



INNOVATION-DRIVEN DEVELOPMENT IN EDUCATION, DIGITAL ECONOMY, AND APPLIED TECHNOLOGIES

**The University of Technology
in Katowice Press, 2025**



INNOVATION-DRIVEN DEVELOPMENT IN EDUCATION, DIGITAL ECONOMY, AND APPLIED TECHNOLOGIES

Monograph

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The University of Technology in Katowice Press

2025

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ISBN 978-83-68422-10-8

DOI: 10.54264/M055

Editorial compilation :

The University of Technology in Katowice Press

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1.10. INFORMATION AND COMMUNICATION TECHNOLOGIES IN HIGHER EDUCATION IN UKRAINE: STATUS OF IMPLEMENTATION AND EFFICIENCY

The relevance of the problem of introducing information and communication technologies (ICT) in higher education in Ukraine is due to the need to adapt the education system to the challenges of a modern digital society. Today, global education is experiencing an active phase of digital transformation, where ICT plays a key role in ensuring the quality of education, flexibility of the educational process and expanding access to knowledge. Ukrainian higher education, striving to integrate into the European educational space, must ensure the proper level of use of digital technologies, which is one of the requirements of the Bologna Process. The problem has become particularly relevant in the context of the COVID-19 pandemic, when the higher education system was forced to urgently switch to distance learning. This transition revealed not only opportunities, but also significant problems: insufficient technical base, uneven level of digital competence of teachers, lack of adapted methodological materials. Recent events, including Russia's full-scale war against Ukraine, have further exacerbated the need to use ICT as a basis for ensuring the continuity of the educational process, especially in conditions of evacuation, occupation, or limited access to offline resources. At the same time, ICTs open up new opportunities for innovative forms of learning, including blended, adaptive, and personalized learning that meet the needs of the modern student. However, the effectiveness of implementing such technologies largely depends on the presence of a clear strategy for the digital transformation of higher education institutions, the level of digital literacy of participants in the educational process, and access to quality infrastructure.

The problem of the implementation and effectiveness of information and communication technologies (ICT) in higher education in Ukraine has been studied by many Ukrainian scientists, in particular specialists in the field of pedagogy, educational technologies and information systems. Among the leading scientists, it is worth noting V. Bykov, who is one of the founders of the scientific direction of modeling organizational systems of open education and the implementation of cloud technologies in the educational process. His works, in particular the monograph "Information and communication technologies of a single educational space", have become the theoretical basis for numerous studies in this area. R. Gurevich in his works analyzes methodological aspects of the use of ICT in the educational process, and also develops textbooks on information and telecommunication technologies for higher education institutions.

A significant contribution to the development of the topic was made by N. Pavlyshyna, who studied the use of the Moodle platform in e-learning using the example of such areas as "Tourism" and "Social Work".

M. Kozyar studied the integration of ICT and pedagogical technologies in higher education, focusing on mobile and cloud solutions. N. Kussul, although better known as a specialist in computational intelligence, contributed to the development of ICT infrastructure necessary for the digitalization of higher education institutions. O. Glazunova and M. Shyshkina from the National University of Life Resources and Environmental Sciences of Ukraine developed the concept of a university cloud-based learning environment. A. Stryuk and S. Semerikov focused their research on the model of implementing blended learning in Ukrainian higher education institutions.

Among other researchers actively working in this area, it is also worth mentioning V. Babeenko, M. Zhaldak, Y. Zhuk, M. Morse and many others. They study both theoretical and applied aspects of the use of ICT, in particular in the management of educational institutions, the formation of digital competence of teachers and students, as well as in improving the quality of the educational process.

Thus, the issue of effective implementation of ICT in higher education in Ukraine has a wide range of research, covering both fundamental and applied aspects, and remains one of the key topics of modern Ukrainian pedagogical science.

R. Gurevich and M. Kademiya note that the rapid development of information and communication technologies, in particular the Internet, and their widespread implementation in all spheres of the economy have become a powerful incentive for the modernization of the educational sector. Today, according to them, there is practically no educational institution where computer technology, ICT or Internet technologies are not used (Gurevich & Kademiya, 2005).

