



CONFERENCE ARTICLE

**PEDAGOGICAL AND PSYCHOLOGICAL ASPECTS OF USING ARTIFICIAL INTELLIGENCE AMONG
FUTURE PRIMARY SCHOOL TEACHERS**

Nilufar Rakhmatboy qizi Nazarova

PhD Student, Gulistan State University, Uzbekistan

Abstract: This article examines the pedagogical and psychological aspects of integrating artificial intelligence (AI) into the preparation of future primary school teachers. As AI technologies increasingly penetrate the educational environment, it is essential to understand their impact on teacher training and professional development. The article begins by exploring the theoretical foundations of AI in education, highlighting its potential to improve teaching methodology, personalize learning experiences, and support student engagement.

It further examines the psychological impact of AI tools on teachers and students, including their influence on motivation, self-efficacy, and the development of critical thinking skills. Through a review of existing literature and empirical research, the article identifies the main challenges and opportunities associated with implementing artificial intelligence in teacher-training programs.

Practical recommendations are provided for educators and policymakers, emphasizing the need for comprehensive training that equips future teachers with the skills to effectively integrate AI into their pedagogical practice. Ultimately, this article aims to contribute to the ongoing discourse on the role of technology in 21st-century education and its transformative potential for teacher preparation.

Keywords: Artificial intelligence (AI), pedagogy, psychology, teacher education, primary education, educational technology, learning theories, student engagement, cognitive development, emotional intelligence, human-computer interaction, personalized learning, teaching strategies, classroom management, professional development, ethical considerations, digital literacy, collaborative learning environment, teacher-student dynamics, future teachers..

Introduction

The rapid development of digital technologies in the twenty-first century has fundamentally reshaped the landscape of education, and artificial intelligence has emerged as one of the most transformative forces within this process. From intelligent tutoring systems to automated assessment platforms, AI is no longer a distant prospect for schools but an everyday reality that increasingly shapes how teachers plan lessons, monitor progress, and communicate with learners. Primary education, in particular, occupies a unique position in this transformation, since it lays the cognitive, emotional, and social foundation upon which all subsequent learning is built.

Against this background, the preparation of future primary school teachers for working with AI-based tools acquires special significance. Teacher-training institutions face the dual task of equipping prospective educators with technical competence in using AI systems while also developing their pedagogical judgment and psychological sensitivity regarding when, how, and why such tools should be applied in the classroom. Without this dual preparation, there is a risk that AI will be adopted mechanically, without sufficient regard for its effects on children's motivation, autonomy, and socio-emotional development.

The purpose of this article is therefore twofold: first, to map out the principal pedagogical opportunities that AI offers for primary education, such as personalized learning, real-time progress monitoring, automated assessment, and gamified instruction; and second, to examine the psychological dimensions of AI use, including its influence on student motivation, self-regulation, social interaction, and competitive behavior. The article also considers what these findings imply for the design of training and professional-development programs for future teachers.

Theoretical Background and Related Research: The integration of artificial intelligence into education has attracted growing scholarly attention over the past decade, particularly in relation to adaptive learning systems and intelligent tutoring systems (ITS). These systems are designed to adjust the pace, sequence, and difficulty of instructional content according to each learner's demonstrated abilities, thereby embodying long-standing pedagogical principles of differentiated instruction within a technological framework. Researchers in educational technology generally agree that such systems hold considerable promise for primary-level learners, whose academic needs and developmental trajectories vary widely even within a single classroom.

At the same time, the psychological literature on educational technology emphasizes that the benefits of AI are not automatic; they depend heavily on how the technology is implemented and on the pedagogical philosophy guiding its use. Concepts such as self-efficacy, intrinsic motivation, and self-determination theory provide a useful lens for understanding why some AI-supported learning experiences enhance student engagement while others may inadvertently undermine it, for instance by fostering excessive reliance on external feedback or unhealthy comparison with peers.

Taken together, this body of research suggests that the successful integration of AI into primary education depends less on the sophistication of the technology itself and more on the pedagogical and psychological competence of the teachers who mediate its use. This underscores the importance of systematically preparing future teachers, which is the central concern of the present article.

