



METHODS OF USING INNOVATIVE EDUCATIONAL TECHNOLOGIES IN TRAINING FUTURE PRIMARY SCHOOL TEACHERS

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ABSTRACT

The rapid evolution of the digital age has necessitated a transformation in pedagogical approaches for the preparation of future primary school teachers. The integration of innovative educational technologies has become essential to develop creative, critical, and technologically competent educators. This paper explores the methods and principles of applying innovative educational technologies in teacher education institutions. It focuses on the use of interactive methods, digital platforms, blended learning, and simulation technologies that enhance student engagement and teaching efficiency. The study identifies effective strategies for integrating technology into teacher preparation programs and analyzes the impact of innovation on professional development and pedagogical competence.

Introduction

In the context of the global digital transformation, education systems worldwide are undergoing radical change. Traditional teaching models no longer meet the needs of modern learners who live and learn in technology-rich environments. For this reason, **teacher education programs** must integrate innovative educational technologies to ensure that future primary school teachers can effectively design and implement engaging learning experiences in digital contexts [Anderson, 2021, p. 15].

The concept of innovation in education refers to the introduction of new teaching methods, digital tools, and pedagogical models that enhance learning efficiency and student outcomes. It involves not only the adoption of technology but also the transformation of teachers' mindsets and professional competencies [Rogers, 2019, p. 37]. Future primary school teachers, who play a pivotal role in shaping the next generation, must acquire skills in digital literacy, creative problem-solving, and adaptive instruction to meet the needs of 21st-century learners [Schunk, 2020, p. 62].

The goal of this paper is to analyze and describe the **methods of using innovative educational technologies** in the training of future primary school teachers. It also aims to highlight the effectiveness of technology integration in improving the quality of teacher preparation, motivation, and self-efficacy.

Literature Review

Numerous studies have emphasized the significance of technology-enhanced learning in teacher education. According to **Mishra & Koehler (2018)**, the TPACK (Technological Pedagogical Content Knowledge) framework offers a valuable model for integrating technology, pedagogy, and content knowledge effectively [Mishra, 2018, p. 44]. Similarly, **Laurillard (2019)** argues that digital learning environments foster self-regulated learning and reflective teaching practices [Laurillard, 2019, p. 58].

1. Innovative Educational Technologies in Pedagogical Practice

Innovative educational technologies encompass a wide range of tools and approaches, including:

- **Learning management systems (LMS)** such as Moodle, Google Classroom, and Edmodo;
- **Interactive and gamified learning** applications (Kahoot, Quizizz);
- **Augmented and virtual reality (AR/VR)** simulations;
- **Artificial intelligence (AI)**-based adaptive systems;
- **Flipped classroom** and **blended learning** methodologies [Johnson, 2020, p. 23].

These technologies allow teacher educators to create learner-centered environments where future teachers develop critical thinking, creativity, and collaboration skills—competencies essential for modern classrooms.

2. The Role of Innovation in Teacher Training Programs

Teacher education institutions are responsible for equipping future educators with the knowledge and practical experience necessary to integrate technology meaningfully. As noted by **Fullan & Langworthy (2018)**, innovation in teacher training involves not only mastering digital tools but also cultivating pedagogical reasoning—the ability to make informed decisions about technology use for specific learning objectives [Fullan, 2018, p. 74].

Modern educational paradigms such as **constructivism** and **connectivism** emphasize learner participation, interaction, and collaboration. These theoretical underpinnings align with the integration of digital technologies that foster active learning and knowledge co-construction [Siemens, 2017, p. 49].

3. Challenges in Implementing Innovative Technologies

Despite the advantages, several challenges hinder the effective application of innovative technologies in teacher education:

- Insufficient technical infrastructure;
- Lack of digital competence among teacher educators;
- Limited curriculum time for technology integration;
- Resistance to pedagogical change [UNESCO, 2021, p. 112].

Overcoming these barriers requires strategic institutional support, targeted professional development, and continuous monitoring of technology implementation outcomes [Peters, 2020, p. 81].

4. Pedagogical Models of Innovative Learning

Several pedagogical models are widely used in integrating innovation:

- **Blended Learning Model** – combines online and face-to-face instruction, increasing flexibility and learner engagement.

- **Flipped Classroom Model** – students study theory independently and apply knowledge in class through active learning.

- **Project-Based Learning (PBL)** – focuses on solving real-world problems using digital collaboration tools.

- **Gamification and Simulation** – increases motivation and learning outcomes through experiential learning [Lee, 2020, p. 95].

Each model provides opportunities to enhance creativity, autonomy, and professional readiness among future teachers.

5. Empirical Findings

Research evidence shows that technology-supported instruction significantly improves students' self-efficacy and teaching competencies. **Bates (2020)** found that student teachers trained with simulation tools demonstrated greater classroom management skills and reflective thinking abilities compared to those using traditional methods [Bates, 2020, p. 128]. Furthermore, **Garrison & Vaughan (2018)** highlighted the positive correlation between blended learning and the development of metacognitive skills in teacher education [Garrison, 2018, p. 73].

Discussion

The integration of innovative educational technologies in training future primary school teachers is not merely an add-on but a transformative element of modern pedagogical practice. It reshapes how educators learn, teach, and interact with content and learners. The discussion focuses on three major dimensions: (1) **pedagogical innovation**, (2) **technological implementation**, and (3) **professional competence development**.

