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ANALYTICAL STUDY OF SOFTWARE AND TECHNICAL MEANS FOR INCLUSIVE EDUCATION

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The implementation of digital methods, particularly the use of computers, promotes the creation of diverse corrective and educational programs. This allows educators to go beyond traditional teaching methods, motivate students, and employ new approaches for students with special educational needs.

The synergistic combination of pedagogical practices and innovative technical tools opens new opportunities for developing students' perception, concentration, and fine motor skills, as well as teaching the basics of computer literacy. Information and communication technologies (ICT) and interactive multimedia change the dynamics of the educational process, expanding access to resources and facilitating independence from physical location.

The shift to a process-oriented approach, which views learning as a dynamic process, ensures the inclusion of each student's individual needs. The use of ICT contributes to effective inclusive education, allowing students with disabilities to actively participate in the educational process.

ICT functions as compensatory, communicative, and didactic tools, facilitating access to educational resources, creating alternative forms of communication, and expanding pedagogical strategies. Assistive technologies and adaptive software promote individualized learning, making it accessible to all students. However, the integration of ICT into inclusive education faces challenges that need to be addressed to ensure the successful implementation of inclusive approaches.

The use of ICT in higher education increases the efficiency and accessibility of inclusive learning, creating conditions for the full inclusion of students with various needs in the educational process.

Keywords: *ICT, inclusive education, information technology, higher education institutions (HEIs), teaching methodology, special educational needs.*

Problem Statement. Inclusive education is a key element of modern educational policy, aimed at ensuring equal access to quality education for all students, including those with special educational needs. The successful implementation of inclusive education requires the availability of effective software and technical means that facilitate the adaptation of the educational process to the individual needs of learners.

Analysis of Recent Research and Publications. Research conducted on this topic is based on a formalized pedagogical approach with elements of psychology [1] and

does not decentralize the task of engaging a wide range of learners. The papers [2, 4, 5] focus on working with school-age students. Additionally, there is no tracking of the current state of the problem in works [3, 6], with much attention given to the pedagogical aspect, which is undeniably important and key. However, there is insufficient attention to identifying and establishing the level of inclusive education in higher education institutions, and there is also a lack of information about the implementation of modern information technologies in the educational process.

Aim of the Article. The aim of this study is to conduct a comprehensive analysis of the software and technical means used for inclusive education, in order to identify their advantages and disadvantages, as well as to develop recommendations for their effective implementation and use in the educational process.

Presentation of the Main Research Material. The rapid development of new information technologies and their implementation in Ukraine in recent years has created increasing opportunities for youth development. Computer literacy is becoming a necessary condition of modern life and serves as an effective technical means to diversify the educational process. The rapid pace of new trends and the application of computer technologies significantly affect students' perception of the world around them [7-11].

In the field of education, particularly in the context of inclusive education, information technologies play a key role in enhancing the effectiveness and quality of corrective and educational processes. The implementation of methodologies based on the use of digital equipment, especially computers and their components, is an important step in creating diverse corrective and educational programs. Undoubtedly, digital technical means in the educational process have numerous advantages. Firstly, they allow for the transcendence of traditional teaching methods, providing additional motivation for learning activities, especially in complex cases where other methods are not sufficiently effective. Moreover, the use of computer technologies opens new "bypass routes" for the formation and development of all students, particularly the application of corrective methodologies for students with special educational needs [12, 13].

The synergistic combination of pedagogical practices and innovative technical tools allows for the creation of new content directions, expanding the possibilities of using analytical systems, and developing students' perception, concentration, and fine motor skills. Studying the basics of computer literacy is also important, as this approach will enhance the effectiveness of corrective education in all its aspects and ensure inclusive conditions for the education of students with diverse needs [14].

The application of information and communication technologies (ICT) and interactive multimedia in education opens new perspectives for students and changes the traditional dynamics of the educational process. In particular, the integration of ICT in education promotes independence from the physical location of participants, expands access to resources via the Internet, and enables students to independently initiate the learning process [15].

