

## INTEGRATION OF SUBJECTS IN DEVELOPING STUDENTS' BIOLOGICAL COMPETENCIES

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**Abstract:** *This article explores the role of interdisciplinary integration in developing students' biological competencies through a synergetic approach in the educational process. The synergetic approach is considered as an effective methodological framework that views the learning process as a self-organizing system, where students' knowledge, skills, abilities, and personal qualities are developed in interconnection and harmony. Particular attention is given to the integration of biology with other natural sciences, social sciences, and applied disciplines in order to enhance students' scientific thinking, problem-solving abilities, and practical application of biological knowledge.*

**Keywords:** *synergetics, system, structure, subject-related competence, moral competence, pedagogical mastery, competence, ability, skill, synergetic approach.*

### INTRODUCTION

One of the important characteristics of globalization processes is determined by the development of students' subject-related competencies based on modern educational trends. The development of students' subject-related competence based on a synergetic approach in education is considered one of the new directions. In this approach, the competence of the student's personality is regarded as a system composed of self-organizing structures during the process of becoming an intellectually developed individual. Thus, the synergetic approach implies the formation of specific systems or structures in the process of developing students' subject-related competencies. From the perspective of subject-related competence, developing students' knowledge level based on a synergetic approach involves the systematic and step-by-step formation and development of their subject competence. The study emphasizes the importance of a competency-based approach in modern education, highlighting the development of key, subject-specific, and interdisciplinary competencies. Through systematic and step-by-step learning activities, students are encouraged to actively participate in the learning process, think independently, and engage in creative inquiry. The integration of subjects within a synergetic framework contributes to improving the effectiveness of biology education, increasing students' motivation, and preparing them for real-life situations and future professional activities. The findings suggest that the application of a synergetic and interdisciplinary approach in biology teaching creates favorable conditions for the holistic development of students' scientific

competence and supports the formation of competitive, intellectually developed individuals. Without understanding the structure, content, and characteristics of students' activities, it is impossible to purposefully form their subject-related competencies, knowledge, skills, abilities, and personal qualities. Such an approach to studying students' activities is also methodologically necessary. A methodological approach to the student's knowledge level and personality at the current stage of pedagogical science development requires analysis from the standpoint of activity and personality. At the same time, the chosen systemic approach makes this both a practical and inevitable necessity. In our society, improving and reforming the education system, its modernization, and the application of innovations in the educational process require a competency-based approach to education

**Competency-Based Approach in Education .** The competency-based approach in education is understood as teaching students to effectively apply the various types of skills they have acquired in situations encountered in their personal, professional, and social lives. Education based on a competency-based approach is aimed at developing students' ability to apply the knowledge, skills, and abilities they have acquired in their personal lives, future professional activities, and social interactions. After graduating from general secondary education institutions, students should be prepared to continue their education within the system of continuous education and to enter personal, social, economic, and professional relationships in their independent lives.

To take their place in society, solve problems encountered in this process, and most importantly, remain competitive in their field and profession, they must possess the necessary key competencies. It is known that general education institutions are tasked with forming key competencies in students through the educational process, including communicative competence, information-handling competence, self-development competence as an individual, social and civic competence, general cultural competence, mathematical literacy, and competence in being informed about and using scientific and technological innovations.

**Types of Competencies** In a competency-based approach, educational goals are focused on students' self-awareness, understanding ways to achieve learning objectives in the educational process, activating students' learning and cognitive activities, and supporting their adaptation and socialization into society and independent life through personal self-development. Competencies are classified into levels according to the methods of their formation and their importance in an individual's life. Key competencies are competencies that create a foundation for the overall development of the student's personality. Specific competencies are

competencies formed exclusively through the biology subject. Analysis of the literature shows that competencies formed in students are divided into three levels:

1. General competencies - competencies formed through the content and teaching process of all subjects included in the general education curriculum.

2. Specific (biological) competencies- competencies formed in the biology teaching and learning process based on knowledge, skills, and abilities regulated by the State Educational Standards.

3. Interdisciplinary competencies- competencies formed through the implementation of interdisciplinary connections in teaching social-humanitarian, natural-mathematical, and applied subjects.

General competencies are fundamental competencies that are formed through the content and teaching process of all subjects included in the general education curriculum. These competencies play a crucial role in the overall development of a student's personality and serve as a foundation for lifelong learning. General competencies include communication skills, critical and creative thinking, information literacy, self-development, social responsibility, and civic awareness. They enable students to effectively interact with others, adapt to changing social conditions, and actively participate in social and professional life. The development of general competencies is not limited to a single subject; rather, it is achieved through the integrated influence of all educational disciplines and pedagogical activities. Specific (biological) competencies are competencies that are formed directly within the process of teaching and learning biology. These competencies are based on knowledge, skills, and abilities regulated by the State Educational Standards and are closely related to the content of biological science. Specific biological competencies include understanding biological concepts, processes, and systems; applying biological knowledge to explain natural phenomena; conducting observations and experiments; analyzing biological data; and making scientifically grounded conclusions. The formation of these competencies helps students develop scientific thinking, environmental awareness, and a responsible attitude toward nature and living organisms. Biological competencies also prepare students to solve practical and theoretical problems encountered in everyday life and future professional activities related to natural sciences. Interdisciplinary competencies are formed through the implementation of interdisciplinary connections in teaching social-humanitarian, natural-mathematical, and applied subjects. These competencies reflect students' ability to integrate knowledge and skills acquired from different disciplines and apply them in complex, real-life situations. Interdisciplinary competencies promote holistic thinking, problem-solving, and the ability to view issues from multiple perspectives. For example, the integration of biology with chemistry, physics, geography, mathematics, and social sciences

enhances students' understanding of natural processes and their impact on society. The development of interdisciplinary competencies supports the synergetic approach in education, where learning is seen as an interconnected and self-organizing system. As a result, students become more flexible, innovative, and capable of adapting to modern scientific, technological, and social challenges.

A student's competence in biology is the ability to use the knowledge, skills, and abilities acquired in biology to solve practical and theoretical problems encountered in everyday life and to apply them in practice. Conclusion In conclusion, developing key, specific, and subject-related competencies in harmony through teaching biological sciences in general secondary schools based on a synergetic approach creates a foundation for students' independent thinking and creative inquiry. It also plays an important role in improving the effectiveness of knowledge acquisition.

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