The Role of Information Communications in the Educational Environment of Higher Education Institutions

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Abstract: In a rapidly evolving world with advancing technology and digital tools, understanding the role of information communications in higher education has become highly relevant. This study aims to determine the impact of information communications on the educational process and student communication and proceeds from the need to understand this impact in the context of the growing digitalization of society. The research objective was accomplished through the utilization of an analytical approach, involving the examination of available data and relevant literature in the field. Both qualitative and quantitative methods were employed to analyze the data, enabling the formulation of impartial conclusions regarding the influence of information communications on the higher education institution’s educational environment. The main results found that using information communications in higher education had a positive impact, including the creation of interactive learning materials that engaged students and boosted motivation. Virtual communication and knowledge sharing also enhanced students’ communication skills for their future careers.

Keywords: educational process, online communication, academic performance, electronic resources, development strategies, scientific research
1. Introduction

The relevance of information communications is due not only to the rapid development of information technologies but also to the need for more effective knowledge exchange and communication between participants in the educational process. Modern learners actively utilize digital tools and social media in their everyday lives, and the study indicates that the use of information communication technologies in the educational environment contributes to improved material comprehension, the development of communication skills, and collaboration between learners and educators. Research conducted in this area indicates the need to develop new approaches and strategies for using information communications in the educational process. However, some questions remain open and require further study.

Parveen and Husain (2021) focused on the role of infographics in learning and mastering knowledge. They defined infographics as a graphic means of transmitting information that promoted easy assimilation of the material and increased the effectiveness of interaction between teachers and education. The study focused on the importance of developing visual learning techniques that helped to understand and remember information. The use of infographics in educational materials can make learning more interesting and effective, stimulating the motivation of educational applicants to study subjects (Derevyanko & Zalevska, 2023; Imashev et al., 2016).

Shepelskyi et al. (2023) focused on managing the digital educational environment of educational institutions. The authors reviewed modern digital tools and technologies used in education, analyzed existing management strategies, advantages, and limitations of digital innovation, and highlighted the challenges facing educational institutions. The study highlighted suggestions for optimal strategies that could help educational institutions successfully implement and effectively use digital technologies to improve the educational process and improve the quality of learning.

A study by Ajaps (2023) explored the role of equity in achieving environmental sustainability in higher education. The main focus was on investigating the limitations that affected the implementation of environmental justice in universities. The study highlighted and examine the key factors that hindered the development of equity in the context of environmental sustainability in educational institutions. This helped to understand the challenges and potential ways to improve sustainability strategies in higher education, with a focus on ensuring a more equitable approach to environmental protection in educational institutions (Koshoeva et al., 2023).

A study conducted by Ivanenko et al. (2023) focused on the evolution of educational policy within the broader framework of European integration and digital transformation. The research extensively explored the key facets of transformation occurring within the national educational system in alignment with the nation’s endeavors to align with European Union standards. The authors delved into the influence of European integration on the reform efforts within the educational sphere and conducted a comprehensive analysis of the specific modifications enacted to align the national system with European standards of quality and efficiency.

In a paper published by the authors Kanivets et al. (2020), the development of mobile augmented reality applications aimed at investigating three-dimensional models in technical
drawing graphics was investigated. These apps provided the ability to interact with images and an interactive learning approach (Nesterenko, 2023). Researchers focused on developing innovative approaches to the learning process, harnessing the potential of mobile technologies to improve the quality of education and increase understanding of the subject. Given the importance of mobile applications in modern learning, this research was essential for further developing an interactive and effective learning environment.

The purpose of this study is to examine the role of information communications in the educational environment of higher education institutions and establish the best ways to use them to improve the quality of education. The purpose of the study is to understand how information communications affect the learning process and contribute to the development of educational applicants and teachers.

