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Integration of ICT in Higher Education: teaching and learning in Kazakhstan

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Abstract

Relevance. The development of ICT in Kazakhstan is a long-term process characteristic of all spheres of state activity. The relevance of these technologies is due to globalization, namely the spread of digital technologies, as well as computer technologies dominating in various spheres of social life. The educational process also underwent certain changes, taking into account the introduction of ICT into it.

Purpose. The purpose of the scientific research is to analyze the ways of using ICT in the implementation of activities of higher educational institutions of Kazakhstan.

Methodology. The work uses the methods of analysis, synthesis, comparison, deduction and abstraction.

Results. As a result, it was possible to prove that ICT development in Kazakhstan is currently incomplete. ICT has both positive and negative features in the educational environment. At the same time, the former prevails over the latter, as they allow organizing the educational process in accordance with modern requirements. This allows universities training real specialists who will successfully compete in the labor market. As a result, the level of social well-being in the state will increase. Therefore, ICT is a promising direction for the development of higher education, namely its modernization.

Conclusions. The practical value of scientific research lies in the possibility of implementing its results into work both by officials in the development of state programs aimed at the implementation of ICT, and by subjects of educational activity to improve the educational process.

Keywords: digitization; students; university; computer; Internet network.

Introduction

Digitization and other global processes increase the dynamics of changes in social institutions. This process is irreversible, as society is getting modernized and is being reformed. In this case, not a specific sphere of relations, but the entire process of state activity is being regarded. Information and communication technologies (ICT) play a special role in it, which contribute to the formation, development, and restoration of various social algorithms. Their characteristic feature is the use of digital technologies, which there are many at the moment. The study of ICT implementation methods has become especially relevant in connection with the spread of COVID-19 both in Kazakhstan and other countries of the

world [1; 2]. This provoked fundamental changes that were made to the algorithms of activity in all spheres of social relations. The educational environment is no exception, as long as here, computers and the Internet have become the main teaching tools replacing textbooks. For achieving educational goals, especially in higher educational institutions, it is worth using ICT both remotely and in mixed form of studying. At the same time, as a result of lifting quarantine restrictions and the return to in-class education, the role of ICT has only developed and gained higher priority. However, the effectiveness of their use depends solely on the approaches to their implementation in the educational environment [3].

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This question has been popular in scientific doctrine since the early 2000s, from the period of development of informatics and computer technology. There are many positions that reveal both theoretical and practical foundations of this issue. Researchers study the essence of ICT, their nature, functions and their possible implementation to the educational process in higher education.

In particular, A. Keszthelyi [4] studied the history of the formation and development of ICT. He managed to reveal the main stages of the birth of these technologies. The conclusions obtained by him allow for establishing the nature of ICT and independently describe its structure. M. M. Suleiman et al. [5] believe that ICT is an additional tool designed to ensure the functioning of the modern educational environment. In their research, they identified the main tasks of ICT, which are to accelerate, improve the quality and individualize learning. These results should be used in the study of the principles and purposes of ICT. Unlike previous researchers, Z. G. Shatri [6] focused not only on the advantages, but also on the problems of ICT in the educational process. According to the researcher, such tools reduce the role of the teacher in the university. This is expressed in the fact that students work out and study the material independently, and the teacher only coordinates them. This conclusion should be taken into account when characterizing ICT deficiencies. A. Ahrens et al. [7] believe that for the use of computer technologies in universities in Kazakhstan, it is necessary to conduct special training of subjects of educational activity. This will reduce both technical and subjective problems and will also increase the efficiency of the ICT use process. In turn, P. Kropachev et al. [8] in their research prove that ICT is the basis of the future development of the educational environment of Kazakhstan. They believe that such an approach is the key to improving and ensuring quality training of future specialists in various fields.

The purpose of the work is to reveal ways of involving ICT in the sphere of higher education of Kazakhstan, in particular, in the activities of universities. The tasks of the given study were to reveal the current state of ICT development in Kazakhstan; to describe the impact of such technologies on higher education; to explore approaches to learning and ICT; to establish the advantages of using ICT in the educational environment.