Table 1

**Principles of Equality, Accessibility,
and Effectiveness in the Educational Process**

	Traditional Model	New (Inclusive) Model
Role of Faculty	Expert	Partner
Learning Process	Teacher-centered	Student with special educational needs-centered
Criteria of Success	Demonstration of existing knowledge, skills, and abilities	Accessibility, new knowledge, improvement in quality of life
Type of Knowledge	Acquisition, accumulation, reproduction	Interpretation, explanation, accessibility
Knowledge Assessment Methods	Testing	Practice-oriented tasks (using sensory systems)
Educational Paradigm	- Content-oriented; - Teacher-oriented	Oriented towards the development of a holistic personality
Dominant Form of Learning Activities	Independent work	Group work, work with a tutor

The changes in the educational process highlighted in Table 1 indicate a transformation from the traditional model to a new one based on the use of ICT. In this new approach, the faculty acts as a partner, and the learning process focuses on the students. Additionally, the criteria for success shift from demonstrating existing knowledge to improving personal skills and knowledge.

The new educational strategy, which views education as a process of developing the ability to comprehend and interpret knowledge, transforms the role of the learner from a passive consumer to an active participant in the educational process. The use of ICT enables students to expand their knowledge, enhance their skills, and actively engage in the learning process through group work and other interactive methods [16].

One of the key aspects is the transition from a content-oriented to a process-oriented approach, where learning is understood as a dynamic process rather than a final product. This approach is characterized by observing the growth of students' personal metrics and their participation in dynamic dialogues [17-21].

An important stage in this context is inclusive education, which considers the diversity of students and their individual characteristics. The inclusive approach does not view differences as a problem but as an opportunity to enrich the educational process. By addressing the needs of each student and ensuring access to education for all, inclusive education creates a conducive atmosphere for creativity, trust, and mutual support [18, 19].

ICT, due to its compensatory properties, helps individuals with disabilities actively participate in the educational process by providing access to various materials in an acceptable format. This creates opportunities to overcome barriers and ensures equal opportunities for all participants in the educational process [19].

Inclusive education for students in higher education institutions becomes even more relevant and effective with the implementation of ICT as a compensatory, communicative, and didactic tool. This opens new opportunities for students with special educational needs and creates favorable conditions for learning.

The integration of information and communication technologies (ICT) into the education system becomes an important step in achieving greater efficiency and accessibility in inclusive education. The use of ICT serves as a compensatory, communicative, and didactic tool, opening new perspectives for students with disabilities and creating favorable conditions for their full inclusion in the learning process (see Fig. 1).

Compensatory use of ICT means that technology supports traditional learning activities. This includes facilitating access to educational resources, partially compensating or replacing lost natural functions, making education more accessible to students with various types of disabilities.

In the communication aspect, ICT is used to create alternative forms of communication and support alternative communication. This allows students with disabilities to communicate and interact effectively in the learning environment.

The didactic aspect includes a revision of traditional methods of learning and teaching with the help of ICT. This leads to the expansion of pedagogical strategies and the introduction of new approaches to inclusive education. Assistive technologies and special software are selected taking into account the specific needs of students, which contributes to a more effective learning and development process.

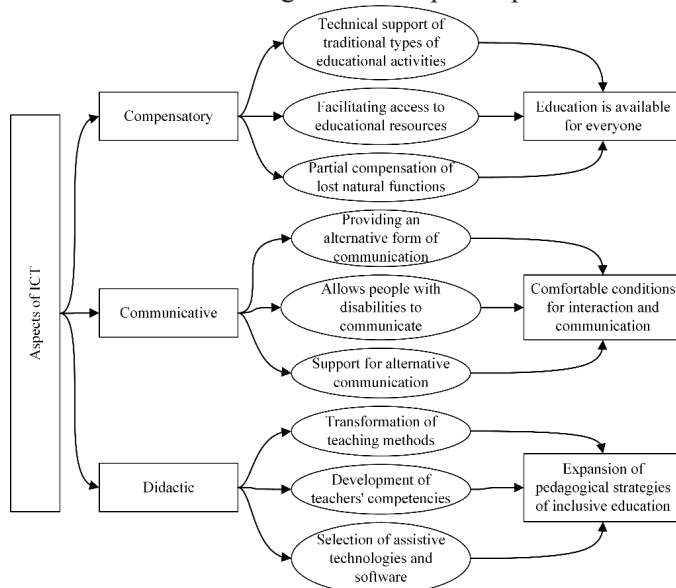


Fig. 1. ICT and accessibility for learning outcomes

The use of ICT in higher education also emphasizes the importance of individualizing learning approaches. Each student can use technology according to their particular needs and learning styles. The didactic capabilities of ICT allow adapting the learning content, providing a personalized approach for each student. In particular, adaptive software for text reading, speech recognition or other specialized applications help students with various types of disabilities in the implementation of educational tasks. This not only expands students' opportunities, but also creates conditions for their active interaction with the educational material.

