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# APPROACHES TO DETERMINING THE PROFESSIONAL COMPETENCES OF FUTURE "TECHNOLOGY" TEACHERS

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**Annotation:** Teacher education in the 21st century should equip future teachers with advanced cognitive and professional skills. This article examines how recent pedagogical innovations, particularly technology-enhanced and competency-based approaches, can foster intellectual competence and professional intelligence in pre-service teachers. Intellectual competence is understood as the analytical, creative, and critical thinking skills that underpin effective teaching. Professional intelligence (or professional thinking) refers to the domain-specific cognitive flexibility and problem-solving abilities that enable teachers to respond flexibly to challenges in the classroom. We review the theoretical underpinnings of these constructs and then describe innovative teaching strategies (e.g., blended/switched learning, gamification, collaborative learning, project-based learning) that foster them.

**Keywords:** intellectual competence; professional intelligence; teacher education; innovative pedagogy; critical thinking; digital technologies; competency-based education.

Global education systems increasingly require teachers to have 21st century skills – critical thinking, flexibility and digital literacy – to educate diverse learners. Recent crises and rapid technological change have accelerated the shift to new teaching paradigms. Teacher education programmes must now prepare candidates not only in subject knowledge but also in integrating technology and developing higher-order thinking. In practice, this means moving beyond traditional lecture models, towards innovative pedagogies (such as blended or flipped learning) and aligning curricula with clearly defined competencies[1]. Developing future teachers' intellectual competence (analytical, creative and metacognitive skills) and professional intelligence (cognitive flexibility and situational problem-solving in teaching) is central to these efforts. This article reviews theoretical perspectives on these constructs, reviews modern educational methods and technologies for teacher training, and highlights case studies that demonstrate their practical impact. We draw on recent research and global examples to inform pedagogical faculty on integrating innovative approaches that develop both intellectual and professional potential in teacher candidates.

Defining intellectual competence. Research defines intellectual competence (often closely related to terms such as "intellectual and pedagogical competence") as a set of high-level cognitive abilities. For teachers, this includes analytical thinking, synthesis, abstraction, creativity, and problem solving. For example, Kachalov et al. define intellectual competence as "the ability to apply analytical thinking and an integrated approach to professional tasks." In practice, this means that a teacher can analyze classroom situations, generalize from experience, and flexibly apply knowledge. Scientists say that intellectual competence includes the characteristics of intelligence: flexibility, creativity, and critical thinking, as well as skills such as comparing, abstracting, and generalizing information.

Professional Intelligence (Professional Thinking). The concept of professional intelligence or professional thinking in education refers to the domain-specific cognitive abilities that enable teachers to work creatively and effectively in their work. Barno Ashurova defines professional thinking as "the characteristics of a specialist's thinking that allow him to successfully perform professional tasks at a high level of skill: to quickly, accurately and originally solve simple and

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extraordinary problems in a particular subject area". In teaching, this means that a professionally intelligent teacher can quickly identify students' misunderstandings, adapt lessons and implement innovative solutions. This is consistent with D.V. Vilkeev's concept that teachers should develop systematic thinking[4.

The importance of teacher training. Teacher training systems are increasingly emphasizing competencies. For example, a Russian study notes that higher education institutions strive to form intellectual and pedagogical competencies that include critical analysis, idea generation and readiness for research and innovation. Similarly, competency-based approaches focus on outcomes such as the ability to solve specific problems and adaptability. Kiseleva and Seliverstova argue that competency-based teacher education transition involves the specification of specific professional outcomes and the targeted development of these skills.

Therefore, the theoretical literature emphasizes the development of effective teacher education in terms of intellectual competencies (e.g., critical thinking, creativity) and professional intelligence (e.g., adaptive decision-making, systemic thinking) in future teachers.

