ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-6

PEDAGOGICAL FOUNDATIONS OF THE COMPETENCY-BASED APPROACH IN BIOLOGY EDUCATION

Khakberdiyeva Shoira Tursunaliyevna
Acting Associate Professor of the
Department of "Chemistry and Biology" of the
Termez State Pedagogical Institute,
E-mail: xakberdiyevashoira81@gmail.com

Annatation. This article analyzes the theoretical and methodological foundations of the competency-based approach in biology education. The importance of the competency-based approach in teaching biology, and its role in fostering students' biological literacy, ecological culture, scientific worldview, and practical skills, is highlighted. Additionally, the impact of using modern pedagogical technologies, digital educational tools, and innovative methods in biology education on the development of competencies has been analyzed. Based on the research findings, recommendations have been developed for improving the teaching of biology using a competency-based approach.

Keywords: biology education, competency, competence, competency-based approach, biological literacy, innovative technologies, ecological competency, educational quality, teaching process.

Аннотация. В данной статье анализируются теоретические и методологические основы компетентностного подхода в биологическом образовании. Подчеркивается важность компетентностного подхода в преподавании биологии и его роль в формировании у учащихся биологической грамотности, экологической культуры, научного мировоззрения и практических навыков. Кроме того, проанализировано влияние использования современных педагогических технологий, цифровых образовательных инструментов и инновационных методов в биологическом образовании на развитие компетенций. На основе результатов исследования сформулированы рекомендации по совершенствованию преподавания биологии с использованием компетентностного подхода.

Ключевые слова: биологическое образование, компетенция, компетентностный подход, биологическая грамотность, инновационные технологии, экологическая компетентность, качество образования, учебный процесс.

Introduction. The globalization processes taking place in the world education system, the rapid development of science and technology, and the modern demands of the labor market are creating the need to fundamentally renew the content of education. Today, the primary goal of education is not only to impart theoretical knowledge to students but also to develop their competencies to apply that knowledge in real-life situations.

In the education system of the Republic of Uzbekistan, the implementation of a competency-based approach has also been identified as one of the priority tasks. In particular, the competency-based approach in teaching biology ensures that students scientifically understand the relationships between nature and society, analyze biological processes, and approach environmental problems responsibly.

The distinctive feature of the science of biology is that it studies living organisms, their structure, life processes, evolution, and their interactions with the environment. Therefore, integrating

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

theoretical knowledge with practical activities is crucial in biology education. A competency-based approach is an effective pedagogical mechanism that ensures this very integration.

Research Methodology. The research process utilized the methods of pedagogical observation, analysis of scientific-pedagogical literature, comparative analysis, a systematic approach, and generalization. Additionally, national and international experiences in biology education were studied, and the practical outcomes of the competency-based approach were analyzed.

The Concept and Essence of the Competency-Based Approach

In pedagogy, the concept of "competency" refers to the set of knowledge, skills, qualifications, and personal qualities necessary for an individual to successfully perform a specific activity. Competence, on the other hand, is the ability to apply these competencies effectively in real-life situations.

The competency-based approach is a pedagogical model focused not on learners memorizing knowledge, but on applying it in practical activities. This approach is based on the following principles:

-The practical orientation of education;
-person-centered education;
-development of independent learning;
-the formation of critical and creative thinking;
-ensuring interdisciplinary integration;
-orientation toward solving real-life problems.

In biology, the competency-based approach helps students apply biological knowledge in daily life, develop a healthy lifestyle, analyze environmental problems, and master elements of scientific research.

Literature Review. The competency-based approach began to be widely used in the world's education systems in the late 20th century. The theoretical foundations of this approach are reflected in the educational standards developed by the European Union, UNESCO, and the OECD. The competency-based education model is significant for its focus on integrating students' theoretical knowledge with practical application.

Among foreign scholars, J. Raven has described competence as an individual's ability to perform a specific activity effectively. In his opinion, competence is formed as a result of the integration of knowledge, skills, and values. A. Khutorskoy evaluates the competency-based approach as a pedagogical system that ensures a person's readiness for practical activity.

In modern research in biology teaching methodology, the competency-based approach has been shown to be an important factor in developing biological thinking, a scientific worldview, and ecological culture in students.

In the scientific works of Uzbek scholars N. Sayidahmedov, R. Mavlonova, O. Tolipov, M. Usmonboyeva, and other pedagogical researchers, the theoretical and practical aspects of competency-based education are extensively covered. Their research places special emphasis on developing students' independent thinking and problem-solving competencies based on modern pedagogical technologies.