Materials and Methods

The analysis method was used in the research for the imaginary decomposition of the whole phenomenon, namely ICT, into structural elements. In addition, the method of analysis is applied to the distribution of the educational process in a higher educational institution. Based on this, this method made it possible to reveal the peculiarities of the subjects of such activity, their goals and tasks. These results were combined using the synthesis method. Separate parts of ICT were integrated into various stages of educational activities at the university. As a result, the synthesis method made it possible to establish the role and importance of ICT in the educational and professional activities of students. Also, this methodological tool was used to restore the integrity of the studied pedagogical phenomenon, due to knowledge about the functions and essence of ICT.

Another tool used in the study was the comparison method, which involved establishing commonalities and differences between different objects. Therefore, this method involved comparing different categories, namely the advantages and disadvantages of involving ICT in the educational process. It was used in the process of researching the impact of information technologies on higher education in Kazakhstan as a whole. The method of comparison made it possible to identify and compare the methods of introducing ICT into educational classes in higher educational institutions. In addition, it was applied to establish common and distinctive features in the nature of the impact of ICT on the activities of teachers and students.

The method of deduction in scientific research involved the analysis of a specific phenomenon, namely the use of information technologies in the educational environment, at the expense of knowledge about the general, in particular, concept and essence of ICT. It was used when comparing the existence and development of the educational process with and without the use of ICT.

The method of abstraction involved consideration of the essence of ICT in the field of education. This method was used during the study of the features and functions of information technologies, which are manifested in the activities of higher educational institutions. The abstraction method is used for in-depth study of the essence of ICT in the process of training future specialists of various profiles. This method involved a personalized study of such technologies, taking into account the features of the field of higher education.

The generalization method was used in the process of evaluating the facts established during the research. It envisaged the study of both positive and negative features of ICT in the educational process. The generalization method was used to establish the nature of their influence on subjects of educational activity.

Results

The global development of information and computer technologies has contributed to the reform of society, increasing the role of digital literacy in it. It is important to note that the involvement of innovative mechanisms is relevant of all types of social relations. The system of education, which was traditional in Kazakhstan, where the in-class form of studies prevailed, underwent special changes. Both in general secondary and higher education before the start of the COVID-19 pandemic, computer technologies were poorly developed [9]. For the most part, they were used in educational classes in certain specialties related to informatics and digital mechanisms. However, with the spread of the coronavirus disease, this trend changed due to the introduction of quarantine restrictions. The remote studies, which involved the construction and development of the educational process based on a computer and the Internet, became especially relevant. Since 2020, ICT tools have started to improve. Of course, one cannot claim their absence before the beginning of the epidemic, since the formation of information technologies in Kazakhstan began back in the 1980s. Already in 2004, computer science and programming began to be taught at Suleiman Demirel University. However, at that time, information technologies did not fully correspond to the

modern idea of ICT. This is evidenced by the lack of approaches to its consolidation and dissemination both among normative legal acts and the subjective attitude of citizens [10].

Starting from 2020, namely with the introduction of quarantine measures, all educational centers were forced to carry out their activities remotely. Undoubtedly, the main factor in the global spread of ICT during this period was the observance of quarantine and the avoidance of large gatherings of people. However, in addition to it, it is possible to mention some more that characterize the state policy of Kazakhstan aimed at introducing such tools into the educational process. Among them, is the need to reform the country in accordance with a completely new development strategy based on highly effective technologies; the possibility to effectively modernize the society based only on the use of ICT. It is also necessary to emphasize the existence of a close connection between the level of well-being of citizens, national security, social well-being and the spread of ICT in the country. The factors described above are fundamentally important for Kazakhstan, which is determined by both political and social conditions. Based on this, it can be noted that at the moment, Kazakhstan is experiencing a number of complex transformations, which are characterized by an increase in the quality of education in higher educational institutions due to its fundamental nature. In addition, provision of the educational process with the use of ICT technologies is provided. This is expressed in the ability of educational institutions to provide access to the educational environment for all categories of the population [11].