Blended and modified learning. Blended learning—the combination of traditional classroom time with online learning—and modified classrooms have been widely used in teacher education. Research shows that blended models can increase engagement and learning outcomes. For example, one study found that hybrid learning "leads to increased engagement and improved learning outcomes" compared to traditional lectures. In a modified classroom, students review lectures or content online before class, freeing up time in class for active learning. Modified models have been shown to promote higher-order thinking and teamwork: Strayer (2012) et al. found that students' engagement, critical thinking, and practical skills improved when lessons were modified.[6]

For preschool teachers, experiencing a modified model firsthand can help them appreciate student-centered learning and active pedagogy, thereby developing their own analytical and teaching skills.

Gamification and immersive technology. To make learning more engaging, teacher educators often use gamification. This involves adding game-like elements (scores, badges, challenges) to learning activities. Research shows that gamified learning can significantly increase student motivation and retention: students have shown higher academic performance and continued participation in gamified courses. For future teachers, planning and participating in gamified lessons can help them develop creativity and problem-solving skills. can enhance decision-making.

Similarly, augmented and virtual reality tools create immersive simulations of classroom scenarios. VR simulations allow trainees to manage a classroom or conduct scientific experiments in a safe, virtual environment.

Collaborative learning and online communities. Modern teacher education emphasizes collaboration and reflective practice. Computer-supported collaborative learning uses digital platforms (forums, shared documents, social media) to connect teachers. Research shows that collaborative platforms foster a sense of community and continuous professional development among teachers. Group projects using online tools in teacher preparation programs (e.g., collaborative lesson plans in Google Classroom) develop both social and cognitive skills. In addition, many institutions offer MOOCs and hybrid courses for teacher preparation. Online courses offer flexible competency-based modules (e.g., in assessment design or inclusive pedagogy), which allowing candidates to demonstrate their skills at their own pace. These approaches are consistent with competency-based learning: learners progress by demonstrating mastery of skills[8].

Project-based and problem-based learning. Engaging prospective teachers in Project-Based Learning (PBL) is another important strategy. In PBL, candidates design or implement long-term projects that reflect real-world classroom problems (e.g., developing an inclusive curriculum unit). Research has linked technology-enhanced PBL to improved teacher effectiveness and

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student engagement. As teachers work on projects, they must use critical thinking, research skills, and collaboration, thereby exercising their intellectual competencies. Teachers also learn to manage complex tasks that reflect the "systems thinking" of professional intelligence. For example, combining PBL with multimedia production (creating instructional videos for teacher candidates) simultaneously develops technological and creative skills. Overall, these active, learner-centered approaches reflect a modern emphasis on competency-based learning, where clearly defined outcomes (such as critical thinking or digital literacy) guide both teaching and assessment.

Clear innovations around the world demonstrate the above approaches in action. In Queensland, Australia, educators have implemented an AR-based "Holobox" to address a shortage of rural teachers. This immersive holographic interface allows teachers to "live" in multiple classrooms at once, overcoming distance. Using Holobox reporting, pre-service teachers have improved their engagement and hands-on experience with distance learning. Similarly, Khan Academy's development of Khanmigo, an AI-powered tutoring system, offers pre-service teachers new analytical tools. Khanmigo provides real-time feedback and personalized lesson planning support. Early reports suggest that using AI can help teacher candidates practice differentiating lessons and more effectively track student progress. In the United States, Midwestern University has launched virtual reality classroom simulations for its teaching programs.

In these VR environments, pre-service teachers are exposed to realistic scenarios (such as managing a disruptive student or conducting a lab experiment) in a non-threatening environment. A study of the program found that participants gained confidence and self-esteem—they were better prepared for real classrooms after VR training. Similarly, a teacher training program in Pennsylvania called Total Experience Learning combines business innovation concepts with project-based learning. Prospective teachers learn by working on community projects and entrepreneurial tasks and planning research-based units. Observers note that graduates of these programs are more likely to lead student-centered, interdisciplinary teaching.[5] European institutions also report success with blended models. For example, several countries combine online modules with in-person workshops to train teachers in reflective practice and ICT skills. In one case, teachers complete digital coursework in pedagogy and then meet in workshops to discuss practical issues, effectively combining asynchronous and synchronous learning. Dupont (2019) found that such programs foster sustainable professional development habits and improve digital fluency. Overall, these cases from Australia, North America, and Europe suggest that technology-rich, collaborative programs can enhance both the intellectual growth and practical preparation of teacher candidates.

