

DIGITAL CULTURE OF FUTURE TEACHERS: ESSENCE, STRUCTURE AND COMPONENTS

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Abstract: *This article analyzes the pedagogical and psychological essence of the concept of digital culture of future teachers, its structural components, and the criteria for its formation. Scientific approaches in world and Uzbek pedagogy are compared, international experience is assessed on the basis of the DigCompEdu framework [1] and the UNESCO ICT Competency Framework for Teachers [2], and the pedagogical conditions for developing digital culture in higher education are elaborated. The research findings are visualized through infographic diagrams.*

Keywords: *digital culture, digital competence, competency-based approach, pedagogical category, information and communication technologies, DigCompEdu, digital citizenship, future teacher, digital content*

INTRODUCTION

The era of rapid digital transformation is bringing profound change to every part of the education system - from the organization of the learning process to the preparation of pedagogical personnel. In this environment, digital culture has become one of the key factors determining a teacher’s professional potential. The European Framework for the Digital Competence of Educators (DigCompEdu), developed by the Joint Research Centre of the European Commission in 2017, has become a scientifically grounded benchmark for describing the level at which teachers use digital technology in their professional practice [1].

Improving the quality of education and developing the digital competence of pedagogical personnel has been established as a task at the level of state policy in the Republic of Uzbekistan. In preparing future teachers, higher education institutions are required to form not only technical skills but a holistic digital culture that also embraces value-oriented aspects such as digital ethics, information security, and digital citizenship.

Nevertheless, a single, generally accepted approach to the content, structure, and formation criteria of the concept of “digital culture of a future teacher” has not yet been established. This situation determines the relevance of the topic and calls for its comprehensive scientific analysis. The purpose of this article is to reveal the essence of the concept of digital culture of future teachers as a pedagogical category, to identify its structural components, and to scientifically substantiate the ways of its development.

REVIEW OF RELATED LITERATURE

The roots of the concept of “digital culture” go back to the second half of the 1990s. The American researcher Paul Gilster, in his 1997 work *Digital Literacy*, defined digital literacy as an individual’s ability to find, evaluate, and create information across different formats; this approach later formed the theoretical foundation of the concept of digital culture [3].

Marc Prensky introduced the widely used concepts of “digital natives” and “digital immigrants” into scientific discourse, highlighting the fundamental differences in how

successive generations interact with information technology [4]. Mike Ribble, in turn, developed the theory of digital citizenship, emphasizing that digital culture encompasses not only technical but also ethical-legal dimensions [5].

In European education policy, this direction found its expression in the DigCompEdu framework, led by Christine Redecker: a teacher's digital competence is described through six areas and twenty-two competencies as an integral part of professional activity [1]. Likewise, the UNESCO ICT Competency Framework for Teachers (3rd edition, 2018) defines a teacher's technological development trajectory through six aspects and a three-level system [2].

In the pedagogical-psychological school of the CIS region, this issue has been examined from the standpoint of information culture and professional-pedagogical readiness, with digital culture interpreted as a component of an individual's general culture and their capacity to function in an information society.

In Uzbek pedagogical science, this issue has been studied in the works of a number of researchers, who interpret digital culture as a factor developing the individual and an inseparable part of the teacher's professional competence - manifested not merely in the ability to use technical tools, but in the capacity to think responsibly, critically, and creatively within the digital environment.

HISTORICAL EVOLUTION OF THE CONCEPT

The scientific interpretation of the concept of digital culture has passed through several stages. In the earliest stage (the 1980s), it was regarded as “computer literacy” - the ability of an individual to operate computer technology. In the second half of the 1990s, with the spread of the internet, Paul Gilster introduced the concept of “digital literacy,” shifting the focus toward the ability to find and evaluate information.

At the beginning of the 2000s, the European Union's *Key Competences for Lifelong Learning* (2006) formally recognized digital competence as one of eight key competences [6] - a turning point that elevated digital skills from an isolated technical ability to a holistic educational outcome. In 2017, the European Commission's DigCompEdu framework and, in 2018, UNESCO's updated ICT CFT document represented the culminating stage of this evolution - the transformation of digital competence into a profession-oriented, multi-level, and measurable pedagogical category.

Thus, the concept evolved from a discrete technical skill into an integrative pedagogical category - “digital culture” - combining knowledge, skills, motivation, and personal qualities.