2. Materials and Methods

Various methods were used to conduct the study, allowing a comprehensive analysis and drawing objective conclusions. First, to gain an in-depth understanding of the problem, an analysis was conducted in the educational environment of higher education institutions. Second, the available data and literature related to this subject were systematically processed. A large number of scientific studies, papers, reports, and other publications were analyzed, which allowed obtaining confirmed results and additional arguments for the problem under study. Qualitative and quantitative methods of analysis were used for deeper generalization and systematization of the obtained data. The qualitative analysis included categorization and thematic analysis of text materials, which allowed an understanding of the participants in the process and their views on the implementation of information communications. The quantitative analysis involved statistical data processing and the use of numerical indicators, which allowed assessing the scale and intensity of the introduction of digital technologies in the educational process. The introduction of information and communication technologies in higher education institutions has a positive impact on the educational environment. The use of digital tools increases the availability of knowledge, improves the quality of training, and encourages the active involvement of applicants for education in the educational process. The introduction of information and communication technologies ensures the modern training and development of educational applicants in a digital environment.

Continuing the study methodology, the third method that was applied is the method of comparative analysis. This method allowed comparing different approaches and practices of using information and communication technologies (ICT) in higher education in different countries or institutions. Through comparative analysis, the features, strengths, and weaknesses of various approaches were analyzed in detail, which helped to draw reasonable conclusions and recommendations for optimizing the use of ICT in specific higher education settings. The comparative analysis allowed comparing different models and practices used in different countries or institutions of higher education regarding the implementation and use of ICT in educational processes. This allowed identifying trends that contributed to the successful implementation and effective use of ICT and factors that may become obstacles to success.

The analysis of various approaches also helped to identify the most effective practices and
methods of using ICT in higher education, which could be used as a basis for further research and development of strategies for improving educational processes. The use of the comparative analysis method allowed for avoiding one-sided approaches and conducting an objective assessment of various options for using ICT in educational processes. An important result was the identification of the advantages and disadvantages of different systems, their potential, and limitations, which contributed to the creation of a comprehensive understanding of the role and importance of ICT in higher education. The obtained conclusions and recommendations allowed for making an informed choice and implementation of optimal approaches to the use of information and communication technologies in specific conditions. This can contribute to improving the quality of the educational process, training highly qualified specialists, and developing higher education in general, ensuring a high level of competence and adaptability of applicants for education in modern society.

3. Results

The use of ICT is at the forefront of higher education, as they have a substantial impact on the formation, transfer, and transformation of knowledge. ICT open up new perspectives related to the effective use of modern information resources in higher education. In particular, the access to open educational resources on the Internet permits the possibility of online communication with applicants for education and colleagues, prompts updating of educational material, automation of control, management and organization processes, and many other advantages (see Figure 1).

Figure 1

ICT Competence

Source: compiled by the authors.
In the modern educational environment, information technologies are used as a subject of study, tools for solving educational problems, and a set of teaching tools. As a subject of study, ICT allows discovering the technology of information interaction and mastering the necessary skills. As a toolkit, they help applicants to solve academic and professional tasks, providing access to the necessary information and resources. As a set of learning tools, ICT optimizes the process of cognition and contributes to the formation of an individual style of professional activity (Majeed et al., 2022).

The use of ICT in higher education involves creating virtual educational environments with different subject orientations to prepare future specialists for real challenges. These environments are based on real-world software tools used in their professional fields and include elements that replicate classrooms, e-governance laboratories in education, interactive classrooms, and electronic management systems for the educational environment. These learning environments are built on real-world software and have a prepared information base and a wide range of scenarios for activities that an education applicant can perform in these environments. In addition, they include control and measurement materials for assessing the success of educational applicants (Ivanenko et al., 2023; Slobodeniuk, 2023). This “immersion” in the information environment allows educational applicants to get a more practical approach to learning aimed at developing real professional skills.

Ukraine has a developing ICT sector that has shown rapid growth in recent years. Key areas of focus include software development, telecommunications infrastructure, e-governance, and emerging technologies like AI. Ukraine has a strong talent pool for IT and software engineering. Over 200,000 specialists are employed in the IT industry, making Ukraine the 4th largest exporter of IT services in Europe. Major multinationals have R&D (research and development) centers in cities like Kyiv, Lviv, and Kharkiv. The country has also invested heavily in developing its fiber and mobile internet infrastructure. 4G connections reach over 96% of the population. Initiatives like the launch of the 4G Ukraine mobile network by lifecell in 2021 are helping connect more citizens. 5G rollout has begun in major cities as well.

