INNOVATIVE METHODOLOGICAL APPROACHES IN TEACHING CHEMISTRY IN HIGHER

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Education: Experience of Navoi State University

ABSTRACT

This article discusses innovative and effective methodological approaches used in teaching chemistry in higher education institutions. The study is based on the professional pedagogical experience of the author at the Department of Chemistry of Navoi State University. Particular attention is paid to student-centered learning, interactive methods, problem-based learning, digital technologies, and experimental-practical integration. The effectiveness of these methods in improving students' analytical thinking and subject competence is analyzed. The results of the study show that the integration of modern pedagogical technologies into the chemistry curriculum significantly increases students' motivation and academic performance.

Keywords: chemistry education, teaching methodology, innovative methods, digital technologies, higher education, student-centered learning.

INTRODUCTION

In the context of global educational transformation, the modernization of teaching methodologies has become one of the key priorities in higher education. Chemistry, as a complex and multidisciplinary science, requires special pedagogical approaches to ensure students' deep understanding and practical application of theoretical knowledge. Therefore, the improvement of chemistry teaching methodology based on modern educational technologies is an urgent task.

The main goal of this research is to analyze and implement innovative teaching methods that increase the effectiveness of chemistry education and contribute to the development of students' critical and analytical thinking skills.

METHODOLOGY

The study is based on a combination of qualitative and practical research methods, including:

- Classroom observation
- Analysis of students' academic performance
- Surveys and interviews

- Experimental implementation of new teaching techniques

During the research process, interactive strategies such as problem-based learning, project-based tasks, case studies, group discussion, laboratory simulations and digital platforms were actively applied.

Special emphasis was placed on practical experiments, which allowed students to establish a connection between theoretical concepts and real chemical processes.

RESULTS AND DISCUSSION

The implementation of innovative pedagogical methods has shown significant positive results:

- Students' interest in chemistry increased markedly
- Academic performance improved
- Analytical and critical thinking skills developed
- Independent research abilities strengthened

In addition, digital tools such as virtual laboratory simulations, multimedia presentations, and online resources helped students better understand abstract chemical concepts and complex reaction mechanisms.

The integration of interdisciplinary connections and real-life chemical applications contributed to the formation of professional competencies among future specialists.

CONCLUSION

The results of this research confirm that the use of innovative, student-centered teaching methods in chemistry education significantly enhances learning outcomes. The experience of Navoi State University demonstrates that the integration of modern pedagogical technologies, combined with traditional experimental practice, ensures the formation of deep subject knowledge and professional skills in students.

Future research may focus on the widespread implementation of digital laboratories and artificial intelligence tools in chemistry teaching.

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