The role of information technologies in education[54]

Роль інформаційних технологій в освіті

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Abstract

In the article we find out the possibilities of using information technologies to modernize the educational process in higher education institutions. The article reveals the content of information technologies, describes the possibilities of their application, and shows their role in higher education institutions for the modernization of education. It is noted the functions inherent in the system of information provision of monitoring and quality control of education. The article distinguished the components of information technologies (hardware and software; applied information; the end user of information and the components of the national information system (modern telecommunications infrastructure; distributed computer network; system of national information resources); system-methodological. Information technologies are classified according to several features: the method of process in the information system; the step of treatment of organization tasks; the classes of hi-tech actions carried out; the kind of user interface). Priority directions in the field of informatization of education (introduction of

Анотація

У статті розкрито зміст інформаційних технологій, виписано можливості їх застосування та показано їх роль у закладах вищої освіти для здійснення модернізації освіти. Розглянуто функції, які притаманні системі інформаційного забезпечення моніторингу й управління якістю освіти. Виокремлено компоненти інформаційних технологій (апаратні й програмні засоби; прикладна інформація; кінцевий користувач-споживач інформації та компоненти загальнонаціональної інформаційної системи (сучасна телекомунікаційна інфраструктура; розподілена комп'ютерна мережа; система національних інформаційних ресурсів). Якість освіти досліджено у трьох зрізах: концептуальному; теоретичному; системно-методологічному. Інформаційні технології прокласифіковано за рядом ознак: способом реалізації в інформаційній системі; ступенем охоплення завдань управління; класами здійснюваних технологічних операцій; типом призначеного для користувача інтерфейсу). Виділено пріоритетні напрями у сфері інформатизації освіти (упровадження

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multimedia technology, use of multimedia products in higher education institutions) have been identified. Aspects of information inequality are described (physical access, financial access, cognitive access, access to significant information, and political access). The significance of distance education for today is shown, and its principles are considered.

Keywords: information technologies, innovation of the educational process, institutions of higher education, distance education, multimedia.

мультимедійної техніки, застосування мультимедійних продуктів у закладах вищої освіти). Розписано аспекти інформаційної нерівності (фізичний доступ, фінансовий доступ, когнітивний доступ, доступ до значимої інформації, політичний доступ). Показано значущість для сьогодні дистанційної освіти, розглянуто її принципи.

Ключові слова: інформаційні технології, модернізація освітнього процесу, заклади вищої освіти, дистанційна освіта, мультимедіа.

Introduction

Today, through the development of the society we understand deep economic and social transformations, and the use of novelties of scientific and technological progress in all spheres of human activity. The use of information technologies is an central issue in the realization of scientific and technical progress: it is the automation of production and its intensification, it is the introduction of highly effective technologies and the improvement of planning and management of all industries (Kuchai, 2014).

Computerization of the educational process in the era of the 21st century in higher education institutions is considered as a global, promising direction for its renewal and improvement. Priority attention is paid to this issue in all countries of the world at the level of higher education institutions themselves, as well as at the state level. The difficulty lies in the fact that this problem (full-scale computerization of the educational process) requires long-term purposeful work and constant attention specifically in institutions of higher education (Zhabolenko & Zhdanova, 2007).

The practice of educational activities of future specialists showed the advantages of information technologies in the change of professional skills and rational possible of the individual. These benefits deserve to be used as much as possible (Klepko, 1998).

Human activity is based on information provision (scientific information, in particular pedagogical, etc.). Many scientists have researched and are researching the advantages of information support, highlighting the means of operation, procedural and operational, and informational and resource components. Progressive information technologies include in their content methods that make it possible to

increase the level of informatization in higher education, and improve the information environment and information technology (Petrychenko, 2014).

In the article, we set out to investigate the following tasks:

1. Establish the functions of the information system for monitoring and managing the quality of education in a higher educational institution;
2. Determine the main components of information technologies;
3. Highlight the requirements for implementing a flexible system of training specialists taking into account quality requirements;
4. Show the classification of information technologies according to various characteristics;
5. Describe the advantages of information technologies;
6. Determine the possibilities of information computer technologies;
7. To show the main directions of using computer information technologies in the educational process, taking into account their methodological expediency and possibilities.
8. The advantages of distance learning are noted;
9. Consider the possibilities of effectiveness of pedagogical support of monitoring activities

The purpose of the article: is to find out the opportunities of using information technologies to modernize the educational development in higher education institutions.