Research Results. During the study, the effectiveness of organizing biology instruction based on a competency-based approach was examined. Analyses showed that in lessons organized using traditional teaching methods, students are primarily limited to acquiring theoretical knowledge. In

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

lessons organized based on a competency-based approach, students have the opportunity to connect knowledge with practical activities.

In biology classes, students' biological competencies have been significantly developed as a result of using project work, laboratory sessions, problem-based assignments, and virtual laboratories.

Discussion of the Results. The results obtained confirmed that teaching biology using a competency-based approach significantly improves the quality of education. In particular, it was determined that laboratory work and research-based methods are crucial for developing students' skills in independent thinking and scientific inquiry.

Today, the development of the science of biology is linked to the rapid advancement of fields such as biotechnology, genetics, ecology, and molecular biology. Therefore, the use of modern information and communication technologies is considered necessary for developing students' biological literacy.

Virtual laboratories and digital platforms expand opportunities for studying biological objects and serve to model complex biological processes. This, in turn, increases the effectiveness of competency-based education.

Furthermore, teaching biology in connection with environmental issues fosters a responsible attitude toward nature in students. As a result, ecological competencies are developed, and knowledge of the principles of sustainable development is reinforced.

Recommendations for Improving the Competency-Based Approach

The following recommendations have been developed to further develop the competency-based approach in biology education:

1. Widespread implementation of research-based educational technologies in biology lessons.
2. Expand the use of virtual laboratories and digital platforms.
3. Organize projects aimed at increasing students' ecological and biological literacy.
4. Integrate the STEAM approach into biology education.
5. Developing methodologies for using artificial intelligence and digital educational tools.
6. Improving modern criteria for competency assessment.
7. Developing teachers' digital pedagogical competence.

Conclusion. In biology education, the competency-based approach is considered one of the priority directions of the modern education system. This approach serves to integrate students' biological knowledge with practical activities, develop their scientific thinking, and build competencies for solving real-world problems.

Research results have shown that organizing the biology curriculum based on a competency-based approach is highly effective in developing students' biological literacy, research skills, ecological culture, and independent thinking skills.

Therefore, the use of modern pedagogical technologies, innovative methods, virtual laboratories, and digital resources in the biology education process should be considered an important factor in improving the quality of education. The competency-based approach, by integrating the theoretical and practical aspects of biology, serves to educate future generations of competitive, environmentally conscious, and scientifically minded young people.

REFERENCES USED

1. Tolipov O‘., Usmonboyeva M. Pedagogik texnologiyalarning tatbiqiy asoslari. – Toshkent: Fan, 2019. – 280 b.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

2. Tolipov O‘., Sharipov Sh. Umumiy pedagogika. – Toshkent: Iqtisod-Moliya, 2021. – 312 b.
3. Mavlonova R., To‘rayeva O., Xoliqberdiyev K. Pedagogika. – Toshkent: O‘qituvchi, 2020. – 528 b.
4. Sayidahmedov N. Yangi pedagogik texnologiyalar nazariyasi va amaliyoti. – Toshkent: Fan va texnologiya, 2018. – 172 b.
5. G‘ofurov A.T., Fayzullayev S.S. Biologiyani o‘qitish metodikasi. – Toshkent: Tafakkur, 2020. – 356 b.
6. Eshonqulov O‘. Biologiya ta’limida zamonaviy pedagogik texnologiyalar. – Toshkent: O‘qituvchi, 2021. – 198 b.
7. Jo‘rayev R.X., Ziyomuhamedov B. Ta’lim menejmenti. – Toshkent: Sharq, 2020. – 240 b.
8. Xaqberdiyeva Sh. T. (2025). Zamonaviy ilg'or xorijiy tajribalar asosida qon aylanish tizimi mavzusini o'qitishning innovatsion pedagogik texnologiyalarni qo'llash imkoniyatlari. «Maktabgacha Va Maktab Ta'limi» Jurnali, 3(12), 16–19. https://doi.org/10.5281/zenodo.17991257
9. Haqberdiyeva S. T. The role of pedagogy and psychology in improving the methodology of teaching biology based on a general approach to secondary schools //Texas Journal of Multidisciplinary Studies. – 2022. – T. 6. – C. 115-118.
10. Haqberdiyeva S. T. Improving the Teaching Methods of Biology in General Secondary Schools on the Basis of A Competency-based Approach //Academicia Globe. – 2022. – T. 3. – №. 03. – C. 132-136.
11. Tursunaliyevna H. S., Nozima A. Effectiveness of using innovative technologies in teaching the morphology of bacteria //Journal of Universal Science Research. – 2023. – T. 1. – №. 10.-c. 60-66.