



COMPETENCE-BASED APPROACH IN TEACHING BIOLOGY AT SCHOOL

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Abstract

The article examines the competence-based approach in teaching biology at school. It focuses on the development of students' key competencies such as critical thinking, problem-solving, research skills, and the ability to apply biological knowledge in everyday life. The competence-based approach promotes active learning, creativity, and independent thinking through practical and interactive teaching methods. The article also emphasizes the role of modern educational technologies in enhancing students' motivation and deep understanding of biological concepts.

Keywords: Competence-based approach, biology teaching, critical thinking, research skills, active learning, creativity, educational technologies.

INTRODUCTION

The concept of "competence" implies the acquisition of knowledge and experience to such an extent that they allow a person to make judgments, express opinions, and be well-informed in a certain field or on a specific issue. The understanding of "competence" can be viewed as the ability to establish connections between knowledge and a given situation, or more broadly, as the capacity to identify and determine a sequence of actions for solving a problem. In pedagogical science, scholars interpret the concept of "competence" in different ways.



LITERATURE REVIEW

A.V. Khutorskoy defines the term “*competency*” as a set of interrelated personal qualities — knowledge, skills, abilities, and modes of activity — while “*competence*” refers to an individual’s mastery of a corresponding competency. The author also notes that competence is always personalized and characterized by the individual qualities of each student.

N. M. Bibik considers the term “competence-based approach” as the orientation of the educational process toward the formation and development of key and subject-specific competencies of an individual [1].

According to I.A. Zimnyaya, “it is the competence-based approach that reflects the content of education, which is not limited to a learner-centered direction but provides for the acquisition of holistic experience in solving life problems and fulfilling key functions and social roles” [4].

V.V. Kraevsky defines competence as “a specially organized set of knowledge, skills, abilities, and attitudes acquired in the process of learning and serving as a performance-activity characteristic of education” [7].

DISCUSSION AND RESULTS

The competence-based approach is aimed at enabling students to acquire solid and functional knowledge, productive skills, and expanded reflection, as well as forming a positive emotional and value-based attitude toward learning and future professional activities.

Mastering subject competence in the school subject “Biology” ensures the formation of strong and deep knowledge about the structure, functioning, ecology, and evolution of biological systems at various levels of organization. It also contributes to the development of students’ creativity and the achievement of the goals of specialized biological education. Students acquire a scientific understanding of living nature based on a system of biological knowledge, comprehension of research methods, and awareness of the interrelation between the development of methods and theoretical generalizations in biological science [3].

Furthermore, the competence-based approach in teaching biology fosters the development of cognitive interests, intellectual abilities, and creative potential of



senior students through experimentation, problem-solving, and modeling of biological processes. It enables learners to independently search for and analyze biological information, describe modern discoveries in biology, and acquire knowledge about maintaining their own health and the rational use of natural resources.

The approach also promotes pre-professional preparation for careers that require a profound understanding of biological sciences, such as medicine, agriculture, and environmental protection. In addition, it enhances self-education, experimental, and analytical skills, as well as the ability to apply biological knowledge in real-life situations. Ultimately, this approach prepares students for further professional education and future career development.

Subject biological competence includes several key components: operational, research, and cognitive competencies.

Logical-semantic competence plays a crucial role in ensuring the correctness, efficiency, and accuracy of thinking, as well as the ability to build a logical sequence of elements within a system. A student with well-developed logical-semantic competence possesses a clear system of biological concepts, understands their integrative value, and can establish both interdisciplinary and intrasubject connections [4].

Such a learner demonstrates strong logical thinking, applies knowledge and experience to solve real-life problems, provides well-reasoned arguments and conclusions, distinguishes proven statements from unproven ones, generalizes, compares, and formulates hypotheses. Moreover, they can express thoughts clearly, define biological terms accurately, and use them to explain biological phenomena and processes. They are also capable of analyzing and synthesizing large volumes of factual data, identifying relationships and development trends within biological systems, and drawing scientifically grounded conclusions.

To develop students' subject competencies in biology, it is necessary to improve the existing teaching methodology. The effectiveness of biology education is ensured by the following psychological and pedagogical conditions:

taking into account the individual characteristics of students, their cognitive interests, and professional orientation;



enriching the methodological toolkit with methods, techniques, tools, and forms of teaching that stimulate independent cognitive activity;
focusing on a research-based approach to learning biology as a key means of forming subject competencies;
creating a developmental educational environment;
providing conditions for successful learning;
using productive teaching technologies and methods in response to the growing volume of information resulting from the rapid development of biological science [8].

One of the most effective technologies that helps form key competencies is the technology of critical thinking, which represents a system of techniques aimed at developing the ability to express one's own thoughts, form personal opinions, solve problems, work in groups, and build constructive relationships with others. The development of critical thinking in students during biology lessons depends on several factors:

Time. Students need sufficient time to collect, process, and present information on a given problem. Such work may take place before, during, or after the lesson, requiring constant inquiry and mental engagement [5].

Clear goal setting. Students should clearly understand that they are expected to express their ideas, hypotheses, and opinions in various forms and without limitation.

Communication. By exchanging opinions, students recognize their significance and contribution to problem-solving.

Respect for others' opinions. Learners must develop the ability to listen and appreciate others' perspectives, understanding that finding an optimal solution requires hearing all viewpoints. This process allows them to form their own well-reasoned opinions, which can be refined through "collective wisdom" as a result of class discussions or problem-based learning [2].

It is difficult to imagine a modern lesson without the use of project-based learning. Project activities help reveal students' potential, abilities, and awareness of their personal resources. Through project work, students strive to acquire the necessary information and knowledge while viewing their skills from a new perspective. They encounter new, non-standard problems requiring creativity,



strong willpower, and a high degree of self-realization. The result of such activities is a qualitative transformation in the student's psychological and personal structure.

By enabling students to grasp the internal logic of the subject and by carefully selecting learning material based on principles of practical relevance and functionality, teachers enhance the role of independent learning.

In today's world, knowledge and skills alone are insufficient for success. It is also essential to have self-confidence, decision-making ability, teamwork skills, and the capacity to focus on specific goals, identify problems, make assumptions, and independently or collaboratively search for solutions. Students must also learn to take responsibility for the outcomes of their actions [8].

Upon mastering a topic, students are able to:

explain phenomena in living nature using scientific thinking;

independently or collaboratively investigate living systems;

analyze and identify environmental problems;

understand the importance of biology for sustainable development.

Furthermore, they develop a sense of responsibility for the rational use of natural resources and the ecological well-being of their local community, their country, and the world. They also demonstrate readiness to participate in solving environmental issues and contribute to improving the ecological state of society [4].

CONCLUSION

Teaching biology based on the competence-based approach ensures the formation of students' key and subject-specific competencies necessary for successful learning and real-life application. This approach shifts the focus from memorizing facts to developing analytical thinking, research skills, creativity, and independent decision-making. By using interactive methods, research projects, and critical thinking strategies, students become active participants in the learning process rather than passive recipients of knowledge.

Creating a developmental educational environment, applying productive pedagogical technologies, and considering students' individual characteristics contribute to forming a well-rounded personality capable of solving biological



and environmental problems responsibly. Thus, the competence-based approach in biology education not only enhances students' scientific literacy but also nurtures their sense of responsibility towards sustainable development and the preservation of nature.

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