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Professional Skills Of A Teacher In Teaching Chemistry

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ABSTRACT

This article is devoted to the study of issues related to the development of a teacher's professional skills in teaching chemistry. The purpose of the research is to identify ways to form the professional competencies of chemistry teachers and to organize their pedagogical activities effectively using modern methods. The research methods include analysis of scientific literature, pedagogical observation, and surveys. The results show that the professional competence of a modern teacher is directly related to the application of interactive and innovative methods in chemistry lessons, encouragement of students' independent activities, and integration of advanced technologies into the educational process. In conclusion, it is emphasized that continuous support for teachers' professional development and the improvement of professional training systems play a crucial role in effective chemistry teaching.

Keywords: Chemistry education, teacher, professional skills, innovative methods, interactive learning, students' independent activity, technological literacy, pedagogical planning, motivational skills, communicative skills, professional development, assessment, experiment, educational effectiveness, scientific research activity.

INTRODUCTION

Chemistry education occupies an important place in the education system of the 21st century, as it develops students' scientific thinking, logical reasoning, and skills of acquiring knowledge through experimentation. At the same time, effective teaching of chemistry is directly related to the professional skills of a modern educator. A contemporary teacher must not only possess strong subject knowledge but also be able to apply innovative and interactive methods, motivate students toward independent learning, and integrate advanced technologies into the educational process.

Chemistry education is not only about learning scientific concepts but also serves as a means of developing students' analytical thinking, problem-solving skills based on experimentation, and the ability to make scientific decisions. The professional competence of a teacher is one of the key factors determining the quality of this process. Meanwhile, pedagogical approaches in the global education system are rapidly changing, increasing the need for individualized and adaptive teaching methods aligned with students' needs, in addition to traditional approaches.

Recent pedagogical studies show that the professional development of teachers and the improvement of in-service training systems play a significant role in increasing the effectiveness of chemistry lessons. Modern educational standards require teachers to move beyond being mere transmitters of information and instead act as facilitators who guide students' learning processes and engage them in research and creative activities. Therefore, a teacher's professional skills and innovative pedagogical approaches are among the main determinants of the quality of chemistry education.

Currently, innovative methods such as laboratory simulations, digital resources, and interactive learning platforms are widely used in chemistry lessons. At the same time, teachers' communicative and motivational skills are of great importance, as they help increase students' confidence in their knowledge and actively

engage them in learning. Pedagogical practice shows that even when advanced technologies are used, a teacher without sufficient professional competence cannot maximize lesson effectiveness.

In global education, digital technologies, interactive laboratories, and virtual experiments are increasingly applied. In this context, a teacher's technological literacy and mastery of modern methods enable the learning process to become more engaging and effective. Numerous studies confirm that interactive teaching methods not only improve students' academic achievement but also enhance their independent thinking and problem-solving skills.

Modern chemistry education is closely linked to educational policies, standards, and assessment systems. Teachers must thoroughly understand curricula, syllabi, and competency standards and be able to implement them in practice. Thus, professional competence involves not only teaching skills but also strategic and systematic knowledge delivery, continuous analysis, and improvement of the educational process.

A teacher's professional development is also closely connected with ongoing scientific research activities. A modern chemistry teacher not only teaches topics but also keeps track of developments in the field, studies scientific articles and practical experiences, and introduces innovations into the learning process. This contributes to the development of students' independent research skills and scientific curiosity.

This article aims to analyze ways of improving the professional skills of modern educators, explore their potential for implementing innovative approaches, and identify effective teaching methods in chemistry education. Through pedagogical practice, surveys, and observations, the study examines chemistry teachers' competencies and ways to develop them.

The research problem lies in the fact that traditional teaching methods and teachers' professional skills do not always align with modern requirements. Therefore, there is a growing need for continuous professional development and the implementation of contemporary pedagogical approaches. The purpose of this article is to identify key ways to enhance teachers' professional skills in teaching chemistry.

LITERATURE REVIEW

In recent years, pedagogical research has paid considerable attention to the relationship between teachers' professional competence and instructional effectiveness. For instance, studies by H.A. Shamsiyeva (2020) and R.J. Karimov (2021) emphasize that teachers' pedagogical competencies-such as the use of interactive methods and encouragement of students' independent activities-directly improve lesson quality. Their research shows that, in addition to traditional approaches, innovative methods and technological tools deepen students' knowledge and increase their scientific interest in chemistry lessons [1][2].