Literature Review

V. Shtanko & T. Bordyugova (2012) single out aspects of information inequality: «physical access, financial access, cognitive access, access to significant information, political access».

O. Kuchai (2014) highlighted the problems of training (theoretical training and methodical training) of specialists in higher education institutions in Poland using multimedia technologies. The basics of training future specialists using multimedia technologies are conceptually substantiated. Features of the use of multimedia technologies are shown at the professional training of specialists in the field of pedagogy. Progressive ideas of using the Polish experience of teacher training for the possibility of their implementation in the education of other countries are singled out.

L. Petrychenko (2014) named the most important components of information technology and revealed their importance for education: hardware, software tools; applicable information; end user of information.

V. Varenko (2014) analyzed the main components of the national information system (modern telecommunications infrastructure; distributed computer network; system of national information resources).

L. Savchenko (2014) substantiates the concept of multimedia and emphasizes the importance of the latest computer technologies and methods for education, proves the importance of information technologies in education, emphasizes the power and versatility of the means of obtaining, processing, and transmitting information, which is important for monitoring the educational activities of future specialists.

A. Kuzminskyi et. al., (2018) in the conditions of informatization of society and mass global communication single out and substantiate the general goal of high-quality continuous training of a specialist for professional activity who can use all the latest means of information technologies, which will contribute to the implementation of all areas of informatization of education.

O. Semenikhina et al., (2020) proved the importance of the role of courses on open resources during the COVID-19 pandemic, identified and described a large number of innovative educational courses on foreign open resources and not enough - in Ukraine. The beginning of Ukraine's work in the development of such courses and open educational resources is shown, albeit slowly.

O. Oseredchuk et al., (2022) proved the necessity by information technologies in monitoring the quality of higher education and showed their advantages.

Methodology

To achieve the set goal, the following research methods were used: theoretical (analysis of philosophical, pedagogical, and psychological literature), which makes it possible to justify the initial positions of the research; interpretative and analytical methods, based on which sources are studied using synthesis, analysis, systematization and generalization.

Remote education dictates its specifics in the organization of educational activities, forms, methods and content of education, selection of teaching aids, including part of information.

The methodology of information technologies involves active use by users of telecommunication networks of different levels (local and global). They are the main system-forming sub-sign and are considered in three directions: a) as a resource of teaching any subject area; b) as a component of the traditional training system; c) as a incomes of interdisciplinary integrated approach to learning. The use of information technologies and telecommunication networks in education allows you to solve the problems of training, development and education of future specialists at the level of modern social and economic requirements.

The use of computer-based learning methodology is focused primarily on the integration of all types of educational activities and the preparation of subjects of the educational process for life in the conditions of the information society.

The dynamics of the development of the information society showed that traditional methods and means of education are not enough to improve the quality of specialist training. This fact indicates the need to implement innovative approaches to learning in the field of higher professional education, including the implementation of innovative educational programs, which include the transition of the educational process to new modern electronic, computer, web-oriented technologies, online

learning systems, that is, the transition to education using the latest information technologies. All these problems are considered by us in the article.

Results and Discussion

Today offers a diverse range of information technologies in education, but let's single out a universal general procedure of information and systematic activity, which Yu. Surmin & Tulenkov (2004) justifies under the name: "universal technology of analytical activity".

Information technology - the procedural use of a set of collection methods and their means; collection, transfer of data and their processing (primary information) to update data on the state of the object, on the process of updating the phenomenon (information product) (Androschuk & Kondratenko, 2014).

Information technology is an organized system proposed to explain the tasks of monitoring and organization of a higher education institution, which is characterized by a set of methods and means of implementing operations of collection, registration, transmission, accumulation, search, processing and protection of information based on constantly updated software, the use of innovative and constantly updated means of computing and communication, as well as the latest ways in which information is transmitted to those who are waiting for it (Varenko, 2014).

1. The functions of the information system for monitoring and managing the quality of education in a higher educational institution.