According to A. Bezugliy, V. Boychuk and V. Umanets, information and communication technologies are tools based on the use of electronic computing equipment and communication means that provide various groups of users with access to services related to the collection, transmission, storage and processing of information in all spheres of social activity (Bezugliy et al., 2022). N. Fominykh defines ICT as a complex of technological tools and resources that facilitate communication and ensure the processes of creating, distributing, storing and managing information. Such tools include computers, the Internet, television, radio and telephone communications (Fominykh, 2009). Continuing the opinion of the above authors, it can be argued that information and communication technologies (ICT) not only provide technical support for information processes, but also play a key role in the transformation of society as a whole. ICTs have become the basis for the formation of an information society, where knowledge, rapid data exchange and access to information resources determine the level of development of both an individual and social institutions.

In addition, ICTs stimulate innovative processes in education, medicine, economics and other areas, contributing to the introduction of new forms of interaction, distance learning, e-government and digital services. In this context, ICTs act not simply as technical means, but as a socio-cultural phenomenon that changes the way of thinking, lifestyle and the structure of relationships in society.

O. Spirin considers information and communication technologies as a set of technologies for developing information systems and building communication networks that require psychological and pedagogical support during design, development, implementation and operation. The importance of using ICTs for formalization and solving problems in various subject areas is also emphasized (Spirin, 2009).

In turn, we will understand information and communication technologies (ICT) as a set of modern technical means, software and technological solutions that ensure the processes of creating, storing, processing, transmitting and distributing information, as well as organizing effective communication between users in various fields of activity, including education, science, economics and management.

A. Bezugliy, V. Boychuk and V. Umanets divide information and communication technologies into two main classes: universal and professionally oriented. Universal ICTs include such tools as text editors, database management systems, spreadsheets, tools for modeling objects, processes and systems that can be used in a wide range of areas to solve general tasks. Professionally oriented technologies, on the contrary, are specialized in a specific field of activity and serve to perform professional functions. These include, in particular, accounting programs, library systems, automated translation platforms, educational complexes and other applied systems (Bezugliy et al., 2022).

According to O. Lytvyn, L. Rudenko and M. Kozyar, ICTs used in the educational process are classified by functional purpose. Among them are: informational and cognitive, which contribute to the independent assimilation of new knowledge; educational-control and training – for testing knowledge and consolidating practical skills; demonstration-modeling and simulation – for virtual reproduction of processes and phenomena; gaming – where learning takes place in the form of a game; problem-based learning technologies that implement cognitive tasks and provide indirect management of the educational process; as well as reference and information tools, to which it belongs (Lytvyn et al., 2021).

Summarizing the approaches of researchers to the classification of information and communication technologies, two main groups of ICT can be distinguished: general-purpose and professionally oriented. The first includes universal software tools used in various industries – text editors, spreadsheets, database management systems, modeling tools, etc. The second group

includes specialized technologies adapted to specific professional tasks – accounting systems, library programs, educational and translation complexes.

In the field of education, ICT is also divided by functional purpose: informational and cognitive (for independent study of the material), control and training (for testing knowledge and forming skills), modeling and simulation (for virtual reproduction of phenomena and processes), gaming (as a motivational and didactic tool), problem-oriented (for implementing creative and cognitive tasks), as well as reference and information systems (electronic databases, dictionaries, encyclopedias, search platforms).

Thus, information and communication technologies (ICT) in the modern educational space act not only as a means of automating routine administrative and educational processes, but also as a powerful tool for transforming the very essence of educational activity. They provide access to a wide range of electronic resources, allow for the implementation of individual educational trajectories, contribute to increasing motivation for learning through interactive forms of interaction, expand the possibilities of distance and blended learning, and also create conditions for the development of critical thinking, creativity and independence of students. All this leads to an increase in the efficiency of the educational process and its compliance with the needs of the modern information society.

