

**THE ROLE OF INFORMATION TECHNOLOGIES IN DEVELOPING THE
PROFESSIONAL COMPETENCE OF FUTURE TEACHERS**

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Annotation: This article explores the crucial role of information technologies in shaping the professional competence of future teachers. It discusses how digital tools and resources enhance pedagogical skills, facilitate access to up-to-date educational materials, promote collaborative learning, and develop essential digital literacy. The paper also addresses challenges related to technology integration in teacher education and emphasizes the need for supportive infrastructure and training. Ultimately, the article underscores that integrating IT into teacher preparation programs is vital for cultivating adaptable, skilled educators capable of meeting the demands of modern classrooms.

Keywords: information technologies, professional competence, future teachers, teacher education, digital literacy, pedagogical skills, collaborative learning, educational technology, teacher training.

Introduction. In the contemporary world, where digital technologies permeate almost every aspect of daily life, the field of education is undergoing significant transformation. The advent of information technologies (IT) has revolutionized the way knowledge is delivered, acquired, and managed. For future teachers, the integration of IT into their training is no longer optional but a critical necessity. Professional competence in teaching today extends beyond subject matter expertise and pedagogical knowledge; it requires the ability to effectively harness digital tools and resources to enhance learning outcomes. Developing such competence enables future educators to meet the challenges of diverse classrooms, foster student engagement, and adapt to rapidly changing educational environments. The role of information technologies in teacher education is multifaceted, encompassing not only the acquisition of digital skills but also the transformation of teaching methodologies and the cultivation of lifelong learning habits. As educational institutions strive to prepare teachers who can thrive in digital classrooms, it becomes essential to explore how IT contributes to their professional growth. This article examines the significant role that information technologies play in developing the professional competence of future teachers, highlighting key areas such as pedagogical innovation, access to resources, collaborative learning, and digital literacy.

Facilitating access to up-to-date knowledge and resources. The digital age offers unprecedented access to a wealth of educational materials, research, and professional development opportunities. Future teachers can leverage online databases, digital libraries, webinars, and MOOCs (Massive Open Online Courses) to continuously update their subject knowledge and pedagogical understanding. This continuous learning process fosters a culture of self-improvement and adaptability, key components of professional competence in teaching. Information technologies enable collaboration among teacher trainees across geographical boundaries through online forums, social media groups, and collaborative platforms like Google Workspace or Microsoft Teams. These tools encourage sharing of best practices, peer feedback, and collective problem-solving. Building professional networks early in their careers helps future

teachers gain diverse perspectives, cultural competencies, and support systems essential for effective teaching in multicultural and dynamic classrooms.



Figure 1. Professional development skills for modern teachers

Incorporating IT in teacher education programs ensures that future educators become proficient in digital literacy — an essential skill for modern teaching. Mastery of educational software, learning management systems (LMS), and communication tools prepares them to integrate technology seamlessly into their teaching practice. Moreover, understanding data privacy, digital ethics, and cybersecurity enables them to safeguard their students and maintain professional standards. While the benefits of IT in developing professional competence are clear, challenges such as unequal access to technology, varying levels of digital skills among teacher trainees, and resistance to change must be addressed. Educational institutions should provide adequate infrastructure, training, and support to bridge these gaps and foster an inclusive digital learning environment. The integration of information technologies plays a pivotal role in developing the professional competence of future teachers. By enhancing pedagogical skills, facilitating access to resources, promoting collaboration, and fostering digital literacy, IT prepares educators to thrive in modern educational settings. As the teaching profession continues to evolve, embracing technological advancements will remain essential for cultivating skilled, adaptable, and competent teachers ready to inspire the next generation.

Analysis of literature. The integration of information technologies (IT) into teacher education has been extensively studied in recent years, highlighting its pivotal role in developing the professional competence of future teachers. A comprehensive review of the literature reveals several key themes: the enhancement of pedagogical practices, development of digital literacy,

access to continuous professional development, and fostering collaborative learning environments. Many scholars emphasize that IT transforms traditional pedagogical approaches by enabling interactive, student-centered learning environments. According to Koehler and Mishra (2009), the Technological Pedagogical Content Knowledge (TPACK) framework underlines that effective teaching with technology requires an understanding of how technology interacts with pedagogy and content knowledge. This framework has become foundational in guiding teacher education programs worldwide to incorporate technology meaningfully rather than superficially. Research by Ertmer and Ottenbreit-Leftwich (2010) further supports that teachers who receive targeted IT training develop higher confidence and competence in using digital tools to enhance student engagement and learning outcomes.

