Stages of Improving Information-Pedagogical Competence of Students in Higher Education Institutions

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Abstract: This article examines approaches to enhancing teaching methodologies in higher education by aligning subject-specific instructional strategies with general didactic principles. Particular attention is given to the role of digital technologies in presenting academic content in a clearer, more structured, and accessible format. The integration of digital tools into the educational process simplifies the demonstration and verification of problem solutions, enabling students to develop a deeper conceptual understanding. Furthermore, the use of digital educational technologies supports learners in independently solving problems, fostering their analytical thinking, creativity, and intellectual potential.

Keywords: Digital technology, procedural approach, dialectical method, constructive approach, digital learning technologies, abstraction, modeling, interactive learning.

Introduction: Today, what is commonly referred to as "digital education" continues to expand within the system of lifelong learning, with the use of information and communication technologies (ICT) becoming increasingly widespread. The global pandemic clearly demonstrated that humanity must adapt to digital transformation as an inevitable reality. Understanding the nature and characteristics of digital technologies within society, as well as applying them effectively in the learning process, reflects the diverse ways in which knowledge can be acquired. In fact, comprehending and explaining the essence of educational digitalization is not an overly complex task.

Digital education can be described as the delivery of academic subjects through information technologies, where the organization and management of the instructional process can be carried out with minimal direct human intervention. At the same time, pedagogical and psychological considerations remain essential factors in ensuring the effectiveness of digital learning environments.

The integration of digital technologies into educational systems, particularly under conditions of globalization, has contributed to addressing various structural gaps and shortcomings within the sector. Empirical studies conducted in developed countries confirm the effectiveness of digital tools as instruments for improving educational outcomes. The digital transformation of pedagogical activity positively influences not only the content of education but also its organization, quality, and time efficiency.

According to the views of researchers J. F. Halliwell and R. D. Putnam, the emergence of the virtual education sector prompted scholars to reconsider traditional mechanisms of social capital formation. Some researchers have expressed concerns that virtual learning environments could potentially pose challenges to national stability. In this context, unequal access to educational resources is often interpreted as a loss of essential competencies, including human and social capital [1].

Within the higher education system, the expansion of the virtual education sector (distance learning) has made the contrast between the rapid flow of information and the comparatively slower pace of

traditional academic processes increasingly evident. Contemporary lifelong higher education should therefore be understood as a dynamic and non-equilibrium system characterized by variability, openness, and the fundamental complexity of its internal processes, the functioning of which is largely determined by network logic [2].

LITERATURE ANALYSIS

In his monograph, A. Abduqodirov classifies the use of digital technologies – particularly computers – in the educational process into four main categories:

➢ Passive use, where the computer functions merely as a basic calculating device;

➢ Reactive interaction, in which the computer performs the role of an examiner;

➢ Active interaction, where the computer provides guidance to students and assesses their performance;

➢ Interactive engagement, where the computer operates as a form of artificial intelligence, participating in communicative interaction with the learner [3].

Researcher M. V. Ivanov argues in his scholarly works that the precision of human–machine "dialogue" can never reach a fully advanced level. What is often described as a "dialogue mode" is, in reality, limited to variations in the sequence or volume of transmitted information. Such procedural operations do not ensure the comprehensive processing of stored data within the device's memory. Genuine communication, by contrast, involves objective dialectical contradictions arising within a specific context, including debate and conceptual tension. Even the most technologically advanced machines are incapable of fully grasping these contradictions or interpreting their deeper meaning [4].

Scholars at the University of Sydney in Australia define digital pedagogy as the process of knowledge formation grounded in problem-solving approaches and the development of higher-order thinking skills within educational planning. Their research emphasizes that educators must continuously enhance their pedagogical expertise and professional knowledge in order to remain informed about emerging technologies and effectively integrate them into the learning process [5].

MAIN PART

At present, various perspectives are expressed regarding the teaching of compulsory subjects and their role within the higher education system. In our view, compulsory disciplines in higher education represent not only fundamental digital-oriented courses but also one of the essential components of human culture. However, the conscious and in-depth mastery of these subjects often presents difficulties for students due to the complexity of conceptual relationships and theoretical frameworks involved. As a result, increasing demands are placed on students' logical reasoning and spatial visualization abilities.