According to A. Bezugliy, V. Boychuk and V. Umanets, there are currently two main approaches to determining the role of information and communication technologies in education. The first approach considers ICT as a didactic process organized on the basis of the latest means and methods of information processing, which involves the creation, transfer, storage and display of knowledge, ideas and data in accordance with the laws of cognitive activity of education seekers at minimal cost. The second approach focuses on the creation of a specialized technical environment for learning, where information and communication technologies play the main role. Thus, in the first case, ICT act as a component of the educational process itself, and in the second – as an innovative tool that forms a new learning environment (Bezugliy et al., 2022).

A. Lytvyn, L. Rudenko and M. Kozyar emphasize that ICT significantly transform the educational process, changing not only the structure of teaching and education, but also the very mechanism of knowledge transfer and skill formation. In this regard, the integration of ICT with other pedagogical technologies becomes an important task, which requires a clear understanding of their purpose and determining the effectiveness of their use. At the same time, the problem of formalizing the goals and objectives of educational technologies remains complex and debatable in the scientific and pedagogical community, as does the issue of assessing learning outcomes and managing the educational process (Lytvyn et al., 2021).

V. Boychuk emphasizes that thanks to multimedia capabilities, information and communication technologies allow for a holistic and logical combination of various types of information, presenting it in forms accessible for perception: these can be images (photographs, drawings, maps, slides), audio materials (speech, sound effects, music), video fragments, as well as complex visual effects, animations and simulations. Such multimedia presentations, due to their visual appeal and dynamism, significantly surpass ordinary static text, stimulating students' cognitive interest. In combination with hypertext structures, multimedia content forms hypermedia environments that integrate text, graphic, audio and video information, creating a multidimensional learning space (Boychuk, 2008).

O. Dyshko, T. Zubekhina and N. Pavlyshyna note that thanks to the capabilities of ICT, the concept of continuous and open education is actively developing, within which the student gains freedom in choosing the goals, content, form, time and place of study. This approach creates new challenges for higher education institutions, in particular in ensuring the timely and relevant provision of educational services. In this context, the boundaries between formal, non-formal and informal learning are increasingly blurred, which is clearly manifested in modern formats of electronic learning (e-learning) (Dyshko et al., 2017) and blended learning, which combine the advantages of the traditional classroom form with the capabilities of the digital environment. Such integration contributes to the formation of students' skills of independent knowledge

acquisition, critical thinking, flexibility and adaptability – key competencies that meet the requirements of the modern labor market. At the same time, the need to improve the digital competence of both students and teachers is growing, which necessitates the need to update educational programs, methodological support and organizational structure of higher education institutions. In this process, an important role is played by the ability of ICT to provide personalization of the educational process, analytics of educational data, monitoring of results and operational feedback, which increases the overall quality of education and the level of professional training of specialists.

Ukrainian didactics V. Chaika emphasizes that the potential of information technologies and computer-based learning is extremely broad. In particular, these technologies allow not only to provide educational information, but also to effectively manage the educational process, to verify and correct learning outcomes, to conduct training tasks, and to accumulate data on the course and dynamics of the educational process (Chaika, 2002).

I. Shelevytskyi notes that information technologies, which are based on modern computer and multimedia equipment, open up new prospects for the implementation of modern forms of learning. Distance learning is filled with new content, the active use of online consultations and joint work on educational and scientific projects via the Internet have become familiar elements of the educational process in higher education. This, in particular, creates opportunities for international cooperation between students from different universities, exchange of experience between teachers and scientists. Spline models are increasingly used in the processes of testing knowledge and monitoring educational results (Shelevytsky & Duban, 2010).

V. Bykov emphasizes that the introduction of ICT creates new conditions for improving the quality of education. This is ensured through the development and application of personally oriented teaching methods that meet the individual characteristics of students. A significant role is played by differentiation and democratization of the educational process, which contribute to the development of abilities, creative potential and self-realization of the individual. Important areas are also the organization of collective and international educational activities (education without borders), ensuring wide access to educational information resources and databases, creating automated libraries, as well as the development of a new generation of computer-oriented educational tools. Special attention is paid to the development of tools for assessing educational achievements and means of managing the educational process, which allows increasing the effectiveness of educational activities in general (Bykov, 2010).