Pedagogical Aspects of Artificial Intelligence

☐ Personalized learning process: Artificial intelligence helps deliver learning materials adapted to students' individual needs. This means that individualized teaching methods can be developed for each learner. Future teachers should be trained to use these technologies effectively, including the ability to interpret AI-generated recommendations critically rather than applying them automatically.

☐ Increasing teaching efficiency: With the help of artificial intelligence, teachers can monitor students' achievement levels in real time. This gives teachers the opportunity to identify students' weak points and provide them with timely support, which is especially valuable in primary classrooms where learning gaps can compound quickly if left unaddressed.

☐ Automated assessment systems: Artificial intelligence can increase the speed and accuracy of evaluating students' work. This allows teachers to save time and deliver instruction more efficiently, freeing up time that can instead be devoted to individualized feedback, mentoring, and classroom interaction.

☐ Interactive teaching methods: Artificial intelligence makes it possible to introduce new methods into the teaching process, such as gamification and educational games. This is important for training future teachers to make learning more engaging and effective, particularly for young learners whose attention spans and motivation respond strongly to interactive and game-based formats.

☐ Data-informed instructional planning: AI-based analytics allow teachers to aggregate information about class-wide performance trends, enabling more informed decisions about pacing, grouping, and the selection of supplementary materials. Future teachers benefit from training that helps them translate such data into concrete instructional adjustments rather than treating it as an end in itself.

Psychological Aspects of Artificial Intelligence

Students' psychological state: Artificial intelligence technologies help identify students' individual needs. Teachers can use these technologies to determine students' emotional state and motivation to learn. Such systems help track students' stress levels and improve their emotional well-being, provided that the data gathered is interpreted with appropriate sensitivity and confidentiality.

Self-regulation and independence: Through artificial intelligence, students develop self-management and independent learning skills. This is important in preparing future teachers to help students organize self-directed and effective learning processes, while also ensuring that reliance on AI tools does not replace the development of intrinsic self-discipline.

The social impact of artificial intelligence: It is necessary to explain to students the psychological aspects of using technology and to help them build social relationships with one another. Studying the social impact of AI systems on students' experience and interaction is also of great importance for future teachers, who must ensure that technology-mediated learning does not come at the expense of face-to-face collaboration and peer relationships.

Competition and motivation: Artificial intelligence may create opportunities for students to compare themselves with their peers. Teachers need to be trained to manage this process from a psychological standpoint, directing students' motivation and competitiveness in a positive way and minimizing the risk of anxiety or diminished self-esteem among lower-performing students.

Emotional and ethical sensitivity: Because young learners are particularly susceptible to the emotional tone of their learning environment, future teachers must be prepared to recognize situations in which AI-driven feedback, however accurate, may need to be softened, contextualized, or supplemented with human reassurance and encouragement.

Scientific Research on Pedagogical and Psychological Aspects

Pedagogical findings

Research on educational systems that integrate artificial intelligence into the learning process examines how these technologies assist teachers, affect students, and may transform teaching methods. Adaptive learning systems and intelligent tutoring systems (ITS) are of particular pedagogical interest, as they demonstrate how instructional content can be dynamically adjusted to match individual learning trajectories rather than relying solely on a uniform, one-size-fits-all curriculum.

Psychological findings

There is psychological research on how artificial intelligence technologies motivate students, increase their interest in learning, and bring about changes in self-directed study. Through gamification and virtual assistants, students can develop their knowledge and enhance their self-management skills. At the same time, scholars caution that the novelty effect of AI tools can fade over time, meaning that sustained motivation depends on thoughtful pedagogical design rather than the technology alone.

Teacher Training and Professional Development

Pedagogical and psychological training: Special pedagogical and psychological training programs should be organized to prepare future primary school teachers to apply artificial intelligence effectively in the educational process. Professional development programs are essential for training teachers to work with new technologies, monitor students' psychological states, and adapt the learning process accordingly.

Such programs should combine theoretical instruction with practical, hands-on experience. Future teachers benefit from supervised practicum opportunities in which they can experiment with AI-based tools under guidance, receive structured feedback on their instructional decisions, and reflect critically on the psychological effects observed among their pupils. Equally important is the cultivation of a reflective professional disposition that allows teachers to continuously evaluate whether a given AI tool is serving pedagogical and developmental goals or merely automating routine tasks.