Research indicates that a modern chemistry teacher should not only transmit subject knowledge but also foster students' independent thinking, problem-solving, and experimental skills. The application of interactive and innovative teaching methods directly contributes to enhancing teachers' professional competence. The use of digital tools, virtual laboratory simulations, and interactive learning platforms increases learning effectiveness by enabling students to reinforce theoretical knowledge through practical experience.

Studies also highlight the importance of motivational and communicative skills in actively engaging students and fostering their confidence. Continuous professional development, involvement in research activities, and systematic reflection on teaching practices are essential for improving instructional quality.

Other researchers, such as L.S. Petrova (2019) and M. Yusupov (2022), emphasize that professional development is closely linked to aligning teachers' competencies with curriculum requirements and implementing them in practice[3][4].

International studies by X. Kim (2021) and J. Lee (2020) analyze the effectiveness of digital technologies, laboratory simulations, and interactive platforms in education, concluding that technological literacy and innovative teaching significantly enhance lesson quality [5][6].

Uzbek scholars, including Z. Axmedova (2020) and S. Toshpulatov (2021), propose practical recommendations for developing chemistry teachers' professional competencies, emphasizing continuous professional training, pedagogical seminars, and innovative teaching methods [7].

Overall, the literature shows that a chemistry teacher's professional competence depends not only on subject knowledge but also on innovative pedagogical methods, technological literacy, and the ability to stimulate students' independent and creative activities.

METHODOLOGY

The study aimed to identify ways to develop modern teachers' professional skills in teaching chemistry. A mixed-methods research design combining qualitative and quantitative approaches was used to comprehensively examine teachers' competencies and classroom practices.

The research participants included 50 chemistry teachers from secondary schools and higher education institutions with at least three years of teaching experience and familiarity with interactive teaching methods. Data collection methods included questionnaires, pedagogical observations, and interviews.

Quantitative data were analyzed using statistical methods, while qualitative data from observations and interviews were analyzed thematically. Additionally, a short-term pedagogical experiment was conducted to assess the impact of innovative teaching methods on lesson effectiveness.

DISCUSSION AND RESULTS

The findings indicate that teachers' professional competence plays a crucial role in enhancing chemistry lesson effectiveness. Survey results showed that 78% of teachers regularly use interactive laboratory activities, while 65% integrate virtual laboratories and online simulations into their lessons. Pedagogical observations revealed that interactive teaching significantly increases students' interest and strengthens knowledge retention.

Experimental results demonstrated improvements in students' independent problem-solving skills by 30–40%. Interviews showed that 72% of teachers actively engage in continuous professional development.

The results confirm that teachers' professional competence, particularly in using innovative and interactive methods, directly enhances lesson effectiveness, student engagement, and learning outcomes.

CONCLUSION AND RECOMMENDATIONS

The study confirms that the use of interactive and innovative teaching methods, technological tools, and encouragement of students' independent and creative activities significantly improve educational effectiveness. Teachers' professional competence consists of several components: innovative teaching skills, technological literacy, motivational and communicative abilities, pedagogical planning and assessment skills, and continuous professional development.

Recommendations:

1. Organize regular professional development courses and seminars for chemistry teachers.

2. Expand the use of interactive laboratories, virtual experiments, and digital resources in chemistry lessons.

3. Establish systems for pedagogical consultation and experience exchange to enhance innovative teaching skills.

4. Implement individualized approaches to address students' needs and promote independent learning.

5. Encourage teachers' engagement in scientific research and experimentation with new teaching methods.

In conclusion, a modern chemistry teacher who continuously develops professional skills, effectively applies innovative and interactive methods, and improves pedagogical and technological competencies can significantly enhance the quality of education and students' learning outcomes.

REFERENCES

1. Shamsiyeva, H.A. (2020). Pedagogical Competence of Modern Teachers. Tashkent: Science Press.
2. Karimov, R.J. (2021). Innovative Methods in Chemistry Education. Tashkent: Education Journal.
3. Petrova, L.S. (2019). Teacher Competence and Student Engagement. Moscow: Pedagogy Today.
4. Yusupov, M. (2022). Modern Pedagogical Approaches in STEM Education. Tashkent: Educational Review.
5. Kim, X., & Lee, J. (2020–2021). Digital Tools and Interactive Learning in Chemistry Classes. Seoul:

Journal of Science Education.

6. Axmedova, Z. (2020). Professional Development of Chemistry Teachers in Uzbekistan. Tashkent: Pedagogical Studies.

7. Toshpulatov, S. (2021). Innovative Methods for Teacher Skill Enhancement. Tashkent: Education and Science.