With the help of ICT, teachers can develop interactive teaching methods, use virtual laboratories and simulations, which makes learning more exciting and effective for all students, including those with special needs. Therefore, the integration of ICT in higher education defines a new level of accessibility, efficiency and inclusiveness, making learning more adaptable and accessible to the diversity of the student body.

Inclusive education becomes more effective thanks to the use of information and communication technologies (ICT). These technologies allow for individualized learning, making it accessible to all students. Through video conferencing and chats, ICT facilitates communication between students and teachers. In addition, they revise traditional teaching methods by expanding pedagogical strategies. The use of ICT promotes the development of digital skills and prepares students for the modern labor market, making education democratic and accessible to all (Figure 2).

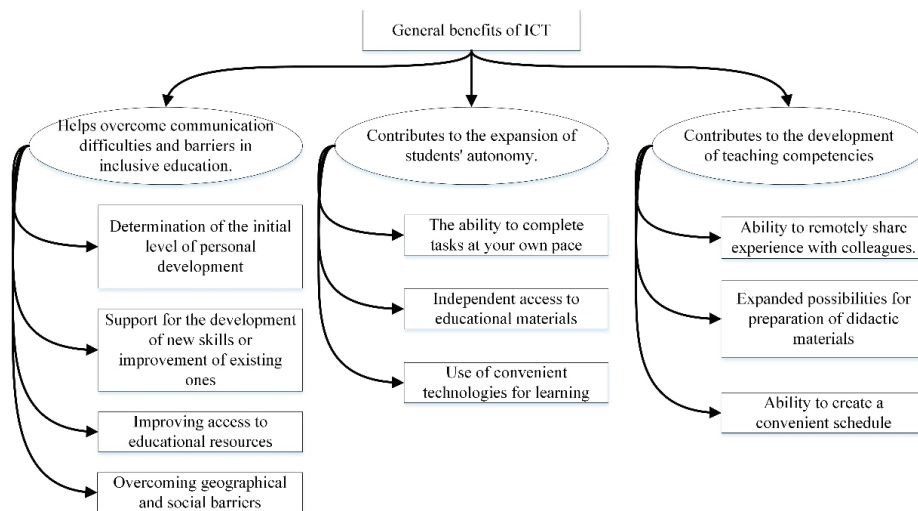


Fig. 2. Effectiveness of ICT in the educational process

The use of ICT within inclusive education not only creates equal opportunities for all students but also contributes to their full educational development and active participation in the learning process.

Inclusive education in higher education institutions is supported by various types of ICT, which open up new perspectives for students with disabilities. The effective use of these technologies promotes the creation of an inclusive learning environment. Standard

technologies such as personal computers, laptops, tablets, etc., equipped with built-in accessibility settings, ensure access to educational resources and make learning more flexible. Assistive technologies such as hearing aids, screen readers, keyboards with special features, and alternative communication systems are essential tools in educational processes within inclusive groups. These technologies provide more personalized learning conditions. Alternative data formats such as HTML and DAISY (digital audio books), Braille printers, and speech synthesizers enhance information accessibility for students with diverse needs [15].

Despite the numerous advantages that ICT provides in inclusive education, there are challenges and issues that require attention for the successful integration of ICT into inclusive education (see Table 2).

Table 2

Challenges and problems in the use of ICT in education

Problem	Availability and support	Financial constraints	Competence of users	Absence confidence	Barriers in technical and educational approaches	Solution
The cost of assistive technologies is high		+				Providing funding through grants and cooperation with partners
Low ICT competence of students and teachers			+			Conducting training and support to increase the level of competence
Uncertainty and confusion when using technology				+		Providing professional development and creating a support network
Access difficulties for students with special educational needs	+					Ensuring the availability of software. Development of adaptive interfaces
The need for system variables of the educational system and methodology					+	A systematic approach to inclusive education, including technical solutions and changes in educational programs

This table helps to identify which aspects need special attention and which solutions can be implemented to overcome each challenge in inclusive education through the use of ICT.

