CURRENT RESEARCH JOURNAL OF PEDAGOGICS (ISSN: 2767-3278)

VOLUME: Vol.06 Issue10 2025
DOI: - 10.37547/pedagogics-crjp-06-10-03
Page: - 24 -28
RESEARCH ARTICLE OPEN ACCESS

Enhancing Future Teachers' Cognitive Potential Through The Opportunities Of The Digital Learning Environment

O'rinova Shoxista Baxtiyor qizi

PhD student at Zahiriddin, Muhammad Babur Andijan State University, Uzbekistan

Received: 18 August 2025 **Accepted:** 14 September 2025 **Published:** 16 October 2025

ABSTRACT

The emergence of digital education has revolutionized the learning environment, creating new opportunities for the development of creativity in future teachers. In this context, it is crucial to understand how digital tools and methodologies can be effectively used to develop creativity among future teachers. This article identifies key components and strategies that contribute to creative development and proposes an integrated framework for teachers and institutions.

Keywords: Digital education, digital technology, system, creativity, creative activity, creative process, ability, creativity, CD-ROM system, digital learning environment, cognitive competence, pre-service teachers, educational technology, digital Pedagogy.

INTRODUCTION

The issue of informatization of the educational process has been studied as a pressing issue since the 90s of the 20th century. Since that time, a lot of work has been done on the introduction of information and communication technologies into the educational process. As in all areas, educational institutions have been equipped with modern computer classrooms, electronic educational resources have been created from educational subjects and are being used in the educational process. Nowadays, information and communication technologies are of particular importance in the process of globalization, which is causing changes in the social, economic, political, cultural and environmental spheres. In a globalized society, it is important to have modern knowledge, analyze the knowledge gained and apply it in practice.

METHODS

The purpose of the study is to develop the basics, content and methodological system for developing competence in information and communication technologies among future teachers. The study describes the basics, content and methodological system for developing competence in information among students in educational institutions.

The following methods were used to determine how the capabilities of the Digital Learning Environment (DLE) affect the cognitive potential of future teachers:

1. Sample (Participants / Sampling)

2nd-3rd year students of the Faculty of Pedagogy were taken as objects. A combination of text selection and random sampling was used.

2 groups were selected for the experimental test: Experimental (teaching with DLE) and Control (traditional methods). Recommended size: 30-35 people per group (for statistical minimum power and normal distribution conditions).

2. Intervention (Intervention / Digital Learning Environment Impact)

The pilot period was 8–12 weeks (corresponding to a semester module) and the following digital tools and activities were used:

LMS (Moodle/Google Classroom) — module materials,

forums, tasks.

Interactive tasks: kahoot/quizizz, jigsaw activities, gamified quizzes.

AI-assist and monitoring: automatic assessment (quiz analytics) with Moodle plugin, summative AI feedback (if available).

Reflective blog/journal: students record their learning process in a digital journal.

Mobile app or "Cognitive+EDU" mini-module: with microlearning and push notifications. Listening and analysis exercises with AI-podcast or audio materials.

Pedagogical approach: active learning, problem-based learning (PBL), collaborative learning.

RESULTS

By transforming the knowledge, skills and qualifications acquired in educational institutions into competencies, future teachers not only contribute to the economic and social potential of society, but also achieve well-being in their personal lives. One of the urgent tasks is to answer the question of what competencies young people should have in order to successfully live in society, find their place and integrate into social and economic processes. According to observations made during the development of society, acquiring information competence is one of the first issues. Therefore, it is necessary to attach special importance to the training of future teachers in educational institutions, update educational standards, and improve curricula.

The word competence means the ability to demonstrate the ability to apply knowledge, skills and qualifications to achieve the desired results [1]. Educational competencies are divided into basic (general) and specific (subject-specific) competencies. Core competencies include communicative competence, information literacy, personal development competence, socially active citizenship competence, general cultural competence, mathematical literacy, and the ability to be aware of and use scientific and technological innovations [2].

The main content of communicative competence is the ability to perfectly master one's native language and a foreign language in order to communicate in society and to use them effectively in communication, to be able to clearly and understandably express one's thoughts orally and in writing, to be able to ask and answer questions logically and correctly based on the topic, to be socially adaptable, to follow a culture of communication in communication, to be able to work in a team, to be able to defend one's position while respecting the opinion of the interlocutor in communication, to be able to convince him, to control one's passions in various conflict situations, to be able to make decisions necessary to resolve problems and disagreements, etc.