Ukraine’s e-governance systems have made progress in moving citizen services online through platforms integration of platforms like iGov, Diia, and Smart City. Adoption of eIDs, electronic documents, e-health, and e-procurement services has simplified bureaucracy. Emerging technologies are a strategic priority, supported by organizations like UNIT City, Ukraine’s largest innovation park. Startup accelerators also foster local entrepreneurship in areas like AI, blockchain, IoT, and big data analytics. However, challenges remain around cybersecurity threats, infrastructure gaps between urban and rural areas, and the need for greater high-tech skills development. Overall, Ukraine’s maturing IT ecosystem powers the digital transformation of business, government, and society.

The “5E learning model” in Ukraine is becoming increasingly popular in educational practice. This approach is actively used in teaching, helping to engage students in active learning. This model refers to a pedagogical approach used in education. It is designed to engage students in active learning and is based on five key stages or phases, each starting with the letter “E.” These stages are:
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1. Engagement: At this stage, educators aim to capture the students’ interest and curiosity, making the topic relevant and engaging.

2. Exploration: Students are encouraged to explore and investigate the subject matter, often through hands-on activities or experiments.

3. Explanation: In this phase, teachers provide explanations and guidance to help students understand the concepts they’ve explored.

4. Elaboration: Students deepen their understanding by applying the knowledge and skills they’ve acquired in more complex and challenging tasks or projects.

5. Evaluation: This final stage involves assessing students’ learning through various means, such as quizzes, tests, or assessments.

The “Internet of Things (IoT)” refers to a network of interconnected physical devices and objects that are embedded with sensors, software, and other technologies, allowing them to collect and exchange data over the internet. These devices can range from everyday objects like household appliances and wearable fitness trackers to industrial machinery and smart city infrastructure. The IoT enables these devices to communicate and interact with each other, share data, and perform tasks autonomously, often with the goal of making processes more efficient, improving decision-making, and enhancing user experiences.

In summary, the 5E learning model is an educational approach with five stages aimed at engaging students in active learning, while the Internet of Things (IoT) refers to a network of interconnected physical devices capable of collecting and sharing data over the internet to enhance various aspects of our lives.

One of the key aspects of the role of information communications in the educational environment of higher education institutions is to increase the availability of education. ICT allows for avoiding geographical, social, and other restrictions that may prevent applicants for education from obtaining a quality education. Through the use of online courses, webinars, electronic textbooks, and other electronic resources, education applicants can study at a convenient time and place, interact with teachers and applicants for education, and receive individual support and control from teachers. This expands access to education for people who previously did not have such an opportunity due to physical, social, or other circumstances. In addition, information communication technologies can create a favorable environment for active learning and attract educational applicants to actively take part in the educational process (Ivanenko et al., 2023). They provide an opportunity to use interactive teaching methods and contribute to the creation of a collective learning space in which education recipients can exchange ideas, studies, and experiences. Such technologies stimulate independence, critical thinking, and creativity of educational applicants and develop collaboration and communication skills. Information and communication technologies have great potential in higher education. They provide new opportunities for the formation, transfer, and transformation of knowledge, increase the accessibility of education, and promote active learning of educational applicants. However, successful integration of ICT into the educational environment requires proper teacher
training and appropriate infrastructure (Denysiyuk, 2023). Only if these aspects are considered can optimum results of using ICT in the education and training of future specialists be achieved.

Through a didactic complex that organizes methodological, content, organizational, procedural, and educational components, it is possible to achieve the goals of information training for future teachers and managers of the educational field. This complex information training ensures continuity and continuity in the professional education system. In a modern educational environment, ICT is used as a means to move from traditional to active forms of learning, contributing to a more effective assimilation of knowledge by educational applicants (Bekpayeva & Nikiforova, 2023). Traditional requirements, such as restrictions on the place, time, and duration of training, are becoming obsolete. ICT provides an opportunity to individualize learning by considering the level of training and experience of educational applicants and using a variety of information resources (Deja et al., 2021). They also change the nature of educational interaction, allowing a shift from a directive to an interactive form of communication. The modern information environment of higher education institutions is based on various means of support, such as technical, software, information, methodological, and organizational. They allow participants in the educational process to interact with different types and levels of Information Resources, use ICT tools, implement pedagogical technologies and algorithms for managing the educational process, and support innovative and scientific activities.