Institutions responsible for teacher education should also consider embedding modules on digital ethics and data privacy within their curricula, given that primary school children represent a particularly vulnerable population whose data and emotional well-being require careful protection.

Challenges in Implementing Artificial Intelligence in Teacher Training

Limited technical infrastructure: Many teacher-training institutions, particularly in resource-constrained settings, lack the technical infrastructure necessary to provide hands-on experience with advanced AI tools, which can leave future teachers theoretically informed but practically unprepared.

Insufficient pedagogical guidance: AI tools are often developed by technology companies without close collaboration with educators, resulting in systems that may not align well with established pedagogical principles or with the developmental needs of young learners.

Risk of over-reliance on technology: Without adequate training, both teachers and students may develop excessive dependence on AI-generated recommendations, potentially diminishing opportunities for independent judgment, creativity, and critical thinking.

Psychological and ethical concerns: The collection and use of student data by AI systems raise legitimate concerns regarding privacy, consent, and the potential for unintended psychological effects, such as heightened anxiety from constant performance tracking.

Variability among learners: Primary school students display wide variation in cognitive and emotional maturity, which means that AI-based interventions calibrated for one group of learners may be poorly suited to another, requiring teachers to exercise considerable professional judgment.

The Future of Using Artificial Intelligence

Guidance for teachers: It is necessary to develop guidelines and methodological manuals for teachers on integrating artificial intelligence into pedagogical processes, including concrete examples of best practice drawn from successful classroom implementations.

Psychological support: Teachers should be given recommendations on how to use AI systems in accordance with students' psychological states, including guidance on recognizing early signs of stress, disengagement, or excessive competitiveness associated with technology use.

Continuous professional learning: As AI technologies evolve rapidly, teacher-training programs should establish mechanisms for ongoing professional learning, ensuring that practicing teachers remain up to date with new tools and emerging best practices throughout their careers.

Collaborative development of AI tools: Closer collaboration between technology developers, educational researchers, and practicing teachers is needed to ensure that future AI tools are pedagogically sound and psychologically appropriate for primary-level learners.

Applied Research and Experiments

Practice: Research should focus on effective methods of teaching educators how to apply artificial intelligence in education, and on studying the effectiveness of various systems, such as chatbots or virtual assistants, in supporting students. Pilot programs conducted within teacher-training institutions can serve as valuable testing grounds, allowing researchers to gather both quantitative data on learning outcomes and qualitative insights into students' and teachers' psychological experiences.

Longitudinal studies that follow cohorts of future teachers from their training period into their early years of independent practice would be particularly valuable, as they could reveal how initial preparation translates into actual classroom behavior and how teachers' confidence and competence in using AI tools evolve over time.

Discussion: The findings discussed throughout this article point to a central conclusion: artificial intelligence, when thoughtfully integrated, can meaningfully enhance the personalization, efficiency, and engagement of primary education, but its benefits are contingent upon the pedagogical and psychological competence of the teachers who implement it. Future teachers who understand both the technical functioning of AI tools and their potential psychological effects are far better positioned to use these tools in ways that support, rather than undermine, healthy child development.

This dual competence cannot be assumed to develop spontaneously; it requires deliberate and sustained attention within teacher-education curricula. Institutions that treat AI literacy as a peripheral add-on, rather than a core component of professional preparation, risk producing graduates who are technically capable but pedagogically and psychologically underprepared for the realities of the AI-enhanced classroom.

Conclusion

Artificial intelligence is poised to play an increasingly significant role in primary education, offering genuine opportunities for personalized instruction, efficient assessment, and engaging interactive learning. However, realizing these benefits depends on preparing future primary school teachers not only to operate AI tools competently but also to understand and respond to their psychological effects on young learners. Comprehensive teacher-training programs that integrate pedagogical, technical, and psychological dimensions of AI use are therefore essential.

Future research should continue to investigate the long-term effects of AI integration on both teacher practice and student development, while policymakers and teacher-training institutions should collaborate closely with technology developers to ensure that emerging tools remain pedagogically sound, psychologically appropriate, and ethically responsible. Only through such a comprehensive and collaborative approach can the transformative potential of artificial intelligence be fully and safely realized in primary education.

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