge about it, the principle of their relationship, the logic of the cognitive movement in the subject, the method of constructing a theoretical picture.

It should be remembered that, as noted by many great didacticists and philosophers of the past (Plato, Aristotle, J.A. Comenius, I.G. Pestalozzi, A. Diesterweg, K.D. cannot be given or communicated. Anyone who wants to learn something must achieve this by his own activity, his own strength, his own effort.

This is possible within the framework of a specially organized educational process, where independent work acts as a means of organizing cognitive activity, as the leading form of educational activity, ensuring the assimilation of fundamental, methodological knowledge, building a student's "thinking tool". For this, the development of skills is very important. (Tab.1)

**Table 1 Formation of skills**

| <b>Stage</b>                    | <b>Psychological structure</b>  |
|---------------------------------|---|
| <b><i>I - initial skill</i></b> | Awareness of the purpose of the action and the search for ways to perform it, based on previously acquired (usually everyday) knowledge and skills; activities are done through trial and error |
| <b><i>II - not enough</i></b>   | Knowledge about how to perform an action and the use of previously acquired skills that are not specific to this activity   |

|                                    |  |
|------------------------------------|--|
| <i>skilful activity</i>            |  |
| <i>III - separate about skills</i> | A number of individual highly developed skills required in various types of activities (for example, the ability to plan one's activities, organizational skills, etc. |
| <i>IV - highly developed skill</i> | Creative use of knowledge and skills in this activity; awareness of not only the goal, but also the motives for choosing, ways to achieve it                           |
| <i>V - skill</i>                   | Confident creative use of various skills and knowledge   |

Educational and cognitive tasks. We and the teachers participating in the experiment formed the ability of students to solve the following types of educational and cognitive tasks aimed at developing the systemic thinking of students:

- compilation of chronological, synchronistic and thematic tables;
- work with a map of a) biological concepts, b) biological systems, c) biological scientific theories;
- Selection and grouping of facts on a cross-cutting problem.
- compilation of a classification of various phenomena and facts from the history and development of biology as a science;
- systematization of one's attitude to biology as a science and subject - positive and negative points, formulating a view on the system of teaching the subject, expressing opinions on its improvement;
- identification and comparison of essential common and distinctive features, properties of various biological phenomena;
- determination of the systemic links of biology with other related sciences - ecology, zoology, anatomy, medicine, etc.;
- highlighting and describing the scientific, moral and aesthetic aspects of biology;
- systematic planning of the search for the necessary information with the allocation and fixation of the most significant facts and problems;
- Construction of rating scales, graphs of the degree of significance of information, etc.

Thus, systems thinking play an important role in the preparation of future biology teachers. The effectiveness of its formation depends on the use of adequate pedagogical methods and technologies that develop in students the ability to comprehensively cover phenomena, streamline semantic structures.

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