To study the current level of ICT development in Kazakhstan in various spheres of social relations, including educational ones, statistical data should be taken into account. In particular, from 2019 to 2022, there is a sharp increase in the amount of expenditures from the state budget for the implementation and development of information and communication technologies, their amount reached 443.1 billion tenge. At the same time, the share of these funds in Kazakhstan's GDP, on the contrary, is decreasing, as long as since 2016 its level has not exceeded 0.6% [12]. The state program "Digital Kazakhstan" provided for the organization and holding of 125 events in various directions [13]. For the period of 2018-2022, 207.8 billion tenge were spent on the implementation of the above provisions, which came from various types of budget, including republican, local and other sources [14]. Unfortunately, as a result of the financing of this vector of state policy, it was established that the costs associated with the provision of information technologies significantly exceeded the costs of their development. For example, for the period of 2013–2022, the share of funds spent on the development of ICT in Kazakhstan amounted to 1,556.6 million tenge, and those spent on their quality service and development - 8,318.6 million tenge [12]. The difference is significant, which had a negative impact on the irrational use of budget funds, which provoked the violation of the norms of budget legislation.

It should be stated that during the entire period of development and introduction of ICT in Kazakhstan, including in the educational sphere, it was not possible to fully form an effective infrastructure of information

technologies. The latter includes institutions related to the technological development of the state and increasing the potential of human resources.

However, one should not assume that such work was not carried out by state bodies at all. Currently, ICT technologies are used by higher educational institutions during the training of specialists. An example of the implementation of such a policy is the signing of a memorandum between the Ministry of Science and Higher Education of the Republic of Kazakhstan and Huawei Technologies Kazakhstan on providing students with the opportunity to get education and certification in the field of ICT [15]. It is important that such practice is not introductory, as it involves participation in specially organized educational competitions, as well as employment of future specialists. This memorandum has benefits not only for students but also for teachers, as it establishes algorithms and curricula in ICT [16].

For an in-depth analysis of the category of ICT in Kazakh society, it is necessary to identify its impact on education, as well as advantages and disadvantages in the process of its use by students. Undoubtedly, to a greater extent, the involvement of such means in the educational environment has a positive effect on the dynamics of its development and the quality of educational services. This is expressed in the acceleration, optimization, modernization of educational activities. As a result, the level of professional competence acquired by students during educational and professional training increases.

Despite this, the introduction of ICT involves a significant increase in the teacher's workload. This is due to the difficulty of combining traditional teaching tools and modernized digital tools at the same time. In addition, one of the biggest problems in the process of using ICT is the lack of an appropriate level of knowledge and development of skills in their use among subjects of educational activity. The disadvantage that complicates the process of learning at a university based on digital means is the lack of direct contact between a teacher and a student. Undoubtedly, the use of ICT is possible with a certain technological development and security of citizens, in particular, education seekers. Thus, for the successful use of such technologies, it is necessary to create special conditions. Among them, there are training subjects of educational activities in the use of special programs and computers; organization of training in an individual direction, which involves an increase in the load on students and teachers; ensuring the appropriate technological level of state development [17].

Despite the complexity of the process of development and provision of ICT activities in the educational environment of Kazakhstan, it is worth noting that such tools have a number of advantages, unlike traditional educational tools. This shows that the impact of digitization and information technology is positive. For example, the quality of the educational process and environment as a whole improves in several directions. Among them: communication, self-organization, individual control, independent preparation of work or performance of tasks. As a result, it makes it possible to increase the level of attendance at educational classes, in particular online. The student's level of self-control increases, and most importantly, responsibility for actions

and the volume of completed or, on the contrary, uncompleted work. The positive thing is that students independently determine the priority of attending classes and completing the tasks set by the teacher. This significantly reduces the time both for searching for information and for its processing [18-20].

Based on the above, it can be stated that the involvement of ICT in teaching in the universities of Kazakhstan has a positive effect not only on the students of education, but also on the teachers. At the same time, a necessary condition for achieving the most effective result is the formation and observance of the special factors described above in the educational environment.