The information environment of higher education institutions aims to create convenient and accessible interactive access to various educational resources. It allows educational applicants, teachers, and researchers to use the global network information space for learning and information exchange. The information environment of the universities contributes to improving the efficiency of the educational process and the development of the student community. The possibility of having an internal information and network structure allows for the integration of various university departments such as departments, deans’ offices, research laboratories, admission committees, libraries, monitoring systems, and quality management systems into a coherent system. This system should meet modern standards and trends in the development of e-learning and learning management, which allows the creation of a modern and effective educational environment for the university. It should ensure the unification of navigation tools so that users can have quick and convenient access to all information resources (Alrikabi et al., 2022).

In addition, the information environment must consider the requirements of information security and copyright compliance. This can ensure the protection of information and ensure the legitimate use of resources. The advantages of such an information environment include the use of a variety of freely available information resources, the use of multimedia elements of educational materials, and the ability to use electronic portfolios to integrate academic achievements (Luiza et al., 2022). It also provides flexibility in the trajectory and time parameters of training and the possibility of interactive communication between the teacher and applicants for education in the context of the subject. For teachers, such an environment provides opportunities to update educational resources quickly, monitor educational activities automatically, adjust the educational process depending on the needs of each educational applicant, and organize and monitor in detail the independent work of educational applicants (Alrikabi et al., 2022). The information environment goes beyond simple access to resources, providing ample opportunities for effective
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organization and implementation of the entire educational process with a high level of quality. This helps to improve the quality of learning and provides more interactive and convenient learning for all participants in the educational process.

Today, higher education institutions are changing their approach to ensuring equal opportunities for quality education through the use of modern ICT. The main conditions for an open educational process in various types of higher education institutions include: the development of high-quality electronic educational resources and ensuring their accessibility for all participants in the educational process is one of the main goals. Important is to create innovative computer-oriented training systems and methodological systems to be implemented in the practice of training the use of data analysis systems contributes to the support of scientific research and effective management of educational processes and the scientific field (Umirezakova et al., 2022). The management of an educational institution is important, and for its effective operation, necessary is to have a well-established management mechanism. Managers and education professionals should improve their managerial skills, including leadership skills. The use of ICT can play an important role in this process. For example, some programs help model role situations and develop management skills, such as the SIMULEARN program. The game, in a team format, allows participants to master the key ideas and principles of the educational process.

When deciding on the use of ICT in the field of higher education, considering the broad strategic goals of the system’s development is necessary that cover the following aspects:

• Introduction of innovative technologies that are applicable not only in the educational process but also in the field of administration. This will facilitate effective collaboration with staff and free up resources to address other training issues.

• Development of ICT skills among teachers, which allows them not only to use new programs in the educational process but also to create their own methods in the information educational environment and use distance methods of professional development.

• Formation of online communities and the creation of virtual groups contribute to the exchange of information at the national and international levels.

• Development of special teacher support services based on publicly available resource centers;

• Systematic monitoring of ICT application and quality assurance of higher education.

The examination of various sources, including the Treaty of Lisbon (2007), the European Centre for the Development of Vocational Training (2013), and UNESCO (2022), shows that the use of ICT in higher education in Europe at the beginning of the twenty-first century is a substantial strategic priority for educational policy and socio-economic development. Therewith, pan-European strategies are formed considering the interests and specific features of all European Union (EU) states. National governments are required to comply with standards, regulations, and decisions relevant to European countries.
The authors considered Slovenia’s experience as the undisputed European leader and “generator of ideas” for implementing ICT in higher education among post-socialist EU member states. One of the ICT development indicators, the network readiness index, shows that Slovenia ranks 3rd with a rating of 7.38, which is the highest among the post-socialist member countries of the ICT Development Index (2017). In recent years, more than 1000 new jobs have been created in Slovenia, and more than 7500 teachers have acquired ICT skills. The introduction of ICT has contributed to the spread of these skills to all segments of society. In the paper by Ojsteršek et al. (2016), six strategic areas aimed at ensuring the successful development of the higher education system in the country were identified.

