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The Development of Methodological Training for Future Primary School Teachers Based on Artificial Intelligence as A Pedagogical Issue

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Abstract: This article explores the problem of methodological training for future primary school teachers using artificial intelligence technologies. It emphasizes the relevance of integrating digital tools into the educational process to improve the effectiveness of professional teacher preparation. The potential of AI to individualize learning, develop methodological competencies, and enhance the motivation of students at pedagogical universities is discussed. Additionally, the article analyzes the pedagogical conditions and approaches that contribute to the successful application of AI in the methodological training of future primary school teachers.

Keywords: Methodological training, future primary school teachers, artificial intelligence, pedagogical technologies, digitalization of education, professional competence.

Introduction: The methodological training of future primary school teachers is conducted under the global challenges of the modern socio-cultural environment: multitasking, digitalization, openness, cultural diversity, and alternative scenarios for individual development. One response to these challenges is the state-supported development of the education system. For example, the national "Education" project includes federal initiatives such as "Modern School," "Teacher of the Future," and "Digital Educational Environment," which aim to create fundamentally new organizational and content-based approaches to the professional preparation of future educators [1]. A special emphasis is placed on the

possibilities of digital transformation within the education system.

Today's primary school students confidently navigate various online platforms, quickly search for information, use artificial intelligence for homework, and communicate via messaging apps. However, they often lack interest in learning, experience difficulties in personal communication with adults and peers, and struggle with emotional regulation and collaboration. In other words, virtual interaction is often easier and more engaging for students than face-to-face communication.

Undoubtedly, teachers must possess the same digital skills as their students. At the same time, they must also develop professional skills in using digital tools within a broader framework of digital culture. Future primary school teachers must be able to spark student interest in learning, select relevant educational content, and choose appropriate pedagogical and digital teaching technologies to help develop 21st-century key competencies.

This is confirmed by the State Educational Standard of Higher Education, which includes the following general professional competencies:

- GPC-6: The ability to use psychological and pedagogical technologies in professional activities necessary for the individualization of learning, development, and upbringing, including students with special educational needs.
- GPC-8: The ability to carry out pedagogical activities based on specialized scientific knowledge.
- GPC-9: The ability to understand the principles of modern information technologies and use them to solve professional tasks [2].

Moreover, according to the Professional Standard for Teachers, essential skills for primary school teachers include: "the development (mastery) and application of modern psychological and pedagogical technologies based on knowledge of personality development and behavior in both real and virtual environments" and "ICT competence" [3].

Therefore, the central challenge in training students at pedagogical universities lies in the search for updated and effective tools and content for methodological training under the conditions of education digitalization.

The aim of this article is to model the process of methodological training for future primary school teachers in the context of digitalization.

Literature review

Various Aspects of the Methodological Training System

for Future Teachers. Various aspects of the system of methodological training for future educators have been analyzed in numerous national and international studies. The growing interest in rethinking this issue is driven by frequent and sudden societal changes: the educational community realizes that the previous ways are no longer sufficient, while the path forward remains unclear. A transitional space is emerging, one that must be filled with new content capable of equipping future teachers to overcome professional challenges and incorporating scientifically grounded learning strategies for students [4, 5]. The content of methodological training should include both the methodological foundations of subject matter and the practical professional tasks teachers will face [6].

Uzbek researchers have developed various pedagogically grounded methodological approaches. However, there is no unified view on the appropriateness of using a specific approach. This is due to the fact that the specifics of each approach influence the development of training content as well as the organization and structure of instructional-methodological resources. Thus, the system of methodological training for future teachers in Uzbekistan is based on a variety of methodological approaches.

According to Sh.Kh. Khozhiev, solving the problem of methodological training for future teachers is linked to increased focus on students' individuality and abilities; hence, the training process should be based on an anthropological approach. M.I. Saidova, while analyzing the development level of students' methodological thinking, considers the competency-based, professionally activity-oriented, and professionally personal approaches the most rational. Z.A. Kholmatova argues that within the competency-based approach, the substantive aspects of the competencies being developed—particularly regarding the readiness of future primary school teachers to apply ICT in their professional activities—are insufficiently addressed.

