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IMPROVING THE METHODOLOGY FOR DEVELOPING FUTURE TEACHERS' PROFESSIONAL COMPETENCE THROUGH GENERATIVE AI-SUPPORTED LESSON DESIGN: A METHODICAL MODEL

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Abstract. Generative artificial intelligence (GenAI) is rapidly changing how lessons are planned and teaching materials are prepared. For teacher education this creates both an opportunity and a risk: future teachers may use GenAI to strengthen their pedagogical design skills, or they may rely on it uncritically. This article proposes a methodical model for developing the professional competence of future teachers through innovative technologies, with GenAI-supported lesson design as its core instrument. The model consists of four interconnected blocks: target, content, procedural-technological and evaluative-reflective. Its central procedure is a cycle of "generate – critique – adapt – teach – reflect", in which future teachers use a GenAI tool to draft a lesson plan, critically evaluate it against curriculum standards and learner needs, adapt it, conduct a microteaching session and reflect on the results. The article describes the stages of implementation in a pedagogical university course, the diagnostic tools for each component of professional competence, and the design of a pedagogical experiment at Bukhara International University. The model shows how innovative technologies can be turned from isolated tools into a systematic means of developing professional competence.

Keywords: future teachers, professional competence, generative artificial intelligence, lesson planning, methodical model, microteaching, reflective practice, innovative technologies, teacher education.

1. Introduction

Lesson planning is one of the core professional activities of a teacher. It requires the teacher to set learning objectives, select content, choose methods and tools, plan assessment and anticipate learners' difficulties. For a future teacher, learning to plan lessons is therefore a concentrated form of developing professional competence.

Since 2023, GenAI tools based on large language models have become widely available. They can produce a complete lesson plan, a set of tasks or an assessment rubric within minutes. Kasneci et al. (2023) note that these tools can support teachers in planning and personalisation, but also carry risks of factual errors, bias and over-reliance. For teacher education the question is not whether future teachers will use GenAI, but whether they will learn to use it as professionals.
In Uzbekistan, the digitalisation of education is supported by state policy, including the Concept for the Development of the Higher Education System until 2030 (Decree PF-5847, 2019) and the Development Strategy of New Uzbekistan for 2022–2026 (Decree PF-60, 2022). However, pedagogical curricula still rarely include systematic training in the critical and pedagogically sound

use of GenAI.

The **purpose** of this article is to propose and justify a methodical model for developing the professional competence of future teachers through innovative technologies, in which GenAI-supported lesson design serves as the central learning activity. The **objectives** are: (1) to substantiate the theoretical basis of the model; (2) to describe its structure; (3) to define the stages of its implementation; and (4) to present the design of an experiment for testing its effectiveness.

2. Theoretical Background

The model draws on four theoretical foundations.

Competence-based approach. Professional competence is understood as an integrative quality combining motivation, knowledge, skills, communication and reflection, which is revealed in professional action (Weinert, 2001; Baumert & Kunter, 2013). Its development therefore requires authentic professional tasks rather than knowledge transfer alone.

TPACK. According to Mishra and Koehler (2006), effective teaching with technology depends on the integration of technological, pedagogical and content knowledge. A GenAI-generated lesson plan is a useful object for TPACK training: to evaluate it, the future teacher must check the content, the pedagogy and the appropriateness of the technology at the same time.

Experiential and reflective learning. Kolb (1984) describes learning as a cycle of concrete experience, reflective observation, abstract conceptualisation and active experimentation. Schön (1983) shows that professionals develop through reflection in and on action. These ideas define the cyclical nature of the model's main procedure.

Learning by design and microteaching. Tondeur et al. (2012) identify learning by design, authentic experience and feedback as key strategies for preparing pre-service teachers to integrate technology. Microteaching, a short teaching episode followed by feedback, allows future teachers to test their designs in a safe environment.

Taken together, these foundations suggest that GenAI should be positioned not as a replacement for the future teacher's planning, but as a *starting point for critique*: the professional work begins where the generated text ends.

3. The Methodical Model

The model consists of four interconnected blocks, summarised in Table 1.

Table 1. Structure of the methodical model

Block	Content
Target	Social order (state requirements for teacher training in a digital environment); goal: development of the professional competence of future teachers through innovative technologies; tasks for each competence component
Content	Modules on innovative educational technologies, TPACK, GenAI in education, digital assessment and academic integrity, integrated into pedagogical and methodological courses
Procedural-technological	Principles (integration, learning by design, gradual independence, reflexivity); forms (lectures, workshops, microteaching, teaching practice); methods and tools (GenAI tools, LMS, interactive content, e-portfolio); the central cycle "generate

Block	Content
	– critique – adapt – teach – reflect”
Evaluative-reflective	Criteria and indicators for five components (motivational-value, cognitive, technological-methodical, communicative, reflective); four levels (initial, basic, productive, creative); diagnostic tools; expected result

The blocks are linked by feedback: diagnostic results from the evaluative-reflective block are used to adjust the tasks and content of the next learning cycle. The **pedagogical conditions** for the model’s effectiveness are: (1) integration of innovative technologies across the curriculum; (2) the use of authentic lesson-design tasks; (3) connection with school teaching practice; and (4) systematic reflection and feedback after each cycle.

