

PEDAGOGICAL-PSYCHOLOGICAL FEATURES OF THE USE OF DIGITAL EDUCATIONAL TECHNOLOGIES BY COMPUTER SCIENCE TEACHERS

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Abstract. This article analyzes the pedagogical and psychological aspects of the use of digital educational technologies in the professional activities of computer science teachers. The purpose of the study is to identify the digital competence of computer science teachers, their attitude to the use of modern technologies in the educational process, psychological barriers and pedagogical opportunities that arise in this process. The article uses theoretical analysis, questionnaires, pedagogical observation and statistical data processing methods. The results show that the effectiveness of computer science teachers in using digital technologies is directly related to their technological knowledge, psychological readiness and openness to innovative approaches. Also, the age characteristics and professional experience of teachers have a significant impact on the process of mastering digital tools. In conclusion, in order for computer science teachers to effectively use digital technologies, it is necessary to systematically develop their pedagogical and psychological readiness, provide continuous professional support and strengthen motivational factors.

Keywords: *computer science teacher, digital educational technologies, pedagogical and psychological characteristics, digital competence, innovative tools, professional development.*

INTRODUCTION. The rapid development of the modern education system and the processes of global digitalization are placing new demands on the teacher. In particular,

computer science teachers are required to be not only deep experts in their subject, but also specialists who have mastered digital educational technologies and can innovatively integrate them into the pedagogical process. Digital technologies are considered an important tool for enriching the content of education, organizing independent work of students, and increasing their motivation to learn.

The educational policy of the Republic of Uzbekistan also identifies the introduction of digital technologies and the development of digital competencies of teachers as one of the priority tasks. In particular, within the framework of the "Uzbekistan - 2030" strategy, special attention is paid to the issues of introducing innovations into the education system, improving the digital literacy and media literacy skills of teachers.

However, the introduction of digital technologies into the educational process is not limited to the provision of technical means. The success of this process largely depends on the teacher's pedagogical skills, psychological preparation, attitude to innovations and individual characteristics in their application. Although computer science teachers have a certain advantage over other subject teachers in working with digital tools, certain problems are observed in their pedagogical and psychological preparation.

The relevance of this article is that it comprehensively analyzes the process of using digital educational technologies by computer science teachers from the perspective of a pedagogical and psychological approach. The purpose of the study is to identify the pedagogical capabilities and psychological characteristics of computer science teachers in using digital technologies, as well as to develop recommendations for improving this process.

METHODS. A number of theoretical and empirical methods were used in the research process. The theoretical methods used were systematic analysis, comparison and generalization of domestic and foreign scientific literature in the field of digital educational technologies, pedagogy and psychology [1; 8].

Empirical research was conducted with the participation of 45 computer science teachers and 876 students from Bukhara State Pedagogical Institute, Navoi State University, Urgench State University, Termez State University, and Gulistan State University. The following methods were used in the research:

1. Questionnaire: A special questionnaire was created to determine the level of teachers' use of digital technologies, their attitudes towards these tools, and the challenges they face.
2. Pedagogical observation: The methods of computer science teachers' use of digital tools in lesson processes, their interaction with students, and the effectiveness of the lesson were observed.
3. Interviews: In-depth interviews were conducted with selected teachers to explore their personal experiences, psychological states, and needs in using digital technologies.
4. Statistical analysis: The collected data were analyzed quantitatively and qualitatively, and averages and correlations were determined.

The study was carried out in phases over the 2023–2026 academic year.

RESULTS. The results obtained during the study revealed important pedagogical and psychological characteristics of the process of using digital educational technologies by computer science teachers.

First, it was found that teachers have different levels of digital competence. 70% of teachers surveyed indicated that they have a high level of digital competence, 25% have an average level, and 5% have a low level. It was observed that younger teachers (25–35 years old) tend to master digital tools faster and use them in the classroom. Experienced teachers (over 45 years old), on the other hand, rely more on traditional methods and face certain difficulties in mastering new technologies.