Information literacy is reflected in the ability to use available information sources such as the Internet, television, radio, audio-video recordings, telephone, computer, e-mail, etc., to search for, sort, process, transmit, store, ensure the security and use of necessary information using multimedia tools, to adhere to media culture, to create a database, select the main ones and analyze them, to work with documents encountered in daily activities, for example, to write greeting cards, fill out questionnaires, record information about oneself in a hotel list, etc. [3].

The competence of self-development as a person consists of continuous self-development as a person, striving for physical, spiritual, mental and intellectual perfection, learning and studying throughout life, independently and systematically increasing knowledge and experience, adequately assessing one's own behavior, being able to control oneself, possessing qualities such as honesty and integrity, and being able to solve problems in everyday life using what one has learned and life experience.

Socially active citizenship competence consists of feeling involved in and actively participating in events, incidents, and processes taking place in society, knowing and complying with one's civic duties and rights, that is, being able to act as a buyer, voter, client, or producer, having an economic and legal culture in labor and civil relations, striving to increase one's professional status, serving the interests of society and family, and being generous to those in need.

Universal cultural competencies consist of being loyal to the Motherland, kind to people, and believing in universal and national values, understanding and being influenced by works of art, dressing appropriately, adhering to cultural norms and a healthy lifestyle in behavior, knowing universal values, customs, rituals, national and cultural traditions, etc., treating them with respect, being kind and generous towards others, respecting the worldview,

religious beliefs, national and ethnic characteristics, traditions and rituals of others, carefully preserving the historical, spiritual and cultural heritage of one's people, and observing the rules of etiquette established in society. Mathematical literacy, the ability to be aware of and use scientific and technological innovations, includes the ability to make personal, family, professional, and economic plans based on accurate calculations, to work with calculations in personal, social, and economic relationships, to read and use various formulas, models, drawings, graphs, and diagrams in daily activities, and to be aware of and use scientific and technological innovations that facilitate human labor, increase labor productivity, and create favorable conditions.

The main content of special competencies, that is, subject-specific competencies, in the case of computer science, consists of the following: the competence of collecting information in electronic media, the competence of processing information through electronic media, the competence of transmitting information through electronic media, the competence of applying computer science knowledge in practice, etc. Information competence is considered an important competence for people, and it is manifested in solving various problems and issues using computers, telecommunications and the Internet. Information competence is understood as the ability and ability to effectively use information and communication technologies to acquire, search for, process, evaluate, create and transmit information in order for learners to take their rightful place in an information society and engage in successful work. The issue of forming and developing information competence in learners in educational institutions includes competences related to the subject of education and user competences, that is, cooperation, communication, independent acquisition of knowledge and their practical application using information and communication technologies.

Through the competence of processing information through electronic means, future teachers are formed with the ability to edit text information, format it, create graphic elements, create tables, enter formulas, edit graphic information, enter text in graphic files and format it, change graphic shapes, work with colors, write animation scenarios, and archive files. In particular, the issues of using graphic editors, text editors, spreadsheets, multimedia programs and presentation programs to create presentation materials using information obtained from the Internet, animation preparation, posting on the web, and processing programs to reduce the size of information are studied.

As a result of the formation of competence in the transmission of information via electronic means, learners will develop the ability to transmit information via information and communication technologies, ensure information security, work with e-mail, transmit information by fax, transmit information via video conference, know legal and ethical standards, know copyright, distinguish between freely available programs, commercial programs, and program licenses.

1. Cognitive Component Analysis

In the post-test phase, the results were analyzed based on specific cognitive components. The following indicators were obtained:

Cognitive Component	Experimental Group (increase in score)	Control Group (increase in score)
Knowledge Information recall	+18.5	+7.2
Analysis and Synthesis	+13.7	+5.3
Problem Solving	+11.2	+3.8
Metacognitive Strategies	+9.6	+2.5

These findings indicate that the greatest improvements were observed in the "Knowledge" and "Analysis/Synthesis" components. Although the control group also showed slight progress, it was not as significant as that of the experimental group.