Summarizing the approaches of Ukrainian scientists, it can be stated that information and communication technologies (ICT) have a powerful potential for transforming the educational process in higher education. V. Chaika draws attention to the wide functional capabilities of ICT, in particular in providing educational information, managing the educational process, monitoring and correcting results, organizing training tasks and collecting data on the progress of learning. I. Shelevytskyi emphasizes the change in forms and formats of learning thanks to modern technical support: distance learning, online consultations, project cooperation between students from different countries, exchange of experience between teachers – all this has become a reality thanks to the active use of ICT. V. Bykov considers ICT as a tool for improving the quality of education by introducing personally oriented technologies, democratizing learning, organizing collective and international cooperation, ensuring open access to educational resources, as well as creating new curricula, assessment tools and managing the educational process.

Thus, ICT not only modernize traditional approaches to learning, but also open up new opportunities for personalization, openness, intercultural interaction and effective management of educational activities.

T. Sydorenko and V. Zabolotna note that despite the variety of computer programs, they do not yet provide a complete solution to the tasks of routine information processing in the management of higher education institutions. That is why educational administration is increasingly using the latest technologies, in particular cloud services. Cloud technologies involve the use of Internet storage, which allows you to store, edit and exchange information. These include

web interfaces for e-mail, online editors for office documents, and complex computing systems that go beyond the capabilities of a personal computer. The main function of cloud solutions is to provide access to data processing at a distance, when the user connects to the provider's facilities via high-speed communication channels. Among the advantages of cloud technologies are: savings on the purchase and maintenance of software and equipment, dynamic provision of resources according to the user's needs, as well as the transfer of technical support responsibilities to the provider. At the same time, there are also disadvantages – dependence on the quality of the Internet connection, the risk of data loss in the event of unreliable backup, and the complete dependence of the stored information on the service provider (Sydorenko & Zabolotna, 2023).

I. Pshenichna also draws attention to a number of problems and risks that accompany the implementation of ICT in higher education. Among them are the mechanical transfer of traditional (paper) textbooks into electronic format without updating the methodological content, the limited and one-sidedness of educational material within a specific electronic course or discipline, the stereotyped actions embedded in the software, which hinders the development of critical and creative thinking of students. This is especially noticeable in the humanities, where a computer cannot replace a “live” dialogue. Also among the problems are the lack of universal software that would meet the needs of all types of higher education institutions, an insufficient level of interactivity, excessive standardization of knowledge, a decrease in the quality of emotional interaction and an increased load on vision and the psyche due to prolonged use of electronic devices. The dependence of the functioning of educational platforms on the type of media and other technical limitations also require attention from the educational community (Pshenichna, 2023).

Summarizing the statements of scientists, we can single out the key shortcomings and risks of using information and communication technologies in higher education, which need to be taken into account when implementing them:

- technical dependence (the effectiveness of ICT use largely depends on the quality of the Internet connection, the reliability of cloud services and providers, as well as compatibility with types of electronic media);
- data storage vulnerability (storing information in cloud storage is associated with the risks of data loss, especially in the absence of backup or technical failures at the provider);
- software limitations (computer programs often function within the framework of specified algorithms, which reduces flexibility in learning, promotes standardization of thinking and hinders the development of creativity and critical thinking);
- stereotyping of educational material (electronic resources often simply duplicate paper textbooks without meaningful modernization, which reduces the effectiveness of digital learning);
- lack of live communication (reduction in the level of emotional and non-verbal interaction between the teacher and the student has a particularly negative impact on the humanities);
- lack of universality (there is no single software that would meet the needs of all higher education institutions, taking into account their specialization and methodological specifics);
- visual and psycho-emotional load (long work at the computer causes increased strain on vision, fatigue, emotional exhaustion, which negatively affects the well-being of students and teachers).

These shortcomings indicate the need for a balanced, critical approach to the implementation of ICT in the educational process and the need for constant improvement of digital educational solutions.