We will set the functions offered by the information system for monitoring and managing the quality of education in a higher education institution:

– the satisfaction of the needs of education seekers, teachers, heads of higher education institutions or structural subdivisions included in this structural subdivision, in the institutions, which are mandatory in the activities of education seekers and are important for the relationship;
– inform about the features, changes in the educational program, the current state of the institution of higher education, the availability and adequacy of educational facilities, the results of the student's learning, the international position of the study of experience, the professional activity and qualifications of teachers;

– deliver documents to students, teachers, and heads of higher education institutions, which will be addressed;
– to identify defects in intellectual development, control the health check of education seekers and professors and teaching staff (physical health, emotional and mental health);
– distinguish the obvious needs of students; inform teaching staff; involve stakeholders in the educational process (Kuchai et al., 2022).

2. The main components of information technologies.

We note the main components of information technology: hardware and software; applicable information; end user of information (Petrychenko, 2014). At the same time, the national information system offers the following components:

– modern telecommunications infrastructure, which includes cable, satellite and other statement channels;
– the spread computer system, which is in the Internet information space, is provided by the information systems of educational institutions;
– the scheme of national information properties, which works similarly to Intranet technology and includes a comprehensive system of information security.

The teaching staff at the institution of higher education uses computer technology in their professional activities and teaches students to apply information technologies in their future professional activities because thanks to global computerization, automated workplaces and local computer networks are created, this allows more efficiency, taking into account operational efficiency, reliability, completeness of the information within the limits of the decisions made, to monitor the quality of higher education, to improve the management functions of the head of the institution.

Reorganized expertise is expected at the comprehensive use of personal computers at the workplace of staffs of higher education institutions. With this approach, the future specialist must be able to enter information into an automated system and, using computer technology, solve the tasks set before him, which will lead to a positive result (Varenko, 2014).

3. The requirements for implementing a flexible system of training specialists taking into account quality requirements.

Implementation of a flexible system of training specialists taking into account qualitative requirements is an important task of educational policy, in particular:

– to the quality of assessment of the level of training of education seekers of various profiles;
– to obtain a qualitative assessment of the result of the professional activity of the future specialist;
– to the qualitative design of not only pedagogical technologies but also information technologies and the determination of their reliability;
– to the qualitative evaluation of the effectiveness of the educational process.

4. The classification of information technologies according to various characteristics;

Today's educational policy requires the obligation to single out such a trend as the "movement for a new quality of education", which is associated with the provision of a new quality of life, embodying such concepts as "human dignity" and "humanity". Approaching from the standpoint of a socio-pedagogical phenomenon, we will conduct the most productive study of the quality of education in three sections (classification), namely:

– conceptual (the implementation of the primary understanding of the quality of education as an object of research is observed. At the same time, the space of ideas is actualized, which has the ability to reveal its systemic and interdisciplinary nature, determination, and lead to the formation of its scientific foundations);
– theoretical (considered as a "collapsed" display of the object, parameters of the quality of education and essential characteristics, genesis, structure, classification of species, types, etc.);
– system-methodological (is applied to educational practice thanks to the implementation of the translation of conceptual and theoretical knowledge into normative, practically oriented, applied knowledge (Kapustin, et. al., 2013).

Today we observe the application of information technology in many educational structures, educational management bodies, and organizations.

The Internet, which is informative and global, plays a big role in education. In particular, it is:

– information superhighway, global information source;
– a global means of communication that is operational;
– base for the development of future, advanced technologies;
– win-win for international organizations, governments, and private companies as an object of investment worldwide;
– development of corporate information systems based on Internet technologies. The information used in the global information system is located on millions of physically spread computer systems with software Web server support, which is subordinate to the global Internet network, that is, its telecommunications means (Luo, 2022). Using Web-browsers saving programs, users, have access to the Internet, use monitoring information (Varenko, 2014; Shunkov et al., 2022).

5. The advantages of information technologies.

Information technologies have advantages:

– respond qualitatively to the improvement of education;
– contribute to the monitoring of the quality of education.

