

PEDAGOGICAL REQUIREMENTS FOR TEACHERS' PROFESSIONAL ACTIVITIES IN THE CONTEXT OF MODERN DIGITAL EDUCATION

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Abstract

This article presents a scientific and theoretical analysis of the pedagogical requirements imposed on teachers' professional activities in the context of modern digital education. The intensive development and widespread implementation of digital technologies in education necessitate the formation of teachers' professional competencies in a new content context. The study systematizes the main requirements for teachers' informational-pedagogical, technological, communicative, and research competencies and substantiates their importance in a digital educational environment. The results have practical significance for ensuring teachers' professional development, increasing the effectiveness of the educational process, and developing innovative pedagogical approaches.

Keywords

digital education; professional activity of teachers; pedagogical competence; digital competencies; innovative pedagogy; digitalization of education.

Introduction:

In recent years, the education system worldwide has been actively involved in digital transformation processes. According to UNESCO (2022), more than 70% of schools in developed countries have integrated digital learning platforms into their curriculum. In developing countries, including Uzbekistan, the expansion of digital resources and online learning environments has accelerated due to the COVID-19 pandemic, requiring teachers to acquire new competencies rapidly.

These processes lead to significant updates in the content, forms, and pedagogical technologies of teaching, which in turn change the requirements for teachers' professional activities. In modern digital education, the teacher acts not only as a knowledge carrier but also as a specialist who designs, organizes, and analyzes the educational process in a digital environment.

Digital technologies, while increasing the efficiency of learning, simultaneously impose new professional demands on teachers. In particular, the ability to develop interactive and multimedia educational materials, effectively use online and hybrid educational platforms, and conduct monitoring and assessment of learning outcomes using digital tools becomes increasingly important. Therefore, scientifically substantiating and systematizing the requirements for teachers' professional activities in the context of digital education is one of the pressing tasks in pedagogy.

Literature Review:

Research demonstrates that teachers' digital competence is critical for the successful implementation of e-learning strategies (Robert, 2019; Polat & Bukharkina, 2020). Teachers' ability to evaluate, select, and integrate digital tools into classroom activities significantly influences learning outcomes and students' engagement.

Recent studies highlight that the rapid increase in information flows within digital environments affects learners' cognitive processing and attention spans. Consequently, digital tools must be integrated with strong pedagogical and psychological justification (Selevko, 2018).

New perspectives in literature:

1. Ahmedzhanova (2020) emphasizes that a structured digital environment improves interactive learning and supports students' self-regulated learning skills.
2. Kurbanov (2021) identifies practical models for incorporating simulation programs, virtual labs, and multimedia tools in various subjects.
3. ISTE Standards (2020) outline six core competencies for educators in digital environments, including facilitation of learning, professional responsibility, and digital citizenship.

Comparing these studies shows that while digital technologies provide opportunities for personalized learning, they also demand systematic teacher training, especially in designing and implementing digital content effectively.

Methodology:

The study aimed to identify and systematize the requirements for teachers' professional activities in digital education.

Methods used:

- Analysis of pedagogical and scientific-methodological literature (2010–2023);
- Review of normative documents regulating digital education in Uzbekistan and globally;
- Comparative analysis of teacher competency models;

- Systemic approach to link teacher activity and digital educational environment;

- Logical analysis to formulate requirements and recommendations.

The systemic approach allowed for viewing teacher activity and digital educational platforms as interconnected components, ensuring a holistic understanding of digital pedagogy.

Discussion of results, new professional competencies, modern teachers need to master the following competencies:

1. **Informational-pedagogical** - ability to organize and present knowledge using digital tools;
2. **Technological** - proficiency in online platforms, virtual laboratories, and simulation software;
3. **Communicative** - effective interaction with students, parents, and colleagues in digital environments;
4. **Research** - use of data analytics and assessment tools to evaluate learning outcomes.

Practical examples:

- Virtual labs in physics and chemistry allow students to conduct experiments safely while teachers monitor results in real-time.
- Interactive simulations in mathematics improve problem-solving skills.
- Online discussion forums and video conferencing enhance collaboration and peer learning.