Digital literacy is recognized as a core competency for modern educators. Martin (2008) defines digital literacy as the ability to use information and communication technologies (ICT) effectively and ethically. Future teachers need to master not only technical skills but also critical thinking about digital content and online communication. Studies by Helsper and Eynon (2013) indicate that digital literacy education must go beyond operational skills to include safe and responsible use of digital resources, an area often neglected in traditional teacher preparation. Information technologies enable future teachers to engage in lifelong learning through access to online courses, webinars, and digital libraries. According to Darling-Hammond et al. (2017), continuous professional development (CPD) supported by technology can be personalized and scalable, allowing teachers to update their knowledge and adapt to new teaching challenges. This access is crucial in a rapidly evolving educational landscape where new pedagogical models and technologies frequently emerge.

Collaboration among teachers and between teachers and students is greatly facilitated by IT tools. Social media platforms, collaborative document editors, and virtual learning environments enable sharing of best practices, peer feedback, and professional networking. Vygotsky's (1978) social constructivist theory underscores the importance of social interaction in learning, and IT applications provide practical means for implementing this theory in teacher education. Research by Trust et al. (2016) demonstrates that collaborative use of technology enhances reflective practice and professional growth among teacher candidates. Despite the benefits, the literature also highlights challenges such as unequal access to technology, varying digital competencies among teacher candidates, and institutional resistance to change (Ertmer, 1999). Furthermore, the digital divide remains a significant barrier, particularly in under-resourced regions, limiting the equitable development of professional competence through IT (Selwyn, 2016).

Research methodology. This study employs a mixed-methods research design, combining quantitative and qualitative approaches to comprehensively explore the role of information technologies (IT) in developing the professional competence of future teachers. The quantitative component focuses on measuring the level of digital literacy, pedagogical integration, and perceived professional competence among teacher candidates. The qualitative component seeks to understand their experiences, attitudes, and challenges related to IT use during their training. The study sample consists of 150 future teachers enrolled in teacher education programs at three universities with established IT integration in their curricula. Participants are selected using stratified random sampling to ensure representation across different subject specializations and year levels. Participation is voluntary, with informed consent obtained from all respondents. A structured questionnaire is designed to assess participants' self-reported digital literacy skills,

frequency and manner of IT use in teaching practice, and perceptions of their professional competence. The questionnaire includes Likert-scale items, multiple-choice questions, and demographic information. To gain deeper insights, semi-structured interviews are conducted with 20 selected participants. The interviews explore experiences with IT tools, challenges faced in integrating technology, and suggestions for improving IT-related training. Curriculum documents, lesson plans, and training materials are reviewed to evaluate the extent and nature of IT integration in teacher education programs.

Table 1: Analytical summary of key themes in literature on it and professional competence development of future teachers

Theme	Key Findings	Implications for Teacher Education
Enhancement of Pedagogical Skills	IT facilitates interactive, student-centered learning and diversifies teaching methods.	Integrate technology pedagogically to improve teaching adaptability and engagement.
Development of Digital Literacy	Digital literacy involves not just technical skills but also critical, ethical, and communicative competencies.	Embed comprehensive digital literacy modules in teacher training curricula.
Access to Continuous Professional Development	Online resources and courses enable lifelong learning and up-to-date pedagogical knowledge.	Provide infrastructure and encourage ongoing professional learning through IT.
Collaborative Learning	IT enables collaboration and professional networking, fostering reflective practice and shared learning.	Promote virtual communities of practice and peer collaboration through technology.
Challenges and Barriers	Unequal access, resistance to change, and varied digital skills hinder effective IT integration.	Address infrastructure gaps and support positive attitudes towards technology use.

Data collection occurs over a three-month period. Questionnaires are distributed electronically to all selected participants. Interviews are conducted either face-to-face or via video conferencing, recorded with permission, and later transcribed for analysis. Document analysis is performed concurrently by the research team to triangulate findings. Responses from questionnaires are analyzed using descriptive statistics to summarize trends and inferential statistics (such as correlation and regression analysis) to explore relationships between IT use and perceived professional competence. Statistical analysis is conducted using SPSS software. Interview transcripts and document analysis results are subjected to thematic analysis. Coding is performed to identify recurrent themes related to IT integration, challenges, and impact on professional competence. NVivo software assists in managing qualitative data. The study adheres to ethical standards, ensuring confidentiality, anonymity, and voluntary participation. Participants are informed about the purpose of the research, and data are stored securely with access limited to the research team.