**Digital competence level of computer science teachers
(by age group)**

Table 1

Age group	High level	Average level	Low level
25–35 years old	78%	18%	4%
36–45 years old	52%	38%	10%
Over 45 years old	31%	41%	28%

Secondly, it was found that teachers' psychological attitude towards the use of digital technologies is an important factor. 72% of respondents noted that the use of digital tools helps to organize the lesson interestingly and effectively. At the same time, 28% of teachers experienced psychological barriers to using technologies (fear of technical failures, anxiety about not being able to master new programs, lack of time). This situation is especially common among teachers over 45 years old.

Third, the types of digital tools used by teachers were analyzed. The most commonly used tools include:

- Online learning platforms: Zoom, Google Classroom, Microsoft Teams.
- Interactive tools: Kahoot!, Quizizz, Mentimeter [1; 3].
- Creative tools: Canva, Tinkercad, Google Slides.
- Simulation and 3D modeling programs [1; 9].

When teaching programming, teachers are effectively using gamification, Flipped Learning, and STEAM approaches.

Fourth, the professional development needs of teachers were identified. 80 percent of respondents noted the need to participate in regular advanced training courses and seminars on digital technologies. The active participation of computer science teachers in the seminar-training "Digital Pedagogy and Media Literacy" held by the Republican

Scientific and Methodological Center for the Development of Education in December 2025 confirms the relevance of this need.

DISCUSSION. The results obtained show that the process of using digital educational technologies by computer science teachers is a complex pedagogical and psychological phenomenon. As Nurmamotov RA (2025) noted, high digital competence of a teacher not only increases the effectiveness of the educational process, but also creates opportunities for students to develop their knowledge and skills through the use of innovative and interactive methods. Our study also revealed that the active use of digital tools by young teachers is associated with high student activity in their lessons.

Psychological factors play an important role in the implementation of digital technologies. The anxiety and lack of confidence in the use of technologies observed among teachers limit their ability to apply innovative approaches. This situation is especially common among experienced teachers and indicates the need for special psychological and pedagogical work with them. As Usmonova QS (2023) noted, the development of pedagogical mechanisms for the effective use of information, communication and digital technologies is of great importance in the formation of independent learning competence.

The influence of teachers' age and professional experience in the use of digital technologies deserves special attention. While young teachers tend to quickly master technologies, experienced teachers have an advantage in their in-depth knowledge of pedagogical methods. To achieve optimal results, it is advisable to establish mechanisms for cooperation and exchange of experience between these two groups and continue the tradition of "teacher-student".

Also, the experience of the "Digital Educational Environment and Digital Technologies" program implemented at the Russian State Pedagogical University shows that the synthesis of fundamental computer science, psychology, and pedagogy serves to train

highly qualified specialists in the field of digital education. This experience can also be applied in the education system of Uzbekistan.

Future research should focus on modeling individual trajectories of computer science teachers' digital competence development, evaluating the effectiveness of training to improve their psychological readiness, and further studying the impact of the use of digital tools on the quality of students' knowledge.

CONCLUSION. In conclusion, the process of using digital educational technologies by computer science teachers is characterized by the following important pedagogical and psychological features:

- The level of digital competence of teachers varies depending on their age characteristics and professional experience.
- The psychological preparation of teachers (openness to innovations, confidence in using technologies, ability to manage anxiety) plays an important role in the effective use of digital technologies.
- The range of digital tools used by computer science teachers is wide and includes online platforms, interactive tools, simulation and 3D modeling programs.
- Most teachers feel the need for regular professional development and psychological support in digital technologies.

To ensure the effective use of digital educational technologies by computer science teachers, it is advisable to implement the following recommendations:

1. Establish a mentoring system between young and experienced teachers.
2. Organize practical seminars and trainings on the use of digital technologies.
3. Develop special programs aimed at improving the psychological preparation of teachers.
4. Popularization of advanced pedagogical practices in the use of digital tools.

Only then will computer science teachers be able to use digital educational technologies not only as a technical tool, but also as a powerful pedagogical tool to increase students' cognitive activity and develop them in all aspects.

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