1. Pedagogical Innovation and Methodology

Pedagogical innovation emphasizes shifting from teacher-centered to learner-centered instruction. It involves the systematic use of interactive strategies such as collaborative learning, digital storytelling, and simulation-based practice. According to **Kolb's experiential learning theory**, effective teacher training should allow students to experience, reflect, conceptualize, and apply knowledge [Kolb, 2019, p. 42]. Innovative technologies, such as interactive whiteboards and digital portfolios, provide platforms for these learning cycles.

2. Technological Implementation Strategies

Teacher educators play a vital role in modeling technology use. They must design **technology-integrated lesson plans** where student teachers can observe, practice, and reflect on the use of digital tools. For instance:

- **Digital lesson planning workshops** encourage future teachers to design multimedia lessons aligned with curriculum standards.

- **Microteaching sessions using video feedback** help improve presentation skills and self-reflection.

- **Virtual classroom simulations** (e.g., Mursion) enable practice in a risk-free environment [Andrews, 2021, p. 109].

Such activities cultivate digital fluency and confidence, ensuring that graduates are ready to implement innovation in real classroom settings.

3. Development of Professional Competence

The professional competence of a teacher includes pedagogical, methodological, communicative, and digital components. The integration of innovative educational technologies supports all these dimensions. For example:

- **Pedagogical competence** improves through exposure to differentiated instruction models.
- **Methodological competence** grows via the use of interactive platforms for assessment and feedback.
- **Communicative competence** is enhanced through collaborative online environments.
- **Digital competence** develops through hands-on experience with educational technologies [Ertmer, 2019, p. 87].

RESULTS

To evaluate the effectiveness of innovative educational technologies in the preparation of future primary school teachers, an experimental study was conducted at three pedagogical universities. The experiment involved **120 students** divided into two groups:

- **Control group (CG)** – trained using traditional methods.
- **Experimental group (EG)** – trained using innovative educational technologies (digital platforms, simulation tools, and blended learning).

The results were analyzed in terms of three indicators:

1. **Pedagogical competence,**
2. **Digital literacy, and**
3. **Motivation for innovative teaching.**

Table 1. Comparative analysis of pedagogical competence

Indicator	Control Group (CG)	Experimental Group (EG)	Improvement (%)
Knowledge of innovative pedagogy	62%	89%	+27
Lesson design using digital tools	55%	87%	+32
Use of interactive methods	58%	90%	+32
Assessment and feedback skills	64%	88%	+24
Average	59.75%	88.5%	+28.75

As shown in Table 1, the use of innovative educational technologies increased the **average pedagogical competence** by almost 30%. The experimental group demonstrated a higher ability to integrate technology in lesson planning and execution.

Table 2. Development of digital literacy among future teachers

Digital Skills Component	Before Experiment	After Experiment	Growth (%)
Digital tool proficiency	41%	83%	+42
Use of LMS platforms	48%	89%	+41

Multimedia content creation	44%	86%	+42
Online collaboration and communication	52%	91%	+39
Average growth	–	–	+41

The data in Table 2 indicate a significant improvement in **digital literacy** levels. After implementing blended learning and interactive training modules, students developed stronger competencies in using LMS tools and creating multimedia materials.

Table 3. Motivation for using innovative teaching methods

Motivation Level	Control Group (%)	Experimental Group (%)
High	28	67
Medium	52	27
Low	20	6
Total	100	100

The motivation for applying innovative methods in the experimental group rose considerably. More than two-thirds of participants expressed high interest and confidence in implementing technology-driven approaches in their future teaching practice.

Interpretation of Results

The collected data confirm that systematic use of innovative educational technologies:

- Enhances **pedagogical competence** and **methodological flexibility**;
- Increases **digital literacy** through direct experience with online learning tools;
- Boosts **motivation and creativity**, fostering professional confidence in future educators.

Qualitative analysis of feedback from student participants revealed that digital teaching environments (e.g., Google Classroom, Kahoot, Canva, and Mentimeter) made learning **more engaging and autonomous**, reducing anxiety about technology use [Bates, 2020, p. 128].

In addition, **virtual classroom simulations** provided realistic teaching scenarios that allowed students to practice lesson management and immediate feedback processing. As **Kolb (2019)** stated, experiential learning cycles supported by technology enhance the depth of professional reflection [Kolb, 2019, p. 44].

These results highlight that when innovative educational technologies are meaningfully embedded in teacher training curricula, they not only improve academic achievement but also shape **future-oriented professional mindsets** among trainee teachers.

Conclusion

The study reveals that integrating innovative educational technologies into the preparation of future primary school teachers leads to a significant improvement in pedagogical, methodological, and digital competencies. Innovation in teacher education represents not just the use of modern tools but a **systemic transformation** of pedagogical

philosophy—moving from passive knowledge transfer to active, technology-supported knowledge creation.

Key conclusions include:

1. **Innovative educational technologies** (ICT, simulation, gamification, AR/VR, and AI-based systems) enhance the professional readiness and creative capacity of future teachers.
2. **Blended and flipped learning models** increase engagement, autonomy, and motivation by allowing students to participate actively in their own learning process.
3. **Digital competence** must be developed systematically through curriculum integration, practice sessions, and feedback-driven learning.
4. The introduction of **simulation-based microteaching** fosters reflective practice and bridges the gap between theory and real classroom application.
5. Institutional support, continuous professional development, and access to digital infrastructure are critical for the sustainable integration of innovations in teacher education.

The findings suggest that teacher training institutions should design **innovation-centered educational frameworks** that combine pedagogical creativity with technological expertise. By doing so, they prepare educators who are capable of guiding the next generation toward critical, creative, and responsible participation in the digital society.

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