Research discussion. The findings from existing research highlight the transformative potential of information technologies (IT) in the preparation of future teachers. This discussion synthesizes the key insights on how IT shapes professional competence, addresses ongoing challenges, and outlines implications for teacher education programs. One of the most significant contributions of IT is its role in enhancing pedagogical skills. Studies reveal that when future teachers engage with digital tools such as interactive simulations, virtual classrooms, and multimedia content, they develop more dynamic and student-centered instructional strategies (Koehler & Mishra, 2009; Ertmer & Ottenbreit-Leftwich, 2010). This hands-on experience with technology not only enriches their teaching repertoire but also fosters adaptability — a critical competence in diverse and evolving educational contexts. However, the effectiveness of this integration is contingent upon comprehensive training that links technology use with sound pedagogical principles, as superficial exposure to IT often results in limited or ineffective application.

Furthermore, digital literacy emerges as a foundational component of professional competence. Beyond technical proficiency, teacher candidates must cultivate critical digital skills, including ethical use, content evaluation, and online communication (Martin, 2008; Helsper & Eynon, 2013). The growing reliance on digital platforms for information and interaction necessitates that educators become role models in responsible digital citizenship. Nonetheless, the literature points to a gap in many teacher education curricula, where digital literacy is treated as an ancillary skill rather than a core competency to be systematically developed. Another crucial aspect discussed is the accessibility and sustainability of IT-supported professional development. The ability of future teachers to engage in lifelong learning through online courses, webinars, and digital resources democratizes access to knowledge and updates in pedagogy (Darling-Hammond et al., 2017). Yet, disparities in infrastructure and access remain a significant barrier, especially in under-resourced regions (Selwyn, 2016). This digital divide risks exacerbating existing inequalities in teacher preparation and, ultimately, educational outcomes for students.

Collaboration facilitated by IT platforms is also instrumental in professional growth. Virtual communities of practice and social media enable future teachers to share experiences, receive feedback, and cultivate professional networks that extend beyond their immediate environment (Trust et al., 2016). This collaborative learning aligns with socio-constructivist theories of knowledge building and reflects modern educational realities where teamwork and communication are vital. Despite these benefits, resistance to change and variability in digital competencies among teacher candidates present ongoing challenges. Ertmer's (1999) distinction between first-order barriers (access to technology) and second-order barriers (beliefs and attitudes toward technology) underscores the complexity of effective IT integration. Addressing these requires not only improving infrastructure and training but also fostering positive attitudes and confidence toward technology use in education.

Conclusion. The integration of information technologies in teacher education plays a vital role in developing the professional competence of future educators. By providing access to diverse digital tools and resources, IT enriches pedagogical skills, fosters digital literacy, and promotes continuous professional development. Moreover, technology-enabled collaboration offers future teachers opportunities to engage in reflective practice and build supportive professional networks. However, to fully realize these benefits, teacher education programs must address challenges such as unequal access to technology, varying levels of digital proficiency, and resistance to

change. A holistic approach that combines robust infrastructure, targeted training, and a supportive learning culture is essential for preparing future teachers to thrive in technology-enhanced educational environments. As education continues to evolve, equipping teachers with the competencies to effectively integrate information technologies will remain a cornerstone of quality teaching and learning.

References

1. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective Teacher Professional Development. Learning Policy Institute.
2. Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47–61.
3. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284.
4. Helsper, E. J., & Eynon, R. (2013). Digital natives: where is the evidence? *British Educational Research Journal*, 39(1), 173–183.
5. Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
6. Martin, A. (2008). Digital literacy and the “digital society.” In C. Lankshear & M. Knobel (Eds.), *Digital Literacies: Concepts, Policies and Practices* (pp. 151–176). Peter Lang.
7. Selwyn, N. (2016). *Education and Technology: Key Issues and Debates*. Bloomsbury Academic.
8. Trust, T., Krutka, D. G., & Carpenter, J. P. (2016). ‘Together we are better’: Professional learning networks for teachers. *Computers & Education*, 102, 15–34.