THE ESSENCE OF THE CONCEPT OF DIGITAL CULTURE OF A FUTURE TEACHER

The concepts of “competence” and “digital culture” are mutually reinforcing categories in a future teacher's professional formation. Competence is an integrative quality expressing erudition, professional readiness, proficiency, and responsibility, while culture is the form in which these qualities manifest themselves at the level of values and norms in a person's activity. From this standpoint, “digital culture of a future teacher” is an integral set of abilities that enable an individual to interact with digital technologies effectively, responsibly, and creatively, to solve pedagogical tasks within the digital environment, and to continuously improve their own practice through digital tools.

Within the DigCompEdu framework, a teacher's digital competence encompasses professional communication, collaboration and professional development, working with digital resources, organizing teaching and learning, assessment, supporting learners, and facilitating learners' own digital competence [1]. This definition establishes digital culture

not as an abstract technical skill, but as a specific competence that can be purposefully developed and objectively assessed within the educational process.

Thus, three key characteristics that describe the digital culture of a future teacher as a pedagogical category can be identified:

- it is not an innate trait but a quality developed as a result of purposeful pedagogical influence;
- it is a complex, multi-component structure formed by the integration of knowledge, skills, and personal qualities;
- it can be diagnosed on the basis of specific criteria and indicators (technological proficiency, ethical responsibility, adaptability).

STRUCTURAL COMPONENTS OF THE DIGITAL CULTURE OF A FUTURE TEACHER

Based on an analysis of the scientific and pedagogical literature, four interrelated components can be distinguished within the digital culture of a future teacher. The cognitive component encompasses the ability to perceive, critically analyze, and evaluate digital information, as well as to generate new pedagogical ideas. The technological-operational component covers the practical ability to use digital tools, platforms, and resources within the educational process. The motivational-value component reflects interest in digital activity, intrinsic motivation, and a striving for continuous self-development. Finally, the ethical-social component consists of the ability to maintain safety, privacy, and ethical norms in the digital environment, as well as to model responsible digital citizenship for learners.

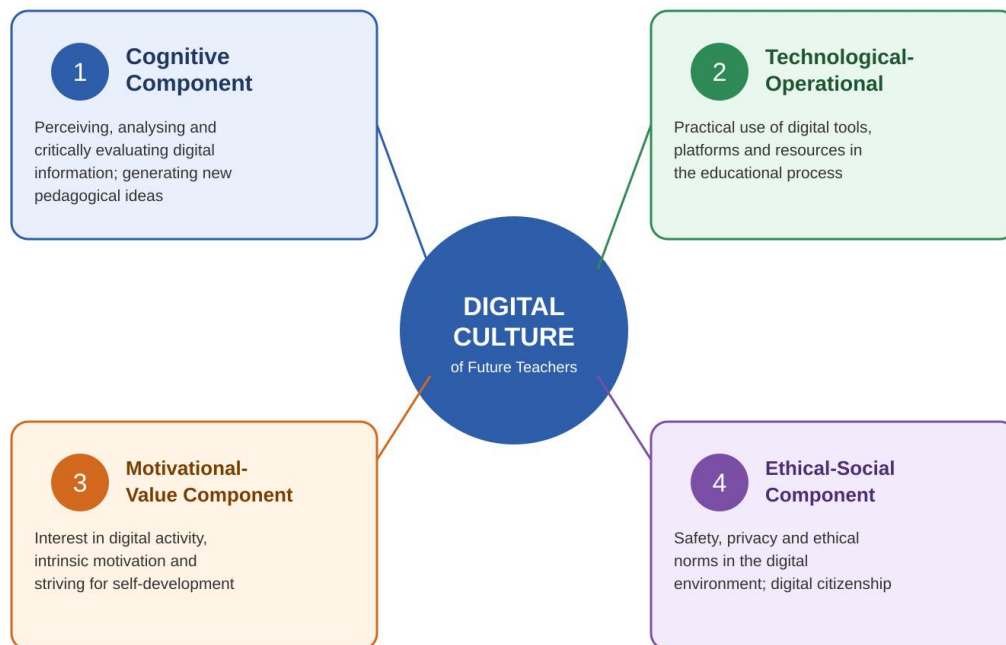


Figure 1. Structural components of the digital culture of a future teacher (compiled by the author)

These four components function in close interconnection: without motivation, cognitive potential does not translate into action; without technological-operational skills, an idea cannot become a practical solution; while the ethical-social component ensures quality and safety control over the entire process. It follows that developing the digital culture of a future teacher requires a pedagogical influence that is complex and systemic in character, encompassing all four components.