In studying compulsory subjects, the formation of specific visual representations is frequently supported by schematic drawings. Nevertheless, reliance on static diagrams often creates additional challenges for students, particularly when the representation becomes unfamiliar or differs from previously observed examples. Some instructors do not sufficiently address these challenges and may overestimate students' abstract thinking capacities. A characteristic issue in the superficial learning of the course "Application of Information Technologies in Professional Activity" is the limited development of quantitative and spatial imagination, as well as the inability to transform mental images constructively.

When solving problems, students with underdeveloped scientific visualization skills struggle to interpret diagrams presented in new or modified conditions, especially when the arrangement of elements differs from textbook illustrations or board drawings demonstrated during class [6].

Digital technologies can serve as tools for developing new concepts and constructing graphical models during instruction, including dynamic or interactive simulations. Encouraging students to independently design and manipulate models plays a crucial role in enhancing their spatial reasoning and constructive abilities. Through modeling activities, learners analyze structural relationships, perform necessary calculations, and apply theoretical knowledge in practical contexts.

The broad implementation of digital technologies in education increases both instructional and educational effectiveness while simultaneously transforming

pedagogical methods, forms, and modes of thinking. Such transformation inevitably brings advantages alongside certain challenges. Addressing these challenges has become one of the central issues in contemporary educational theory and practice. Consequently, it is necessary to refine strategies for integrating digital technologies as instructional tools and to update relevant curricula and methodological frameworks accordingly [7].

It is essential to clearly distinguish the needs and possibilities of employing digital technologies as instructional, developmental, and educational tools at each stage of the learning process. Their use not only reduces the instructional burden on teachers and enhances educational quality but also makes the learning experience more creative and engaging.

Within the educational process, digital technologies may function in three principal roles:

- as a simulation tool;
- as a tutoring system that performs specific instructional functions;
- as a device that simulates professional environments and specialist activities.

Particularly promising is the use of digital technologies for simulation purposes, as they create conditions conducive to the development of critical thinking and decision-making skills. The effectiveness of digital learning tools increases when activities are conducted in an interactive mode. This can be illustrated by the improved learning outcomes achieved in the course "Application of Information Technologies in Professional Activity" through the use of electronic educational programs.

The didactic potential of digital technologies depends largely on the appropriate organization of students' academic work. When employing software-based pedagogical tools, teachers must determine the most effective sequence and format of their application in order to stimulate students' cognitive engagement. In this regard, the following didactic requirements should be observed:

- ❖ careful selection of instructional content suitable for digital presentation;
- ❖ recognition that many topics within compulsory disciplines require comprehensive and structured visualization;

- ❖ provision of preliminary explanations by the instructor and guided work with textbooks and methodological materials;
- ❖ clear instruction for students on how to operate digital devices (computers, tablets, smartphones);
- ❖ focus on the core conceptual elements of the material;
- ❖ continuous monitoring of students' work during digital activities;
- ❖ verification of students' understanding and provision of timely assistance when difficulties arise;
- ❖ integration of digital technologies with other instructional forms and methods;
- ❖ focused development of students' independent comprehension and assimilation of new material through digital means;
- ❖ prior clarification of how to work with software-based instructional resources to encourage productive and purposeful inquiry.

Addressing the economic challenges associated with integrating digital educational resources into the broader information space of the education system requires simplifying their practical implementation. The selection of specific types of digital educational resources should be determined by the nature of instructional activities performed by teachers and students within particular software environments. This approach facilitates more efficient pedagogical management and enhances overall instructional effectiveness.

CONCLUSION

It is important to emphasize that the integration of digital technologies into the education system has become one of the most pressing priorities of our time. The use of digital learning technologies in teaching compulsory subjects enables students to work independently, thereby contributing to the development of their knowledge, practical skills, and professional competencies. The ultimate objective is to enhance the quality of instruction by effectively utilizing the capabilities of digital technologies and by purposefully applying the principles of contemporary educational development. Through such an approach, the educational process can be modernized and further improved in alignment with current technological and pedagogical advancements.

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