A.A. Abdurakhmanov also raises the issue of rethinking the competency-based approach in the training of pedagogical personnel. He emphasizes the excessive standardization of training content and proposes reducing the number of competencies to form a unified "competency framework." D.Kh. Tashbaev rightly notes that methodological training, based on the concept of developmental education, should involve a problem-integrative approach, as this enhances the developmental impact on future specialists.

Given the significant differentiation of social demands, the relationship between professional skills and personal qualities of future primary school teachers

becomes a key aspect of professional training. Analyzing the theoretical foundations of modern methodological systems for training students, F.Sh. Alimova and N.B. Yunusova conclude that the basic principles of the personality-oriented approach provide a guiding framework for pedagogical activity and stimulate the personal potential of future teachers.

Methodological training supports the resolution of professional challenges related to teaching subjects in primary school. U.Zh. Normurodov, G.B. Ergasheva, and M.R. Ismoilova justify the importance of a practice-oriented approach, arguing that students must be equipped with methodological tools for working with schoolchildren. Future teachers must learn to apply methodological skills in practice. According to these authors, the effectiveness of the practice-oriented approach is reinforced through its combination with modular and situational approaches. Training should be structured and tiered in accordance with the stages of learning for each academic subject, enabling students to grasp the specific features of the material being studied. It is essential to rely on real professional situations. M.T. Karimova also believes that teacher training should address the real challenges faced by practicing educators. In her research, she emphasizes the importance of a task-based approach, which allows a focus on the practical aspects of professional competence.

Sh.A. Kudratova, N.Kh. Khamraeva, G.M. Mamaraïmova, Z.M. Tashlanova, D.Sh. Yunusova, and A.A. Turaev explore the renewal of methodological training content and processes for future teachers through a technological lens. The information-logistical approach has become dominant in the professional development of future primary school teachers in Uzbekistan. The effectiveness of training in this context is supported by a system of practice-oriented activities derived from course content.

Methodological training for future primary school teachers encompasses not only content but also methods, forms, and technologies of instruction, which likewise require transformation. Increasingly, research is focused on rethinking instructional formats—for example, replacing lectures with exclusively interactive and training-based forms. It is important to recognize that teachers and students perceive information differently, and students are no longer content with passive lectures; they demand interactive engagement based on real-world practice.

A. Rakhmonkulova, U. Nishonova, and B. Saidjanov, in their study of teachers' digital competencies, conclude that digital literacy gaps must be addressed. Modern

educators must not only facilitate professional communication and collaboration with students but also possess and apply digital knowledge. Only then can they be effective. Uzbek researchers have proposed various effective methods and technologies in the context of digitalization, such as flipped classrooms, digital technologies, online learning, gamification, and others.

A. Mamatova, Kh. Ergashev, I. Yunusova, and M. Kholmatov summarize experiences with the use of digital technologies in student training, highlighting both their advantages and disadvantages. They stress that despite the obvious benefits of ICT, an overload of information and pre-made solutions can lead to information fatigue among students. Online learning has become an effective mode of education; however, as N. Rakhimova, O. Yuldashev, and Sh. Azimova point out, many students struggle to self-regulate their learning processes.

R. Kenzhaboyeva, D. Ismatova, Sh. Ashurova, and M. Tursunov conducted thematic research on the use of flipped classrooms and gamification. Their comparative analysis evaluated how these technologies influence academic performance, anxiety, motivation, and student autonomy. The use of these methods increased student motivation, boosted their cognitive engagement, and fostered greater independence in the learning process.

