



DEVELOPING PROFESSIONAL COMPETENCE THROUGH DIGITAL EDUCATIONAL TECHNOLOGIES IN BIOLOGY CLASSES

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Abstract: *This article examines the relevance of preparing future biology teachers for innovative professional activity. It emphasizes that the effective and widespread use of innovative technologies, information and communication technologies, and modern pedagogical methods in the process of teaching biology is a current requirement of modern education.*

Keywords: *professional competence, biology education, competency-based approach, digital pedagogy, methodological training.*

Introduction

Modern approaches to the modernization of education and the introduction of new generation standards define priority goals and objectives. Achieving these goals requires ensuring a high level of education quality. Today, society needs graduates who are capable of self-development and self-realization, who can effectively apply acquired knowledge, navigate independently in the modern information space, work productively, establish cooperation, and adequately assess their achievements.

The labor market conditions have changed significantly. In a rapidly changing world, the education system must develop such qualities as professional universality, that is, the ability to change fields of activity and methods. At the same time, globalization and informatization processes are intensifying [1].



The main outcome of education is now determined not only by a system of knowledge, skills, and abilities, but also by a set of competencies that enable a person to effectively solve various problems. The competency-based approach prioritizes the ability to solve problems arising in cognition, interpersonal relations, professional activity, and personal self-determination.

To prepare such learners, teachers must use modern educational technologies in school education [2]. New technologies create opportunities for developing personal potential and ensuring the success of graduates. One of the key tasks of modern education is to introduce methods that encourage students not only to acquire knowledge and skills, but also to develop creativity, engage in independent learning, and apply knowledge in real-life situations.

Due to ongoing changes in education, there is a growing need to improve the quality of biology teaching and align it with modern competency-based requirements. However, traditional approaches alone are insufficient to effectively address these challenges [3].

Materials and Methods

To address this issue, it was necessary to review and analyze pedagogical tools and approaches. Based on the study of scientific and methodological literature [4] and generalization of advanced pedagogical experience, the following pedagogical idea was formed: improving the quality of biology education at school is achieved through the use of modern pedagogical technologies (MPT).

These technologies are aimed at:

- forming skills necessary for learning biology;
- increasing learning motivation;
- developing analytical and critical thinking;
- forming universal learning actions;
- activating cognitive activity through a differentiated approach;
- preserving and strengthening students' health.



Objective: to introduce modern educational technologies that improve education quality, increase students' motivation, develop functional literacy and key competencies, and enhance their potential abilities.

Tasks:

- selection of modern pedagogical technologies to improve biology education quality;
- development of teachers' professional competence and methodological culture;
- formation of key competencies in teachers;
- involvement of teachers in designing and monitoring individual learning trajectories;
- implementation of student-centered, health-preserving, differentiated, and information technologies [5].

Biology as a subject provides broad opportunities for applying modern pedagogical technologies. In practice, the following technologies were tested and partially implemented:

- health-preserving technologies;
- differentiated instruction technologies;
- information technologies;
- project-based learning technology.

Health-Preserving Technologies

The use of health-preserving technologies creates a trusting and supportive learning environment, promotes personal development, and reduces stress. These technologies help prevent both psychological and physical strain in students.

There are several principles for organizing such lessons:

1. Proper lesson organization

It is essential to consider health standards and learning motivation. A lesson should be engaging.



As noted by P.Ya. Galperin: *“In a well-organized learning environment, even young children can study 10–12 hours a day without harming their health. What destroys children’s health is boredom”* [6].

Interest can be developed through:

- attractive presentation of material;
- teacher’s personality;
- creating a cooperative learning environment.

2. Considering perception channels

Cognitive styles depend on brain hemisphere dominance:

- Left-hemisphere dominant learners prefer logical and analytical thinking;
- Right-hemisphere dominant learners prefer imagery and creativity.

Accordingly, teaching methods should be adapted to visual, auditory, and kinesthetic learners.

3. Considering work capacity zones

Students’ efficiency varies throughout the day and week depending on biological rhythms [7].

4. Distribution of cognitive load

Lesson efficiency changes over time:

- 5–25 minutes — 80%;
- 25–35 minutes — 60–40%;
- 35–40 minutes — 10%.

Lessons should be structured to avoid fatigue.

Psychological Climate in the Lesson

Each lesson should begin with psychological preparation. A positive emotional environment enhances learning effectiveness. Teachers may use techniques such as mood check-ins and emotional feedback activities [8].

Conclusion



There are no strict limitations in applying modern educational technologies. The Law on Education allows teachers to independently select teaching methods as long as they comply with pedagogical principles.

Modern technologies increase student motivation, support intellectual development, and improve educational outcomes. They also contribute to developing key competencies and functional literacy.

Teachers must master modern teaching tools to ensure students' right to quality education.

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