4. Implementation of the Model

The model is implemented in three stages over one academic semester within pedagogical and methodological courses.

Stage 1 — Orientation (weeks 1–3). Future teachers study the didactic potential of innovative technologies, the principles of TPACK and the capabilities and limitations of GenAI. They analyse examples of good and poor AI-generated lesson plans and agree on rules of academic integrity: the source of every AI-generated fragment is disclosed, and the student remains responsible for the final plan.

Stage 2 — Practice-oriented design (weeks 4–12). The central procedure is repeated in four cycles, each on a new topic of the school curriculum:

1. **Generate.** The student writes a structured prompt that specifies the subject, grade, learning objectives, duration and learner characteristics, and obtains a draft lesson plan from a GenAI tool.
2. **Critique.** Using a checklist, the student evaluates the draft for factual accuracy, alignment with the state curriculum, logic of the lesson stages, suitability of methods and assessment, and inclusiveness.
3. **Adapt.** The student revises the plan, adds interactive methods and digital resources, and records every change with a short justification.
4. **Teach.** The student conducts a 15–20 minute microteaching episode, which is video-recorded.
5. **Reflect.** The student analyses the recording, receives feedback from peers and the instructor, and writes a reflective journal entry.

From cycle to cycle, the instructor’s support decreases: in the first cycle the checklist and prompt template are given in full; in the last cycle students design their own criteria.

Stage 3 — Creative application (weeks 13–15). Students apply the cycle during school teaching practice, develop an original digital learning resource and present an e-portfolio that documents their progress.

Table 2. Correspondence between the steps of the cycle and the components of professional competence

Step of the cycle	Main activity	Component developed
Generate	Formulating learning objectives and a structured prompt	Cognitive, technological-methodical
Critique	Checking content, pedagogy and technology against criteria	Cognitive, reflective
Adapt	Redesigning the lesson and justifying decisions	Technological-methodical, motivational-value
Teach	Microteaching with digital tools	Communicative, technological-methodical
Reflect	Video analysis, peer feedback, reflective journal	Reflective, motivational-value

5. Experimental Design and Diagnostic Tools

The effectiveness of the model will be tested through a pedagogical experiment at Bukhara International University, consisting of ascertaining, formative and control stages.

Participants. Third- and fourth-year students of pedagogical programmes, divided into an experimental group (EG), taught according to the proposed model, and a control group (CG), taught according to the existing curriculum. Groups are matched on academic performance at the ascertaining stage.

Diagnostic tools. Each component of professional competence is measured with a separate instrument (Table 3).

Table 3. Diagnostic tools for the components of professional competence

Component	Diagnostic tool
Motivational-value	Questionnaire on attitudes to innovation and technology self-efficacy (5-point Likert scale)
Cognitive	Test of TPACK knowledge and of the didactic functions of digital tools
Technological-methodical	Expert evaluation of lesson plans with an analytic rubric
Communicative	Observation of microteaching with a structured observation sheet
Reflective	Content analysis of reflective journals using a rubric of reflection depth

Levels and criteria. Results for each component are converted into four levels: initial, basic, productive and creative. The reliability of the rubrics is checked through agreement between two independent experts.

Data analysis. The distribution of students across levels before and after the experiment is compared in EG and CG. Pearson's χ^2 test is used for level distributions, and Student's t-test (or the Mann–Whitney U test when the data are not normally distributed) for mean scores; the effect size is reported as Cohen's d (Cohen, 1988).

Hypothesis. It is expected that the share of EG students at the productive and creative levels will

increase significantly more than in CG, with the largest gains in the technological-methodical and reflective components.

6. Discussion

The proposed model differs from common approaches in two ways. First, it does not teach innovative technologies as a separate subject, but embeds them in the authentic professional task of lesson design, in line with the learning-by-design strategy described by Tondeur et al. (2012). Second, it uses GenAI deliberately as an object of critical analysis. This reverses the main risk of GenAI in education: instead of reducing the cognitive effort of planning, the tool creates material that the future teacher must check, justify and improve.

The model also addresses the barriers identified by Ertmer and Ottenbreit-Leftwich (2010). Repeated successful cycles of design and microteaching build self-efficacy, while reflection helps future teachers revise their beliefs about technology. The gradual reduction of instructor support corresponds to the transition from the basic to the creative level of competence.
Several conditions are necessary for successful implementation: access to GenAI tools and a learning management system, instructors who are themselves prepared to work with GenAI, clear rules of academic integrity and data privacy, and cooperation with partner schools for teaching practice. The model's limitation at this stage is that its effectiveness is hypothesised on theoretical grounds and must be confirmed by the planned experiment.

7. Conclusion

1. GenAI-supported lesson design is an effective means of developing the professional competence of future teachers when it is organised as a cycle of generation, critique, adaptation, teaching and reflection.
2. The proposed methodical model includes target, content, procedural-technological and evaluative-reflective blocks and is implemented in three stages: orientation, practice-oriented design and creative application.
3. Each step of the cycle develops specific components of professional competence, which can be diagnosed with dedicated instruments and assessed at four levels.
4. The experimental verification of the model at Bukhara International University is the next stage of the research.

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