In an era of rapidly expanding information and communication technologies, future primary school teachers must be prepared to integrate these tools into their professional practice. Digital literacy is a core competency for graduates, not only in acquiring theoretical knowledge but also in applying it practically—whether through problem-solving or collaborative tasks. To ensure proper ICT integration in education, modern information technologies must be viewed as a vital means of training future educators [13]. The key element in this integration should be the university instructor, who determines which technologies best support educational goals. At the same time, instructors can also become obstacles to developing students' digital literacy, since “teachers are sometimes less digitally literate than their students” [12]. While most instructors have strong subject and pedagogical knowledge, their digital proficiency often lags behind. For the effective integration of pedagogical and digital technologies, instructors must revise their own information perception models and improve their digital literacy.

Thus, a brief review of the literature within the scope of the research made it possible to identify key aspects of the digital transformation in the methodological

training of future primary education teachers: content; forms, methods, and technologies of work; and staff training.

Methodological Base of the Research

In the course of this study, we used a set of methods, including theoretical analysis of scientific, methodological, psychological, and pedagogical literature, as well as statistical processing of experimental data. The research was conducted in three stages. At the first stage, the main theoretical and methodological foundations for identifying the problem were determined through the analysis of specialized literature. At the second stage, problems related to the methodological training of future primary school teachers were identified through surveys of teachers, students, and employers. At the third stage, a theoretical justification was developed for modeling the methodological training of students in the context of digital transformation. The materials and methods of the research are based on the findings of the authors and their colleagues in the field of methodology and teaching practices in higher education.

RESULTS

The process of methodological training for future primary school teachers is based on the integration of subject knowledge and methodological foundations for teaching primary school courses as provided in the federal primary general education program. During the study of problems related to the methodological training of full-time and part-time students specializing in Primary Education, the specifics of methodological training content in the context of digitalization were clarified. The research was based on the results of surveys and self-assessment reports from students' teaching (practical) internships in their final and penultimate years. The first indicator was the questionnaire "Problems in Studying Methodological Cycle Disciplines by Future Primary School Teachers in the Context of Education Digitalization," with 120 respondents.

The results showed that the overwhelming majority of students recognize the importance of integrated study of subject and methodological disciplines and their necessity for future professional activity. In response to the question "What is most important to you in studying methodological cycle disciplines?" the respondents' opinions were divided. Among the answers were: the quality of theoretical material presentation (74%), quality of seminar sessions based on interactive engagement (69%), form of lesson organization using active learning methods (57%), use of digital technologies (53%), culture of pedagogical

communication (49%), and organization of remote access to electronic methodological materials (39%).

All students believe that education digitalization directly influences their level of professional preparation. According to them, the advantages of studying methodological disciplines in the digitalized environment include the use of various electronic services and resources, process transparency, and accumulation of personalized data during learning. As disadvantages, the respondents pointed out the need for information verification, reduced live interaction with teachers and peers, declining quality of resources, and the need to meet originality and ethical standards.

As recommendations for lectures, students emphasized the need to demonstrate the application of theoretical knowledge in real professional situations, and not merely use multimedia presentations, but original resources that allow teacher-student interaction during classes.

CONCLUSION

Thus, the problems in training future primary school teachers in methodological cycle disciplines are associated with:

- insufficient demonstration of modern technologies during practical training in relation to diverse learning situations in contemporary primary schools;
- limited use of practice-oriented tasks by instructors;
- poor consideration of students' information perception characteristics;
- limited inclusion of various forms of organizing lectures and practical sessions.

Given the identified issues, we believe that the methodological training of future primary education teachers should consider the following modern approaches to educational activity in pedagogical universities:

- Activity-Based (System-Activity) Approach (suggests that learning goals are defined by outcomes, and the outcomes of future primary teacher training should align with the demands of professional practice);
- Competency-Based Approach (focuses the content of training on the graduate's ability to quickly adapt to professional activities and respond effectively in various pedagogical situations);
- Modular Approach (emphasizes shifting educational focus toward modular representation of training content and structure).

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