Table 1. Digital competencies of modern teachers:

Competency Type	Key Skills	Practical Tools
Informational-Pedagogical	Digital content creation, lessons, multimedia	MS PowerPoint, Prezi, Canva
Technological	Online platforms, LMS use	Moodle, Google Classroom
Communicative	Digital communication, collaboration	Zoom, Teams, Slack
Research	Assessment analytics, data	Excel, Google Forms, Learning

Competency Type	Key Skills	Practical Tools
	interpretation	Analytics Tools

Practical Applications, Systematic development of teacher competencies leads to:

- Improved quality of digital learning;
- More personalized and adaptive teaching approaches;
- Increased engagement and motivation among students;
- Data-driven decision-making in lesson planning and evaluation.

Results:

The study demonstrates that structured improvement of teachers’ professional competencies positively impacts the effectiveness of digital education. Modern educational environments demand not only theoretical knowledge but also practical skills in applying digital tools to enhance teaching and learning outcomes.

Teacher training programs must integrate practical modules on:

- **Digital resource creation:** Teachers need skills to design interactive presentations, multimedia lessons, educational videos, and virtual simulations that cater to diverse learning needs. Developing such resources enhances student engagement and facilitates deeper understanding of the material.

- **Online and hybrid instructional strategies:** Effective teaching in digital contexts requires knowledge of synchronous and asynchronous methods, blended learning models, flipped classrooms, and collaborative platforms. Training programs should provide teachers with opportunities to design and implement lessons using these approaches.

- **Assessment analytics:** Teachers must acquire the ability to monitor student progress using learning management systems, automated assessment tools, and digital data analysis. Competence in interpreting analytics allows educators to adjust teaching strategies, provide personalized feedback, and identify learning gaps.

- **Ethical and legal aspects of digital education:** Understanding data privacy, copyright regulations, and online behavior ethics is essential for responsible digital teaching. Teachers should be trained to navigate digital environments safely while protecting students’ rights and promoting ethical practices.

Moreover, the study highlights that ongoing professional development is essential. Workshops, webinars, and collaborative online communities offer continuous opportunities for teachers to update their skills in response to emerging

technologies. Implementing mentorship programs and peer-review mechanisms can further enhance teachers' confidence and effectiveness in digital education.

Finally, evidence from the research suggests that schools integrating structured digital competencies in teacher development report higher student engagement, improved learning outcomes, and increased teacher satisfaction. Systematic adoption of these practices ensures sustainable professional growth and contributes to the overall quality of digital education.

Conclusion:

Requirements for teachers' professional activities in modern digital education are critical for the sustainable development of the education system. Teachers are no longer only transmitters of knowledge; they must also act as designers, facilitators, and evaluators within digital learning environments. This transformation requires the development of four core competencies:

1. **Informational-pedagogical competency** – the ability to structure, present, and adapt educational content effectively using digital tools;
2. **Technological competency** – proficiency in using online platforms, virtual labs, multimedia tools, and other digital resources;
3. **Communicative competency** – skills in interacting effectively with students, colleagues, and parents in online and hybrid environments;
4. **Research competency** – capability to monitor, assess, and analyze educational outcomes using digital analytics tools.

The systematic development of these competencies ensures not only the improvement of teaching quality but also the personalization of learning, fostering higher engagement and motivation among students. For teacher training institutions, these findings highlight the need to integrate practical digital modules into pre-service and in-service training programs.

From a policy perspective, these insights can inform national strategies for digital education, ensuring that schools are equipped with both the necessary infrastructure and qualified personnel. Practicing educators can leverage these competencies to optimize lesson planning, implement innovative teaching methods, and effectively assess student learning in digital contexts.

Looking forward, further research is recommended to explore advanced digital pedagogical approaches, including artificial intelligence, adaptive learning systems, and gamification in education. Integrating these innovations can further enhance teaching effectiveness and student outcomes in digital learning environments.

In conclusion, the professional development of teachers in digital education is not optional but a strategic necessity for building resilient, innovative, and effective educational systems that meet the demands of the 21st century.

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