Thus, the results of the theoretical study indicate the active expansion of digital tools in the educational process, in particular, the widespread implementation of distance learning platforms, the use of cloud services for storing and exchanging information, as well as the use of educational process management systems (LMS), which allow more effective organization of training, monitoring of progress and feedback with students. Despite the positive dynamics of digitalization of education, the study identified a number of significant problems. First of all, this is the uneven access to information and communication technologies (ICT), which is manifested

both in a regional context and within individual educational institutions. Among the main barriers are the lack of a stable Internet connection, insufficient technical equipment, and limited access to modern software. In addition, a significant part of teachers and students demonstrate an insufficient level of digital literacy, which complicates the full use of ICT capabilities in the educational process. Special attention should be paid to the issue of limited funding, which hinders the development of digital infrastructure and the renewal of the material and technical base of educational institutions. At the same time, the analysis of the effectiveness of the implementation of ICT shows mostly positive results. In particular, there is an increase in the quality of the educational process through the use of interactive tools, personalization of learning, flexibility in choosing the forms and pace of learning. ICT also contributes to the growth of students' learning motivation, their involvement in active cognitive activity and the development of independent work skills. As a result, digital technologies not only strengthen traditional forms of learning, but also open up new opportunities for creating an innovative educational environment focused on the needs of modern society.

A promising direction for further research is the development of methods for integrating ICT, taking into account the national context and pedagogical needs.

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1.10. Oksana Patlaichuk, Iryna Briukhovetska, Volodymyr Tovstohan. INFORMATION AND COMMUNICATION TECHNOLOGIES IN HIGHER EDUCATION IN UKRAINE: STATUS OF IMPLEMENTATION AND EFFICIENCY

The article examines the state of implementation of information and communication technologies (ICT) in higher education in Ukraine and assesses their effectiveness in the educational process. The main approaches to the classification of information and communication technologies are analyzed, two main groups of ICT are distinguished: general-purpose and professionally oriented. The advantages and challenges associated with the digitalization of education are identified. Based on empirical data, the impact of ICT on the quality of education, interaction between participants in the educational process and innovative development of the university environment are substantiated. The article may be useful for scientists, teachers, administrators of higher education institutions and developers of educational strategies.

1.11. Larysa Poliakova. THE MEANING OF MEDIA LITERACY OF THE UKRAINIAN YOUTH IN THE MODERN HISTORICAL REALITIES

The modern historical realities, in which Ukraine, is staying are marked not only by military challenges, but also by the large-scale informative war. The young people, who are the most active users of digital media, at the same time become the main target of informative attacks. In these conditions, media literacy is one of the key competencies of the 21st century, as it helps to distinguish between true and fake messages, to counter propaganda and to form one's own public position. The meaning of media literacy of the Ukrainian youth people in the conditions of the modern historical challenges, in particular the russian-Ukrainian war and the globalized informative space has been considered in the article. The necessity of the development of the critical thinking, the ability to recognize fakes and to counteract manipulations in media has been emphasized. It is emphasized that the formation of media literacy among the young people is an important factor of strengthening of the national security, the development of the democratic society and the integration of Ukraine into the European space, increasing informative security and the integration of Ukraine into the European educational and cultural space.

Chapter 2. DIGITAL TRANSFORMATION OF THE ECONOMY AND MANAGEMENT

2.1. Iryna Anhelko. THE ROLE OF INFORMATION TECHNOLOGIES IN IMPROVING MARKETING EFFICIENCY IN DIGITALIZATION

The essence and importance of information technologies in improving the efficiency of marketing activity of enterprises in the conditions of digitalization of the economy is revealed. The essence and functional purpose of IT in marketing, the role of modern tools, including CRM systems, Big Data analytics, marketing automation, social networks, cloud platforms and artificial intelligence, which provide new approaches to the management of relationships with clients, optimization of business proceeds and business proceeds, are outlined. It is shown that the use of digital technologies can significantly reduce time and resources, increase the accuracy of forecasting, instantly evaluate the effectiveness of marketing campaigns and form more personalized consumer proposals. It is concluded that information technologies are a key factor in transformation of marketing strategies and determine the success of enterprises in the digital era.

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