The development of innovative approaches to the use of ICT in the educational process consists in creating and implementing new pedagogical strategies, models, and methods that emphasize the importance of using ICT at all stages of learning. This includes evaluating the effectiveness of information and communication technologies, flexibility in teaching and learning methods, creating virtual environments for communication and collaboration, effective work with various sources of information, systematic monitoring of progress, and the self-assessment of competencies (Uludag, 2023). Also important is the ability to use a variety of pedagogical technologies, such as multimedia resources, mobile devices, and portfolios, which are aimed at solving educational problems. Implementation prospects include the development of interdisciplinary projects, the creation of innovative international projects, the development of pedagogical technologies based on open educational systems, the development of electronic materials, and the provision of cooperation through the open ICT platform (Piddubna & Gorobynskaya, 2023).

The principle of maximum openness and cooperation in ICT includes the creation of an accessible and collaborative ICT platform, the development of open electronic resources, the provision of services, the development of new pedagogical concepts and approaches, and the use of innovative models of motivation and cloud technologies in the field of education. In addition, it provides for the modernization of the educational infrastructure and the creation of a favorable, interactive environment for the partnership of all stakeholders and the effective use of ICT in the educational process. The prospects for implementing and mastering this strategy include modernizing the national educational network and meeting the needs of higher education institutions for didactic support and technical assistance to expand interdisciplinary research and scientific partnerships, improving the system of autonomy of various institutions and levels of higher education institutions (Vovchenko, 2023).

Digital skills implies increasing the level of digital competence and the use of ICT in the educational system. It also increases the importance of core competencies in general, higher education, and adult education. This strategy provides for the development of common skills of teachers, ICT coordinators, supervisors, teachers of higher education institutions, specialists, and employees by strengthening the interaction of professional communities, active exchange of experience, and providing high-quality information services such as consulting and technical support. Prospects for implementation include encouraging higher education institutions to use ICT in interaction with education applicants systematically, their active involvement in the use of ICT in communication with teachers, and performing independent work tasks. The need to create opportunities for training applicants for the development of algorithms and electronic programs...
and the introduction of international certification of digital competencies is notable (Kulyk, 2023).

ICT infrastructure for educational institutions, which provides for the introduction of an open management environment in higher education institutions, modernization of e-learning systems, and the creation of a safe and efficient infrastructure. This includes the use of various devices (mobile phones, computers), interactive technologies, cloud services, unification of platforms, Internet access, and rational space planning. Prospects for implementation include continuous improvement of the ICT infrastructure, creation of a secure intranet, modernization of e-learning systems, provision of efficient and secure infrastructure, and development of innovative solutions in the field of ICT to improve the educational process.

The development of e-learning, which involves the use of digital technologies in higher education, expands its application in non-formal education and adult education. Prospects for implementation include the development of distance learning and the involvement of higher education institutions in the use of open content.

Assessment includes ensuring the quality and effectiveness of the strategy for implementing modern learning technologies through systematic research and analysis of the impact of digital solutions on learning processes at the national and international levels, and the use of international quality standards and comparative indicators of informatization in education. Potential implementation opportunities include involving educational institutions in assessing the level of development of the digital environment and informatization system, monitoring the development and implementation of innovative technologies in teaching and education at the national level, and taking part in international research on understanding digital literacy.

Information and communication technologies have great potential in the field of education. The development of ICT contributes to improved access to knowledge, effective learning, and professional skills development. The introduction of open platforms, electronic content, and pedagogical approaches can promote cooperation between educational institutions and create a favorable learning environment. Increasing the digital competence of teachers, developing e-learning systems, and ensuring effective infrastructure are important steps in realizing this potential. E-learning is becoming increasingly popular and allows expanding educational opportunities. In general, ICT is of great importance for developing education and improving the quality of learning.

4. Discussion

In the article by Kasianenko (2023), an extensive examination of the current utilization of ICT in educational contexts for Ukrainian students with special educational needs (SEN) is provided. The author identified multiple avenues for integrating ICT, encompassing accessibility tools and assistive technologies tailored to students with various disabilities. This included both software and hardware adaptations aimed at catering to individual learning styles and requirements. Additionally, the article delved into the role of online platforms in enhancing communication among students, teachers, and parents. This comprehensive analysis not only outlined current trends but also explored potential directions for SEN education in Ukraine,
offering practical insights for educators and policymakers.

