PEDAGOGICAL FOUNDATIONS OF FORMING DIGITAL COMPETENCE IN PRE-SERVICE TEACHERS

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Abstract. This paper discusses the pedagogical foundations of forming digital competence in pre-service teachers: methodological approaches, the structure of the competence and the pedagogical conditions. Based on an analysis of Uzbek DSc and PhD dissertations and international research articles, it proposes a structure of digital competence consisting of motivational-value, cognitive, activity and reflective components.

Keywords: digital competence, pre-service teacher, competence-based approach, TPACK, DigCompEdu, information culture, pedagogical conditions.

In today's digital society, a teacher's professional mastery has become closely tied to the ability to use digital technologies for pedagogical purposes. The widespread introduction of electronic registers, learning platforms, and distance and blended learning in educational institutions is placing new demands on teacher education. It is therefore an urgent task to provide a scientific basis for the pedagogical foundations of forming digital competence in pre-service teachers, including its essence, structure, methodological approaches and conditions.

The regulatory basis of the issue is formed by the "Digital Uzbekistan – 2030" strategy, approved by Decree No. PF-6079 of the President of the Republic of Uzbekistan of 5 October 2020, and by the state educational standards. These documents set the digitalisation of learning, the creation of electronic learning resources and the improvement of teachers' digital skills as priority tasks. Pre-service teachers' digital competence is therefore a requirement of state policy, and its formation must be reflected systematically in the content of teacher education.

The essence of digital competence. Early pedagogical literature described

teachers' technological preparedness through the concepts of "computer literacy" or "digital literacy". However, as G. Falloon emphasises, technical literacy is not sufficient for teachers: digital competence also covers the pedagogical, ethical, safe and professionally responsible use of technology [6]. In Z.M. Komilova's PhD research, information culture is considered as a unity of motivational-value, cognitive, instrumental-activity and conative components [3]. Summarising these views, digital competence can be defined as an integrative personal and professional quality that expresses a teacher's readiness and ability to solve professional pedagogical tasks effectively, creatively and responsibly with the help of digital technologies.

Methodological approaches. Forming digital competence in pre-service teachers rests on several interrelated approaches.

The competence-based approach defines learning outcomes not as a sum of knowledge but as the ability to act in real professional situations. Under this approach, digital competence is assessed through the products a student creates (an electronic lesson, an interactive task, an online test) and the quality of their application.

The integrative (TPACK) approach. According to the TPACK model proposed by P. Mishra and M. Koehler, a teacher's technological knowledge is not effective in isolation from pedagogical and content knowledge; it is precisely the intersection of these three knowledge domains that affects the quality of teaching [5]. Digital competence should therefore be formed in close connection with subject teaching methods.

The system-activity approach. Digital competence is formed only through active practical work. Sh.A. Xujakulov and T.B. Kadirov identify the gap between theory and practice, weak interdisciplinary integration, insufficiently adapted curricula, and infrastructural and methodological shortcomings as the main problems in teacher preparation. They propose a systematic approach based on the areas of the

DigCompEdu framework: professional engagement, digital resources, teaching, assessment, empowering learners, and facilitating learners' digital competence [4].

The innovative approach. D.M. Xakimova's DSc research argues that a modern teacher should be a specialist with innovative potential who has a thorough command of information and communication technologies and modern pedagogical technologies, and that this potential is formed through a system of continuous professional development [1]. A.S. Atamatov also demonstrates the effectiveness of online platforms, digital resources and an automated platform for monitoring the learning process in developing students' professional preparation in higher education [2].

Didactic principles. The process of forming digital competence should be based on the following principles: *systematicity and continuity* — digital skills are developed consistently across all years and courses; *professional orientation* — each task is linked to the real pedagogical tasks of a future teacher; *activity and interactivity* — students acquire knowledge by creating digital products rather than receiving it ready-made; *individualisation* — students' initial level of digital preparedness is taken into account; *reflexivity* — students regularly analyse their own activity; *digital responsibility* — the requirements of information security, copyright and academic integrity are observed.

The structure of digital competence. Based on the analysis, we propose the following four-component structure of a pre-service teacher's digital competence: 1) the *motivational-value component* — an intrinsic need to apply digital technologies in professional activity and a responsible attitude towards digital ethics and information security; 2) the *cognitive component* — knowledge of digital tools, their didactic potential and regulatory requirements; 3) the *activity component* — skills in creating digital learning resources and organising and assessing learning online; 4) the *reflective component* — the ability to analyse, evaluate and improve one's own digital activity.

In line with the proposed structure, a system of criteria and indicators was developed to determine the level of formation of each component (Table 1).

Table 1

Components, criteria and indicators of digital competence

Component	Criterion	Indicators
Motivational-value	Interest and responsibility	Need to apply digital tools; attitude towards digital ethics and safety
Cognitive	Completeness of knowledge	Knowledge of digital tools, their didactic potential and regulatory requirements
Activity	Practical skills	Creating digital resources; organising and assessing learning online
Reflective	Self-analysis	Evaluating one's own activity; identifying errors and planning improvement

On the basis of these indicators, three levels of digital competence are distinguished: the *reproductive level* — the student uses digital tools by following models and instructions; the *productive level* — the student independently selects and applies tools that fit lesson objectives; the *creative level* — the student creates their own digital learning resources, tests them and improves them. These levels make it possible to track a pre-service teacher's development trajectory and to adjust the learning process in good time.

Pedagogical conditions. The effectiveness of forming digital competence depends on the following conditions: clearly defined digital competence outcomes in curricula and course syllabi; practical tasks involving digital tools in every subject course; organisation of the learning process in an LMS-based digital learning

environment; teacher educators whose digital competence serves as a model; and a developed system of criteria and indicators for determining competence levels.

Conclusion. The pedagogical foundations of forming digital competence in pre-service teachers consist of the unity of the competence-based, integrative (TPACK), system-activity and innovative approaches. Digital competence is not a set of technical skills but an integral professional quality made up of motivational-value, cognitive, activity and reflective components. It is formed effectively in a learning process in which the specified pedagogical conditions are ensured, which is integrated with subject teaching methods and oriented towards practical activity.

References

1. Xakimova D.M. Improving the pedagogical mechanism for developing the innovative potential of school teachers: DSc dissertation abstract (Pedagogical Sciences). – Tashkent, 2024. (in Uzbek)
2. Atamatov A.S. A mechanism for managing the development of higher education students' professional preparation based on innovative approaches (the case of the management programme): DSc dissertation abstract (Pedagogical Sciences). – Tashkent, 2024. (in Uzbek)
3. Komilova Z.M. Developing the information culture of 10th–11th grade students in an innovative educational process: PhD dissertation abstract (Pedagogical Sciences). – Tashkent, 2023. (in Uzbek)
4. Xujakulov Sh.A., Kadirov T.B. Problems of integrating theory and practice in developing the digital competence of pre-service teachers // Preschool and School Education Journal. – 2026. – Vol. 4, No. 2. – P. 9–14. DOI: 10.5281/zenodo.18721485. (in Uzbek)
5. Mishra P., Koehler M.J. Technological pedagogical content knowledge: A framework for teacher knowledge // Teachers College Record. – 2006. – Vol. 108, No. 6. – P. 1017–1054.

6. Falloon G. From digital literacy to digital competence: the teacher digital competency (TDC) framework // Educational Technology Research and Development. – 2020. – Vol. 68, No. 5. – P. 2449–2472.