The process of learning history in a higher educational institution deserves special attention. It should be emphasized that it is advisable to use ICT to increase its dynamics and quality. This can be done by using interactive whiteboards when studying historical maps. In addition, it is advisable to use an information platform such as Coursera, which hosts courses covering different historical periods [21; 22]. This approach can be used both for the organization of the main type of educational work and additional, for deepening students' knowledge of the academic discipline. In addition, it is advisable to use ready-made software products, for example, electronic encyclopedias or software-pedagogical tools. This approach is useful in the course of the student's independent work, searching for information about a historical person or phenomenon. Of course, the methods of using ICT in history lessons include programs of the standard Microsoft Office package [23]. For example, electronic PowerPoint presentations allow the teacher not only in writing, but also graphically reveal the chronology of events, or to show photos of historical documents [24-26]. Surely, this list is not full, since social relations are constantly developing, which involves the formation of new ICT tools. Therefore, it is advisable to continue researching this issue, as well as to promote the development of state policy regarding the spread of information technologies in Kazakhstan, especially in the field of higher education. This approach is necessary because it allows modernizing the educational environment, making it capable of effectively responding to modern challenges. As a result, this will have positive impact not only on the quality of the educational process, but also on the competence of specialists.

Discussion

ICT is actively considered by scientists in various contexts. One of the most common is the educational process. This is due to the priority of the development of educational activities, especially in a higher educational institution. A number of studies reveal different methods and approaches to the implementation of ICT in higher education institutions [27; 28]. It is worth noting that the positions of the authors may both converge and diverge, which makes it possible to organize a discussion by comparing them with the results obtained in this scientific work. For example, J. J. Carrión-Martínez et al. [19] and F. D. Guillén-Gámez and M. J. Mayorga-Fernández [20] characterized the essence of information and communication technologies. They managed to independently formulate their concept, under which the

researcher understands a system of various technological means and resources, which is a necessary tool for communication, development, use, distribution, as well as preservation of materials and data. In their opinion, the general structure of such technologies includes computers, laptops, the Internet, television and telephone communication. However, this list is not full due to the rapid development of social relations and the impact of digitalization on them. There is a significant expansion of means that acquire ICT functions. This, according to the researchers, is the reason for the existence of the debate regarding the specific definition of the concept and components of the ICT system. They are also supporters of the approach, which reveals the latter as a way of operational interaction with information, which includes a certain amount of knowledge about the algorithm for working with digital resources [29-31]. The obtained conclusions are intertwined with the results revealed within the framework of this study. The characteristics of ICT described in the article are similar to those shown in the disclosed position.

M. N. Habib et al. [21] and M. Liesa-Orús et al. [22] studied and revealed the benefits of using ICT in educational institutions. In their opinion, such tools contribute to the individualization of the educational process, which allows the teacher pay more attention to each student. This is expressed in the fact that they can establish individual contact, provide additional consultations to a certain circle of people. In addition, ICT provides for the activation of independent work of education seekers. As a result, there is an increase in the volume of tasks that they perform during the study of the course. This allows them covering a wider range of knowledge and skills, which positively affects the quality of their professional competence. Researchers claim that the use of ICT in higher education institutions contributes to the development of student motivation. As a result, their cognitive activity increases, which is possible thanks to their performance of various types and forms of work. The advantage is also the inclusion of a game character, which allows simulating a wide range of situations and phenomena [32; 33]. This has a positive effect on the professional qualities of applicants, who can apply their skills in various settings. It is worth agreeing with the expressed opinion, since it corresponds to the conclusions of this scientific work. This indicates that computer technologies provide all subjects of educational activity with various opportunities to independently regulate the level of the educational load, as well as the duration of the performance of this or that work [34-36].

C. W. Shen and J. T. Ho [23] paid special attention to the peculiarities of the implementation and use of ICT in educational activities. They called one of its shortcomings the lack of sufficient time to prepare teachers for classes. In this case, we are talking about increasing their employment. This is due to the fact that, to a greater extent, online learning involves asynchronous learning activities. All students perform tasks at different times, according to the set deadline. This negatively affects the organization of the teacher's time, the duration of which increases significantly. In addition, the researchers emphasize the low or average level of computer literacy of teachers. In their opinion, even today, after the introduction and use of

ICT for several years, this problem remains relevant. This is due to the fact that the acquisition of such skills is possible only in the form of additional courses or classes [37]. Currently, the educational and professional training of future teachers excludes the possibility of perfect development of computer literacy [38]. Within the framework of this scientific work, the shortcomings of the introduction of ICT in educational activities were also considered, however, they are somewhat different from the above factors. Therefore, it is advisable to take them into account in the context of the formation of today's priority tasks for the development of higher education.