The research and initiatives described above demonstrate a synergistic effect:

When teacher education combines innovative pedagogies and technologies,

candidates develop stronger cognitive and professional skills. For example, blended and modified models have been repeatedly shown to enhance engagement and higher-order thinking in a variety of contexts. Similarly, gamification and AR/VR not only motivate trainees but also give them hands-on experience in creative problem solving. Importantly, these benefits span cultural contexts—from rural Australia to urban America.

Research suggests that such innovation must be pedagogically driven. Simply adding technology does not guarantee learning gains; on the contrary, when digital tools are aligned with specific learning outcomes (as in competency-based frameworks), they lead to better outcomes. For example, teaching future teachers to use data from online platforms (such as Edmodo analytics) supports reflective learning and data-driven decision-making. Platforms such as Google Classroom and professional networks also help foster collective learning. In essence, these approaches challenge teacher candidates to engage in the kinds of thinking we want to foster in our students: inquiry, analysis, and collaboration. However, implementing these approaches requires careful planning. Research warns that teachers need training in new methods

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and sensitivity to equity issues (such as ensuring that all students have access to the internet). Institutions need to invest in infrastructure and professional development so that innovative tools truly enhance learning, rather than distract from it. However, when these supports are in place, evidence shows that they are more effective. Teacher candidates trained in this way not only acquire certain technical skills, but also demonstrate improvement.[7]

As they practice solving open-ended problems in controlled settings, they become more reflective and flexible—the hallmarks of professional intelligence. Future teachers will work in increasingly complex, digitized learning environments. Therefore, developing their intellectual competence and professional intelligence is crucial. This review shows that a variety of modern pedagogical strategies, from blended learning to AR/VR simulations, can effectively develop the analytical, creative, and adaptive skills of teacher candidates.

In conclusion, by learning through technology-rich, problem-based methods, future teachers will simultaneously acquire critical thinking skills and practical decision-making habits. To be effective, teacher education programs must deliberately integrate these innovative approaches and provide ongoing support for both candidates and teachers. The use of competency-based and technology-enhanced models in teacher education holds promise for preparing intellectually agile and professionally skilled teachers who are ready to face the challenges of the 21st century classroom.

**References**

1. Mirziyoyev Sh.M. We will build our great future together with our brave and noble people. “Uzbekistan” 2017.
2. Mirziyoyev Sh.M. Together we will build a free and prosperous, democratic Uzbekistan. “Uzbekistan” 2016.
3. Nurmamatov Z.Sh. Technology of training future teachers of technology for innovative activities Education and innovative research. - Tashkent. http://interscience.uz ISSN 2181-1709(P). ISSN 2181-1717(E). 2021 - y. P. 1-3.
4. Nurmamatov Z.Sh. Innovative technologies in teaching specialized subjects in education and their possibilities Education and innovative research. - Tashkent. http://interscience.uz ISSN 2181-1709(P). ISSN 2181-1717(E). 2021 - y. P. 1-4.
5. Nurmamatov Z.Sh. Theoretical foundations of training future technology teachers for innovative activities Article Journal of Scientific Information of Tashkent State Pedagogical University. – Tashkent, ISSN 2181-9580. Registered on July 30 under the number №02-00175. 2/2022. –B. 165-169. (13.00.00: №32)
6. Nurmamatov Z.Sh. Technology of training future technology teachers for innovative activities Article Ilm sarchashmalari. - Urgench. 3/2022. –B. 1-3. (13.00.00:№31)
7. Nurmamatov Z.Sh. Process of Preparation of Future Technology Teachers for Innovative Activite Article Eurasian Journal of Engineering and Technology volume.4 -Belgium. ISSN 2795-7640. 2022. Page.1-5.
8. Nurmamatov Z.Sh. The role and importance of innovations in education. Scientific newsletter of Namangan State University. - Namangan. www.journal.namdu.uz ISSN: 2181-0427 . 1/2023. –B. 645-650.(13.00.00:№30).