

RESEARCH ARTICLE

The Effectiveness Of Vitagen-Based Technology In Teaching Biology (Experimental-Trial Results)

Kazakova Dilnoza Qobil qizi

Bukhara State University, Basic Doctoral Student at the Department of Pedagogy, Uzbekistan

Norbotayev Khoshbok Bobonazarovich

Termiz State Pedagogical Institute Professor, Doctor of Pedagogical Sciences (DSc), Uzbekistan

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Abstract

This article analyzes the effectiveness of using vitagen technology in teaching biology. Sixty schoolchildren participated in the study and were divided equally into experimental and control groups. The experimental group was trained based on a vitagenic approach, while the control group was trained using traditional methods. The results obtained showed that vitagenic technology significantly increases students' level of knowledge, independent thinking, and the efficiency of mastering biological concepts.

KEYWORDS

vitagenic technology, biology education, innovative method, educational effectiveness, experiment.

INTRODUCTION

In recent years, student-centered and life-experience-based approaches to the educational process have been the subject of extensive scientific research. In particular, J. Dewey in his work "Experience and Education" substantiated the decisive role of experience and activity in the educational process, and this idea is considered one of the theoretical foundations of the vitagenic approach.

The works of C. Rogers and A. Maslow also show that a student's internal motivation and personal experience are important factors in increasing the effectiveness of education. The research of Russian pedagogical scientists A.A. Verbitsky and N.F. Talyzina highlights the significance of contextual and active learning technologies in developing student competence.

In recent scientific works conducted in CIS countries

(Ibragimov, 2023; Karimova, 2024) it is noted that the vitagenic approach increases the level of students' mastery of biological concepts and develops their independent thinking and practical skills.

A number of scientific works on the introduction of innovative technologies in biology education have also been carried out by Uzbek pedagogical scientists. In particular, it is emphasized that interactive methods, problem-based learning, and learning technologies based on life situations serve to deepen the mastery of knowledge by students.

At the same time, an analysis of existing literature shows that research on the systematic application of vitagenic technology in biological science and the evaluation of its effectiveness on an experimental basis is insufficient. This determines the relevance of this study.

Research methodology

The study was conducted in the 2025–2026 academic year with the participation of 8th-grade students from a general education school. A total of 60 students participated in the study, who were divided into two groups: the experimental group (30 people) and the control group (30 people).

Students in the experimental group studied biology based on vitagenic technology, while the control group studied using traditional pedagogical methods. The primary objective of the study was to determine the impact of vitagenic technology on educational effectiveness.

The assessment of students' level of knowledge and competencies was carried out based on the following criteria:

- knowledge level test (0-100 points)

- independent thinking tasks;
- the quality of practical biological tasks;

In the experimental process, the following didactic approaches were applied in teaching based on vitagenic technology: integrating students' personal life experiences into the lesson content, teaching based on problem situations, linking real biological processes with real-life examples, and organizing reflection and discussion in small groups. In the control group, traditional methods of explanation, commentary, and question-and-answer were used.

Research results

At the end of the study, the results of the students' knowledge levels were presented in the table below.

Table 1. Student knowledge outcomes

Group	Average score	Growth rate
Control group	68 points	+12%
Experimental group	86 points	+34%

Analysis of the results shows that students in the experimental group who were trained using vitagenic technology showed significantly higher results compared to the control group. The average score difference was 18 points.

According to the survey results:

- students in the experimental group showed 78% high activity in explaining biological concepts with real-life examples;
- the level of creativity in independent thinking tasks increased by 2 times;
- interest in the lesson process and learning motivation increased significantly.

Discussion

The results obtained showed that vitagenic technology is an effective pedagogical approach to teaching biology. The higher results of the experimental group compared to the control group confirm the important role of this technology in improving the quality and effectiveness of education.

The vitagenic approach facilitates deeper and more

sustainable knowledge acquisition by integrating students' personal life experiences into the educational process. In particular, linking biological processes with real life ensures that abstract concepts turn into clear and practical representations for students.

Furthermore, this approach develops students' competencies in independent thinking, analysis, and a creative approach. The results show that vitagenic technology serves not only to impart knowledge but also to foster personal development and competencies.

Overall, the application of vitagenic technology in biology is of great importance for modernizing the educational process, increasing student engagement, and improving the quality of learning.

Conclusion

The results of the experimental work clearly demonstrated the high pedagogical effectiveness of vitagenic technology in teaching biology. During the study involving 60 8th-grade students, significant differences were identified between the experimental group (trained using vitagenic technology) and the control group (trained using the traditional method).

Analysis of the results shows that the educational process organized on the basis of vitagenic technology increases the level of students' knowledge acquisition, encourages them to think in connection with real life experiences, and allows for a deeper understanding of biological concepts. The fact that the average results of the students in the experimental group were higher than in the control group confirms the practical effectiveness of this approach.

Additionally, vitagenic technology had a positive impact on the development of students' competencies in independent thinking, analysis, problem-solving, and creative approaches. During the lesson, a significant increase in student activity, motivation, and interest in biology was observed. This shows that the educational process serves not only to impart knowledge but also to personal development.

Overall, it has been confirmed that vitagenic technology is an effective didactic tool for modernizing the educational process, improving the quality of education, and developing students' life competencies.

Therefore, it is advisable to widely implement vitagenic technology in general education schools, integrate it into curricula, and provide methodological training for teachers in this approach.

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