INTERNATIONAL EXPERIENCE: ANALYSIS OF THE DIGCOMPEDU AND UNESCO ICT CFT FRAMEWORKS

The DigCompEdu framework, developed by the Joint Research Centre of the European Commission, describes a teacher’s digital competence through six areas - professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners’ digital competence - comprising a total of twenty-two competencies across six proficiency levels [1]. This framework is notable for focusing not merely on technical proficiency, but on how technology can be used to renew the teaching and learning process itself.

The UNESCO ICT Competency Framework for Teachers (3rd edition, 2018) presents eighteen competencies across six aspects - understanding ICT in education policy, curriculum and assessment, pedagogy, application of digital skills, organization and administration, and teacher professional learning - organized into three successive levels: knowledge acquisition, knowledge deepening, and knowledge creation [2]. Each successive level demands ever-increasing sophistication and independence in a teacher’s use of technology.

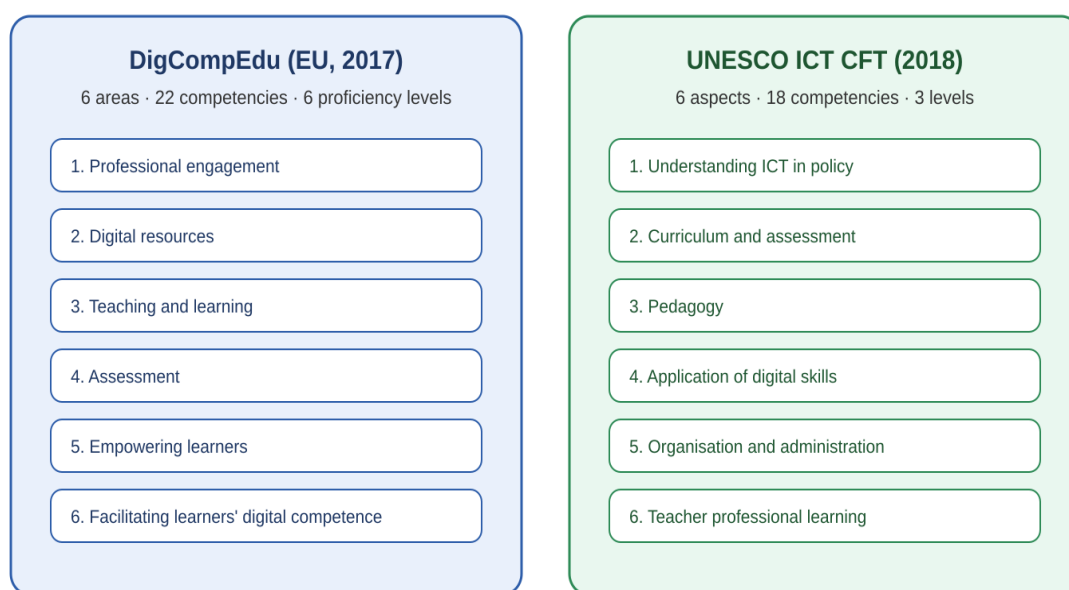


Figure 2. International frameworks for teachers’ digital competence (compiled by the author on the basis of DigCompEdu and UNESCO ICT CFT)

A comparative analysis of the two frameworks shows that, in contemporary international practice, a teacher’s digital competence is no longer treated as a single technical skill, but as a progressively developing, multi-dimensional structure that spans the entirety of professional activity. This, in turn, reinforces the necessity of introducing internationally recognized, coherent, and staged approaches for forming the digital culture of future teachers within Uzbekistan’s higher education system.

CRITERIA AND LEVELS OF DIGITAL CULTURE

In order to purposefully form digital culture within the pedagogical process and to monitor its developmental dynamics, a clear system of diagnostic criteria is required. Drawing on the DigCompEdu and UNESCO ICT CFT frameworks [1] [2], a three-level system for the digital culture of future teachers can be described as follows:

Levels of Digital Culture of Future Teachers

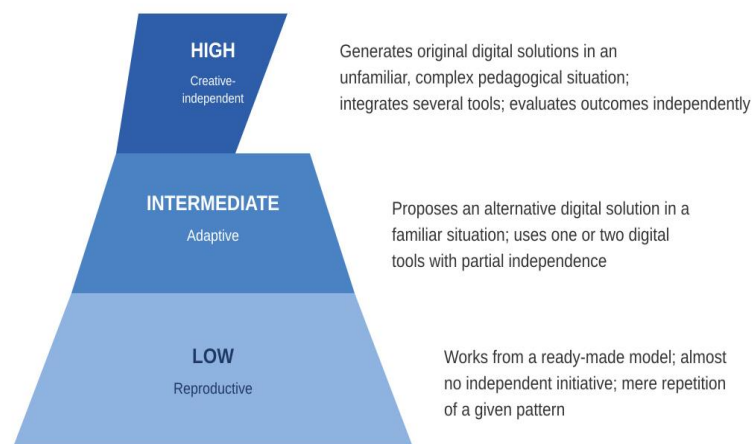


Figure 3. Levels of the digital culture of future teachers

The following criteria are applied in assessment: technological proficiency (the ability to select and apply digital tools purposefully), adaptability (the ability to propose different kinds of digital solutions across varying pedagogical situations), creative approach (the ability to generate original digital content), and ethical responsibility (adherence to information security and digital ethics norms). These criteria derive from the theoretical foundations of the DigCompEdu and ICT CFT frameworks and continue to hold significance in international practice today.

PEDAGOGICAL CONDITIONS FOR DEVELOPING THE DIGITAL CULTURE OF FUTURE TEACHERS

On the basis of the analysis conducted, it is advisable to ensure the following pedagogical conditions for the effective development of digital culture in future teachers:

- ✓ organizing lessons on the basis of problem-based and project-based methods, moving away from a rigidly predetermined template;
- ✓ using open-ended tasks that direct students not toward a single correct answer but toward proposing several alternative digital solutions;
- ✓ incorporating criteria such as technological proficiency, creative approach, and ethical responsibility into the assessment system;
- ✓ the teacher's own demonstration of digital pedagogical practice - since observing a teacher's digital culture fosters a corresponding disposition in students;
- ✓ activating students' cognitive activity through the use of modern digital and information technologies.

It should be particularly emphasized that a teacher's personal digital potential is a decisive factor in shaping a digital environment within the educational process. Research shows that regular exposure to a teacher with strong digital culture gradually increases students' interest in performing digital tasks and fosters a disposition toward responsible digital thinking. For this reason, developing the digital culture of future teachers should be regarded as an integral part of their professional training in higher education.

The principal approaches found in world and national pedagogical science can be summarized in the infographic below:

Comparative Scientific Approaches to Digital Culture

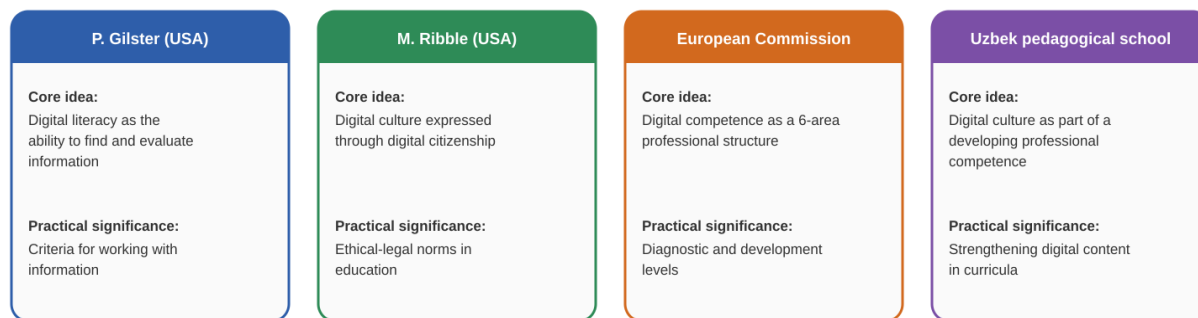


Figure 4. Comparative scientific approaches to digital culture

CONCLUSION

The scientific analysis conducted demonstrates that the digital culture of a future teacher is a complex, multi-component pedagogical category, consisting of the organic unity of the cognitive, technological-operational, motivational-value, and ethical-social components. This competence is not an innate trait but a quality formed as a result of purposeful, systematic pedagogical influence. International frameworks such as DigCompEdu and the UNESCO ICT CFT confirm the need for coherent, staged approaches in this direction. The development of digital culture in future teachers can be achieved primarily through teachers' own application of digital approaches in their professional practice, the organization of the educational process on a problem-based and project-based footing, and the adaptation of assessment criteria to modern requirements.

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