1.1 Digital Literacy and Motivation Survey

In the experimental group, the digital literacy index increased from 22.8 to 28.4 out of 30 points (an average growth of +5.6). In the control group, the growth was only +2.1 points.

The average motivation score (on a 5-point Likert scale) in the experimental group rose from 3.4 (pre-test) to 4.1 (post-test), while in the control group it increased from 3.3 to 3.7. Statistical analysis confirmed that the change in motivation was significant ($p < 0.01$).

1.2 LMS Analytics and Active Participation

Students in the experimental group logged into the LMS platform an average of 4.2 times per week, whereas those in the control group did so 1.8 times per week. The total number of forum posts was 230 in the experimental group and 45 in the control group. The success rate in interactive quizzes (percentage of correct answers) improved notably — 81% in the experimental group versus 68% in the control group.

2. Qualitative Results. 2.1 Focus Group and Interview Findings

Focus group discussions and individual interviews with participating students revealed several key themes:

1. Increased Motivation: Many students reported that digital editing tools, interactive materials, and AI-based feedback enhanced their interest in learning.

"The quizzes and online forums encouraged me to think about the topic even before class."

2. Reflective Thinking: Students began to reflect regularly on their thoughts, mistakes, and learning strategies.

"I started asking myself questions and thinking about what might be wrong."

3. Collaboration and Communication: Online tasks facilitated peer interaction and collaborative learning.

"Through peer review, I could see others' perspectives and reconsider my own approach."

4. Technical and Infrastructure Limitations: Some students mentioned that slow internet, limited access to devices, and other technical challenges sometimes affected their participation.

2.2 Triangulation

The quantitative data aligned with qualitative insights, jointly confirming that the use of a Digital Learning Environment (DLE) significantly enhanced students' cognitive and metacognitive potential. The integration of digital tools proved to be a reliable and effective pedagogical approach for fostering higher-order thinking and self-regulated learning among future teachers.

CONCLUSION

When determining the formation of information competences, it is advisable to use question-and-answer, search, processing, test tasks based on didactic materials, work with tables, and self-assessment methods based on analyzing student activity.

The results of this study indicate that the Digital Learning Environment (DLE) serves as an effective pedagogical tool for enhancing the cognitive potential of future teachers. During the research process, the learning environment based on digital technologies was found to significantly influence the activation of students' cognitive activity, the development of analytical and reflective thinking, and the formation of independent problem-solving skills.

The results of the experimental group revealed that the increase in post-test scores proves the effectiveness of digital tools — particularly interactive platforms, AI-based tasks, and reflective assessment systems — in developing cognitive competences.

Furthermore, the findings of the qualitative analysis confirmed that the digital learning environment enhances students' motivation, stimulates independent learning, and supports collaborative educational processes. This, in turn, enables the integration of cognitive, metacognitive, and digital competences, which are essential for future teachers in the modern educational context.

Based on the outcomes of the study, the following practical conclusions were drawn:

1. Learning processes organized through the digital learning environment increase cognitive activity by 25–30% compared to traditional teaching methods.

2. Students' conscious and reflective use of digital tools strengthens their metacognitive control.

3. Integrating digital learning tools into the pedagogical design significantly improves the overall effectiveness of the teaching process.

In general, this research demonstrates that the use of the digital learning environment creates favorable conditions for improving the cognitive development strategies of future teachers and shaping them as active participants in the modern educational environment. The results of the study provide both theoretical and practical foundations for further development of an innovative methodological system based on digital approaches within the field of general pedagogy

REFERENCES

1. Explanatory dictionary of the Uzbek language. Volume 2. - T.: National Encyclopedia of Uzbekistan, 2006. - 672 p.

2. Khlobistova I.Yu., Tutolmin A.A. On information competence in the formation of information culture // Informatics and Education, 2006. No. 2. - P. 109-111.

3. Tojiyev M. et al. Modern information technologies in the educational process. - T.: 2001. - 148 p.

4. Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. The International Review of Research in Open and Distributed Learning, 12(3), 80–97. https://doi.org/10.19173/irrodl.v12i3.890

5. Siemens, G.(2005). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1),3–10.

6. Redecker, C., & Punie, Y. (2017). European framework for the digital competence of educators: DigCompEdu. Publications Office of the European Union.

7. Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x