This article underscores the transformative role of ICT (Information and Communication Technologies) in education, shifting from traditional to more inclusive and process-oriented approaches. It discusses ICT's ability to compensate for disabilities, facilitate communication, and support diverse learning styles through adaptive software and specialized tools. Moreover, ICT integration in higher education promotes personalized learning experiences and prepares students for the modern workforce.

Despite the advantages, challenges such as technological barriers and the need for teacher training are acknowledged. The article concludes by advocating for continued research and strategic implementation to maximize ICT's potential in fostering inclusive education and improving learning outcomes for all students.

Conclusions. In today's world, the rapid development of information technologies significantly affects educational processes, in particular inclusive education. The use of software and technical tools opens up new horizons for the education of young people, making the educational process more flexible and accessible. Information and communication technologies (ICT) act as a key tool for improving the quality and efficiency of the correctional and educational process.

ICT help go beyond traditional teaching methods, providing additional motivation and effective solutions for students with special educational needs. Thanks to the synergistic combination of pedagogical practices and innovative technical means, it is possible to create multidisciplinary correctional and educational programs that take into account the individual needs of each student.

The use of ICT allows for the individualization of the educational process, giving students the opportunity to adapt educational materials according to their special needs and learning styles. Teachers can use interactive teaching methods, virtual laboratories and simulations, which make learning more interesting and effective.

However, the integration of ICT in inclusive education faces a number of challenges, such as the provision of technical equipment, training of pedagogical personnel and adaptation of existing programs to new conditions. For the successful implementation of inclusive approaches, it is necessary to solve these problems, ensuring accessibility and effectiveness of education for all students.

Thus, the use of information technologies in the system of inclusive education is not only necessary, but also a promising direction of development, which allows creating equal opportunities for all participants in the educational process, contributing to their full personal and professional development.

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АНАЛІТИЧНЕ ДОСЛІДЖЕННЯ ПРОГРАМНИХ І ТЕХНІЧНИЙ ЗАСОБІВ ІНКЛЮЗИВНОГО НАВЧАННЯ

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Впровадження цифрових методик, зокрема використання комп'ютерів, сприяє створенню різнопрофільних корекційних та навчальних програм. Це дозволяє виходити за межі традиційних методів навчання, мотивувати учнів і використовувати нові підходи для студентів з особливими освітніми потребами.

Синергетичне поєднання педагогічних практик та інноваційних технічних засобів відкриває нові можливості для розвитку сприйняття, концентрації та дрібної моторики студентів, а також вивчення основ комп'ютерної грамотності. Інформаційно-комунікаційні технології (ІКТ) і інтерактивні мультимедіа змінюють динаміку освітнього процесу, розширюючи доступ до ресурсів і сприяючи незалежності від фізичного розташування.

Перехід до процесно-орієнтованого підходу, який розглядає навчання як динамічний процес, забезпечує включення індивідуальних потреб кожного студента. Використання ІКТ сприяє ефективному інклюзивному навчанню, дозволяючи студентам з обмеженими можливостями активно брати участь в освітньому процесі.

ІКТ діють як компенсаторні, комунікаційні та дидактичні засоби, що полегшують доступ до навчальних ресурсів, створюють альтернативні форми зв'язку і розширюють педагогічні стратегії. Асистивні технології та адаптивне програмне забезпечення сприяють індивідуалізації навчання, роблячи його доступним для всіх студентів. Однак, інтеграція ІКТ у інклюзивну освіту стикається з викликами, що потребують вирішення для забезпечення успішної реалізації інклюзивних підходів.

Використання ІКТ у вищій освіті підвищує ефективність та доступність інклюзивного навчання, створюючи умови для повноцінного включення студентів із різними потребами в освітній процес..

Ключові слова: *ІКТ, інклюзивна освіта, інформаційні технології, ЗВО, методологія навчання, особливі освітні потреби.*

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