

**THE NECESSITY OF DEVELOPING DIGITAL COMPETENCIES
AMONG HIGHER EDUCATION STUDENTS**

**D.I. Yunusova,
D.A. Babarakhimova**

Abstract. *One of the main characteristics of modern higher education is the dominance of the digital learning environment over the traditional one. Training personnel in a digital educational environment requires not only technical capabilities, but also a certain level of digital competencies among the subjects of education.*

Keywords: *Industry 4.0, Education 4.0, digital higher education, digital production.*

The relationship between technology and the economy began to change fundamentally in the late 20th century. Computerization, then the internet, and now artificial intelligence and Big Data flows have not merely updated the labor market — they have completely rebuilt its entire logic. The pace of these changes is moving faster than any technological revolution humanity has previously witnessed, and the personnel training system is falling behind this pace.

The forecasts presented in the World Bank's 2019 report "The Changing Nature of Work" sparked major discussions in the academic and pedagogical community. The report noted that up to 57% of jobs in CIS and developing countries are at risk of automation [1]. The majority of those at risk are economists, financiers, and management specialists trained within the higher education system. This means higher education must answer not the question "what do we teach," but rather "how do we teach and what skills do we develop."

A comprehensive study conducted by the McKinsey Global Institute in 2017 illustrated this problem even more clearly. According to the research, by 2030, some 375 million people globally — approximately 14% of the world's workforce — will need to change their professional field or acquire new skills [2]. In certain sectors, this renewal is occurring very sharply: 43% of jobs in financial services and 27% in education are being automated, and in their place come positions requiring digital analysis, creative problem-solving, and complex communication skills. Since Uzbekistan's economy has chosen the path of rapidly developing the digital sector, these projections are fully relevant to our country as well.

UNESCO's "Futures of Education" report (2021) and the OECD's "Skills Outlook" analysis identify several key indicators for the readiness of education systems for digital transformation [3]. These include the availability of digital infrastructure, teachers' digital competencies, students' digital literacy, and the alignment of educational content with the technological environment. Notably, developed countries' average scores across these four indicators are 2.4 times higher than those of developing countries - a gap that represents the educational manifestation of the "digital divide" problem.

Technological changes are fundamentally transforming not only labor market demands, but also the requirements for functional literacy in an individual's social life. Filing tax returns online, using digital medical services, working in digital document management systems - these are no longer "additional skills" but necessary conditions of modern professional life. For this very reason, the concept of "digital competency" has moved beyond its narrow technical meaning to encompass a broader significance covering all areas of professional and social life.

To articulate the impact of these global trends on pedagogical science, it is appropriate to use a comparative analysis of the "Industry 4.0" and "Education 4.0" concepts.

Comparative analysis of "Industry 4.0" and "Education 4.0" concepts

Criterion	Industry 4.0	Education 4.0
Technology	Robotics, AI, IoT, Big Data	Adaptive learning, digital platforms, VR/AR environments
Structure of Labor	Automated production, smart factories	Hybrid teaching (online + offline), flipped classroom
Personnel Requirements	Combination of digital, analytical, and creative skills	Competency-based training, continuous education
Assessment	Product and process quality indicators	Portfolio, formative and digital assessment systems
Roles	Engineer, programmer, data scientist, cybersecurity specialist	Teacher as facilitator, student as self-directed learner

As the table shows, while the technologies characteristic of "Industry 4.0" (IoT, AI, robotics) transform the structure of labor, "Education 4.0" is compelled to redefine teaching formats, assessment methods, and roles in order to respond to this demand. The core challenge of this interdependence is that while many universities acknowledge the requirements of "Industry 4.0," they are lagging behind in implementing "Education 4.0" principles in practice.

In the Republic of Uzbekistan, digital transformation policy is being built as a coherent system from the top down - from national strategy to institutional practice. To fully understand the pedagogical dimension of this process, it is

necessary to analyze the provisions directly relevant to digital competency in key regulatory documents of recent years.

Presidential Decree No. PF-5763 of July 11, 2019 - "On Measures to Reform Management in the Field of Higher and Secondary Specialized Education" - was the first major document formalizing the digital competency issue within educational policy [4]. Within the scope of our research, the following provisions are analyzed:

1) Ensuring the quality of training personnel who have mastered information and communication technologies. This provision is not merely about modernizing technical equipment; it implies making ICT skills a criterion - that is, incorporating them into the assessment and monitoring system.

2) Improving curricula based on the widespread use of modern pedagogical technologies and teaching methods. This provision directly implies the methodological renewal of teachers - meaning they too must possess digital competencies.

3) Introducing advanced ICT tools into the educational process. In practice, this provision has been most neglected - the gap between procuring technical equipment and ensuring its pedagogical effectiveness has not yet been bridged.

Presidential Decree No. PF-6079 "Digital Uzbekistan – 2030," approved in October 2020, defined digital changes in the education sector with specific timelines and indicators [5]. These include:

- 1) Increasing the share of the population with digital skills.
- 2) Creating platforms for implementing and developing distance, online, and virtual teaching technologies.
- 3) Developing mechanisms for assessing digital technology usage skills.
- 4) Studying and applying AI, IoT, and robotics technologies in higher education institutions.

Presidential Decree No. PF-5847 "Concept for the Development of the Higher Education System of the Republic of Uzbekistan through 2030" was announced as a strategic document covering both the infrastructural and content-related aspects of digital education [6]. The concept placed particular emphasis on individualizing educational processes through digital technologies. The idea of "individualized learning" cannot be realized without developing digital competency: for a student to learn at their own pace and in a direction suited to them, they must first be able to independently manage digital tools. The concept also explicitly named "blended learning" and "flipped classroom" technologies. However, it is worth noting specifically that for these technologies to operate, neither digital infrastructure nor methodological guides are sufficient on their own - their successful implementation is directly dependent on the level of digital competency of both students and teachers.

The necessity of developing digital competencies among higher education students is grounded in three interrelated scientific dimensions:

Global dimension: Research by the World Bank, McKinsey, and the OECD demands a fundamental shift in the labor market toward digital skills.

National dimension: Presidential Decrees PF-5763, PF-6079, PF-5847 and subsequent resolutions of the Republic of Uzbekistan have established digital transformation in the education system as a priority direction of state policy.

Pedagogical dimension: Five key differences between traditional and modern educational models demonstrate that digital competency should be viewed not as a mere "additional subject," but as an integral structural component of the educational process.

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