On the other hand, in the study conducted by Vinarchuk et al. (2021), a specific focus was placed on the use of health-saving and ICT technologies in preparing future educators to teach students with special educational needs during the COVID-19 pandemic. The authors underscored the significance of addressing the mental and physical well-being of teachers, emphasizing stress management and self-care strategies, especially when working with SEN students. Equipping educators with the necessary skills and knowledge to effectively leverage ICT tools in SEN education is another crucial aspect. The research also highlighted the creation of digital communities where educators could exchange best practices and resources. This investigation offered insights into the distinctive challenges and opportunities presented by the use of technology in SEN education during a global pandemic. Moreover, it underscored the importance of teacher training and well-being as essential dimensions of the discourse.

These sources contribute significantly to the growing body of research concerning the integration of ICT in SEN education. While both highlight the potential of technology to enhance learning outcomes for students with disabilities, they also shed light on issues of accessibility, teacher preparation, and the necessity for comprehensive approaches addressing the social and emotional needs of both educators and students (Kenesbayev et al., 2017).

When comparing the results of this study with the paper by Deja et al. (2021), several noteworthy similarities and differences emerge. Both studies shared a common focus on analyzing the role of information communications within the higher education landscape and their impact on the ongoing digital transformation process. In research, a parallel investigation was conducted, examining the readiness of higher education institutions for embracing digital transformation. This analysis sought to identify key factors influencing these institutions’ willingness to adopt information technologies, shedding light on the challenges and opportunities they faced. Furthermore, both studies delved into strategies for fostering an information-rich culture and innovative learning approaches designed to facilitate the successful implementation of digital changes within higher education institutions. This shared emphasis underscores the importance of technology integration in enhancing the overall quality of education and preparing universities for the demands of a digitally transformed future.

In contrast, a distinct study by Dai and Chiu (2023) took a different angle by examining shifts in reading behavior and preferences among high school students and their parents, with a particular focus on the context of the COVID-19 pandemic. To analyze these changes, the researchers utilized the 5E learning model, providing a unique perspective on the evolving dynamics of education during unprecedented global circumstances. In summary, while the studies by Deja et al. (2021) and the present research contributed significantly to the advancement of technology in higher education and the readiness of educational institutions for digital transformation, the study by Dai and Chiu (2023) offered a distinct lens through which to understand the evolving educational landscape during a global pandemic.

Taft (2011) aimed to examine and present effective methods for visualizing quantitative information. The author focused on various ways of graphically presenting data, such as charts, graphs, and maps, to create clear, informative, and aesthetically appealing visual displays. Based
on the results of the study conducted by Taft (2011), an outline of principles and guidelines for creating visual data that helped readers better understand and use visualization to convey complex quantitative information emerged. This helped improve visual analysis and data communication skills (Molotkina & Khmel'nyts'ka, 2023).

Gavrilova and Topolnik (2017) aimed to examine and analyze modern educational phenomena related to digital culture, digital literacy, and digital competence. According to the results of the study, the authors emphasized the importance of digital culture, literacy, and competence in modern education, as these phenomena become necessary skills and knowledge for a society moving into the digital age. The analysis showed digital technologies affected the educational process, and the development of digital literacy and competence of students was an important component for their successful functioning in the modern Information Society.

Makovii et al. (2022) have placed a strong emphasis on the pivotal role of Information and Communication Technology (ICT) in shaping the information environment of Science within higher education institutions. Their study underscored the broader significance of digital technologies in the development of an informatized society, emphasizing how these technologies have the potential to not only enhance the quality of education but also ensured equitable access to knowledge for all. One noteworthy aspect highlighted in their research was the critical role played by university libraries in creating a conducive scientific information environment. These libraries served as vital hubs for research, knowledge storage, and information exchange within higher education (Kulakhmet et al., 2022). By harnessing the power of digital technologies, universities could create an environment that fostered innovation, collaboration, and the seamless dissemination of knowledge (Karabalaeva et al., 2021).