R. Rabiman et al. [24] formed and described four stages of the organization of educational activities based on ICT in his research. The first is conceptual, which reveals the need to use ICT financial resources. It consists in the integration of educational material in electronic on various media, which are structural elements of information technologies [39; 40]. At the first stage, it is important to form specific educational goals for a certain group of people. The next is the technological stage. Its importance lies in the choice of methods and means of organizing and conducting classes [41]. In addition, this stage includes modeling of various types of interaction between subjects of educational activity. The researchers called the third stage operational. They believe that within its limits, it is expedient to ensure high-quality planning of the lesson, as well as to prepare all the educational tools necessary for its implementation. The last stage involves pedagogical implementation. The researchers reveal this as a change in the role of the teacher in the educational process. This is expressed in the fact that, with the help of ICT, they not only provide information, but also act in all educational activities, being a mentor who helps to guide students [42-44]. The study also paid attention to this aspect, since the introduction of ICT really involves expanding the functions and tasks of the teacher as a subject of the educational process. That is why in this context the results coincide.

The discussion shows that the issue of introducing ICT into the educational environment is multifaceted, that is, it can be studied from different angles. This allows you to identify its features, as well as characterize approaches to successful implementation.

Conclusions

As a result of the research, it was proved that the role of ICT in the field of higher education in Kazakhstan was pivotal. This is due to both external and internal factors. The first include complex social conditions caused by globalization processes, as well as the spread of the coronavirus disease. Internal factors should be understood as the spread of information technologies in society, which are accordingly implemented in professional activities. Therefore, having the skills of owning and working with the ICT is one of the mandatory conditions for a modern specialist.

The study revealed the advantages of using ICT in higher education, which consists in accelerating the educational process, increasing its quality, and reforming student tasks. The latter should be understood as the acquisition of skills related to independent search and processing of material, performance of work, communication with the teacher. This allows increasing the level of their control and responsibility for the performance of the duties assigned to them. As for the shortcomings, they are mainly of a technical nature, as they relate to the availability of special equipment, such as a computer, for subjects of educational activity. This leads to the next problem, which is the need to develop the skills of mastering such tools and programs. Comparing these two components, it was established that the impact of ICT on higher education in Kazakhstan was still positive.

The work describes how ICT and the process of teaching an educational discipline, in particular history, are interconnected. It was proved that the development of information technologies was a promising vector on the basis of which it is possible to build and ensure the activities of high-quality higher education in Kazakhstan. This indicates that research on this issue should be continued in the future, for example, in the context of evaluating the most common ICT tools and the possibility of replacing them with traditional educational tools.

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Conflict of Interest

None.

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Інтеграція ІКТ у вищу освіту: викладання та навчання в Казахстані

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Анотація

Актуальність. Розвиток ІКТ в Казахстані є довгостроковим процесом, характерним для всіх сфер діяльності держави. Актуальність цих технологій обумовлена глобалізацією, а саме поширенням цифрових технологій, а також домінуванням комп'ютерних технологій у різних сферах суспільного життя. Освітній процес також зазнав певних змін з огляду на впровадження в нього ІКТ.

Мета. Метою наукового дослідження є аналіз шляхів використання ІКТ у здійсненні діяльності вищих навчальних закладів Казахстану.

Методологія. У роботі використано методи аналізу, синтезу, порівняння, дедукції та абстрагування.

Результати. У результаті вдалося довести, що розвиток ІКТ в Казахстані на даний момент є незавершеним. ІКТ мають як позитивні, так і негативні риси в освітньому середовищі. При цьому перші переважають над другими, оскільки дозволяють організувати навчальний процес відповідно до сучасних вимог. Це дозволяє університетам готувати справжніх фахівців, які будуть успішно конкурувати на ринку праці. Як наслідок, підвищиться рівень соціального добробуту в державі. Тому ІКТ є перспективним напрямком розвитку вищої освіти, а саме її модернізації.

Висновки. Практична цінність наукового дослідження полягає у можливості впровадження його результатів у роботу як посадовими особами при розробці державних програм, спрямованих на впровадження ІКТ, так і суб'єктами освітньої діяльності для вдосконалення освітнього процесу.

Ключові слова: оцифрування; студенти; університет; комп'ютер; мережа Інтернет.