

**FORMATION OF TEACHER PROFESSIONALISM IN CHEMISTRY EDUCATION:  
CONTEMPORARY PEDAGOGICAL CHALLENGES AND INNOVATIVE  
APPROACHES***Mirbagirova G. M.*

Baku State University, Baku, Azerbaijan

The continuous transformation of educational systems requires chemistry teachers to demonstrate a high level of professional competence, adaptability, and pedagogical innovation. This article examines the process of forming teacher professionalism in chemistry education in the context of contemporary pedagogical challenges, including curriculum modernization, competency-based education, digitalization, and increasing demands for student-centered learning. Special attention is paid to innovative teaching approaches such as interactive methods, problem-based learning, project-oriented instruction, and the integration of digital tools into chemistry lessons. The study emphasizes the role of reflective practice, continuous professional development, and pedagogical creativity in enhancing teaching effectiveness. It is argued that the purposeful development of professional, methodological, and communicative competencies enables chemistry teachers to respond effectively to modern educational needs and to promote deeper conceptual understanding and scientific thinking among students. The findings highlight that innovative pedagogical strategies are a key factor in strengthening teacher professionalism and improving the overall quality of chemistry education.

The rapid development of science, technology, and educational paradigms has significantly transformed the role of the chemistry teacher in modern schooling. Today, effective chemistry instruction requires not only strong subject knowledge but also well-developed pedagogical, methodological, and digital competencies. The chemistry teacher is expected to design learning environments that promote inquiry, critical thinking, and meaningful application of scientific concepts rather than rote memorization. In this context, teacher professionalism is viewed as a dynamic and continuously developing construct shaped by pedagogical innovation, reflective practice, and responsiveness to educational change. Ongoing curriculum reforms, the shift toward competency-based education, digitalization of learning environments, and increasing emphasis on student-centered instruction make the issue of teacher professionalism in chemistry education particularly актуаль. These challenges require teachers to adopt innovative teaching strategies and flexible instructional models. The aim of this study is to identify the key components of chemistry teacher professionalism and to analyze innovative pedagogical approaches—such as interactive methods, problem-based learning, project-oriented instruction, and digital tools—that support its effective development. The study conceptualizes teacher professionalism through an integrated model combining professional competence, reflective practice, and digital-pedagogical integration, adapted specifically to the teaching of chemistry.

Teacher professionalism in chemistry education represents a dynamic integration of subject knowledge, pedagogical skill, reflective practice, and digital competence. In modern educational contexts, the chemistry teacher functions as a learning designer who fosters inquiry, critical thinking, and meaningful application of chemical concepts through innovative instructional strategies. Interactive methods, problem-based and project-oriented learning, and the effective use of digital and visual tools enhance student engagement and support deeper conceptual understanding. At the same time, continuous professional development and reflective analysis of teaching practice strengthen instructional effectiveness and allow timely adaptation to students' learning needs. As a result, the purposeful development of teacher professionalism contributes to increased student motivation, improved scientific reasoning, and higher overall quality of chemistry education, making it a key factor in achieving sustainable and effective learning outcomes.

**References**

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