On a similar note, Buinytska et al. (2020) recognized and acknowledged the immense potential of information and communication technologies (ICT) in education. Their study underscored how ICT could significantly improve access to knowledge, enhance learning effectiveness, and facilitate the development of professional skills. Their research shared common goals with the study by Makovii et al. (2022) particularly in advocating for the introduction of open platforms, electronic content, and innovative pedagogical approaches. These initiatives aimed to foster cooperation among educational institutions and create an inclusive and favorable learning environment for students. Both studies also emphasized the broader importance of ICT in education and its transformative role in enhancing the overall quality of learning experiences. They offered comprehensive overviews of how ICT was instrumental in shaping the landscape of education and evolving learning practices to meet the needs of a digital age.

Kadhim et al. (2023), focused on the use of ICT in online education in engineering colleges to prove that ICT was universal and could improve the quality of learning in different educational institutions. In addition to that, the study by Alrikabi et al. (2022) focused on the development of “smart learning” based on the Moodle platform and digital skills for university education applicants, while this study analysed the role of ICT in the overall educational environment of higher education.

When comparing the results of this study with a study by Majeed et al. (2022), several
additional aspects could be noted that expand the understanding of the role of information communications in higher education. The authors focused on the examination of computational thinking among university applicants. Thus, information communications are an important factor for the development of not only digital literacy skills but also the computational and analytical abilities of educational applicants, which contributes to the improvement of the overall educational process (Abylkassymova et al., 2021; Barabash, 2017). The main conclusion of the researchers considered the fact that the use of digital tools could increase active interaction in the educational field and contribute to changes in educational methods and approaches. This, in turn, ensures a more effective process of teaching and preparing applicants for education for the modern digital world. Abdul-Rahman Al-Malah et al. (2020) focused on the use of modern technologies, such as the Internet of Things (IoT), to improve educational services and develop intelligent educational institutions. Researchers investigated using IoT applications to create talented and intelligent students in educational institutions. The researchers emphasized the importance of Information technologies in the modern educational environment but focused on various aspects of technology implementation in the educational process and the development of educational institutions.

Notably, the use of ICT has great potential to improve the quality of learning and the learning environment. The results of comparison with studies by other authors confirm that ICT contribute to the active involvement of educational applicants in the educational process, facilitate access to information, and promote the development of digital literacy skills.

5. Conclusions

The rapid advancement of technology globally presents both strategic challenges and promising opportunities for the continued growth of information and communication technology (ICT) in Ukraine, particularly its integration within the higher education system. The utilization of mobile devices, telecommunications, and digital tools in the educational sphere plays a pivotal role in actively engaging students in innovative educational initiatives and fostering a creative approach to addressing educational challenges. The progression of information and communication technologies necessitates the development and experimentation of cutting-edge pedagogical methods, with a particular focus on the incorporation of online resources and e-learning across various educational stages. However, the effective implementation of ICT higher education framework hinges on several key factors. These include the establishment of an open information platform facilitating the exchange of technological solutions, the promotion of digital literacy among educators and prospective students, and the assurance of accessibility to information resources for all participants in the educational process.

In addition to the aforementioned factors, the introduction of cloud technologies and the establishment of robust cybersecurity measures hold paramount importance in enhancing the quality of education and the training of skilled professionals. The incorporation of effective electronic educational platforms further complements these advancements, providing students and educators with versatile tools for learning and collaboration. Drawing inspiration from the experiences of European countries in the realm of ICT development can serve as a valuable source of knowledge exchange and mutual learning. By leveraging the insights and best practices
of European counterparts, Ukraine can adopt advanced pedagogical approaches, broaden the accessibility of information resources, and uphold a high standard of education. In summary, Ukraine’s pursuit of excellence in education should encompass not only the integration of modern technologies and cybersecurity measures but also active engagement with international partners to benefit from their expertise and promote continuous improvement in the educational landscape. Focusing on the development of the digital competence of teachers and applicants, the introduction of international quality standards and the creation of an open infrastructure for ICT form the basis for the successful implementation of digital technologies in the educational environment.

Further research should focus on investigating the effectiveness of ICT implementation in various educational contexts, in particular, in vocational training and adult education. Also important is to pay attention to developing infrastructure for digital education, ensuring access to technology for all segments of the population, and developing strategic plans to integrate ICT into the national education system. Collaboration with European countries and the exchange of experiences in the development of digital technologies will also promote advancements in the field of education.

References


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