Using information technology to monitor the quality of higher education, we are observing the improvement of the application of methods, tools, processing, storage, data transmission and, as a result, finding high-quality information on the state of training of experts to further improve the level of their training, for the formation of significant new qualities for a competitive society. So, the problem of training a high-quality and professionally trained specialist is possible with a computerized learning process, constant monitoring of the quality of higher education with the help of computer technologies, because it is information computer technologies that provide openings:

– to improve the professional skills of future specialists;
– increasing the rational possible of future specialists. Therefore, it is time to use the rewards of information technologies (Oseredchuk et al., 2022).

Let's consider another priority direction in the ground of informatization of education - the development and implementation of multimedia products, multimedia technology in the educational process. This priority direction has a powerful educational potential for improvement and optimization of the educational process. In institutions of higher education, with the help of modern multimedia technologies, new approaches to education are introduced, it becomes possible to improve communicative, creative and professional knowledge, and to optimize the development of self-education. Therefore, the introduction of information technologies into education provides an opportunity to move to a new educational stage - the introduction of modern multimedia educational materials.

Starting with the 28th session of the UNESCO General Conference, which took place within the framework of the "Education" program, the research project "Multimedia technologies and personality development" was launched, where the international community properly assessed the role of new information technologies in education and determined promising ways for education using these technologies.

Today, great importance in education is given to the possibility of using multimedia technologies in institutions of higher education where a competitive specialist is being trained. During such innovative training, students acquire the ability not only to notice information from the screen but also learn to recode a visual image into a verbal system, have the opportunity to apply selectivity in information consumption and evaluate quality.

The emergence of the Internet provided an opportunity for the change of a new type of multimedia tools focused on web technologies. You can refer to them both during classroom work and in the process of independent work of future specialists. The main task of higher education institutions is to make the student of education a versatile, creative personality, a future specialist with flexible thinking, who will be able to successfully perform professional tasks on a competitive basis and will be ready to independently acquire new knowledge throughout his life. multimedia tools focused on web technologies.

Multimedia tools focused on web technologies have changed the classroom method used in educational institutions for periods, and now the method and content of student learning are changing under the influence of multimedia technologies on the educational process.

So, having proved the importance of multimedia technologies, we will define them as powerful tools necessary for the scientific and educational community. The invaluable advantages of using multimedia technologies in the educational process are in the training of specialists, as they not only provide greater opportunities for the educational process but also increase the interest of education seekers in learning, and ensure the activity of future specialists during the presentation of the material. At the same time, a necessary condition is the teacher's mastery of multimedia technologies.

Let's single out multimedia presentations as the most effective form of educational material that can be created using Microsoft PowerPoint. Multimedia presentations support to present the material as a system of supporting images, bright and filled with perfect information, structured in an algorithmic order. This approach to the use of educational information is aimed at forming a system of clear visual thinking in students.

6. Determine the possibilities of information computer technologies;

When using multimedia technologies in education, an individual approach is implemented, which gives the student or teacher the possibilities to:

− work in a mode and measure accessible to everyone;
− apply the value of rise of the educational process,
− to mechanize the development of certain practical skills,
− repeatedly repeat operations until complete automation (Kuchai, 2014).

Educational multimedia tools are considered universal because their application is too wide:

− used at different stages of the lesson (motivation, formulation of the problem, explanation of the material, association and overview of knowledge; as illustrations),
− to monitor the quality of education,
− to evaluate educational achievements,
− to receive, transmit, store, process, and present various information,
− for operations related to the study of control and evaluation processes (Savchenko, 2014).

With the use of information and computer technologies in the educational process, students have more opportunities and encouragement to use not only the worldwide network but also to engage in self-education, develop intellectual potential, cultural and social level, improve knowledge of foreign languages (Shtanko & Bordyugova, 2012).

7. The main directions of using computer information technologies in the educational process, taking into account their methodological expediency and possibilities.

Let's dwell on the main directions of using information computer technologies in the educational process, taking into account their methodological expediency and possibilities. These are:

– search for information in the local network and the global network;
– transmission, storage, and processing of information;
– use of modern interactive didactic and methodical materials;
– automation of education control;
– development of software tools for educational space of various purposes;
– use of educational websites in the educational space;
– computer experiments with virtual models;
– organization and processing of experiment results;
– distance learning in educational activities;
– an organization for students of intellectual leisure education (Nosenko, 2011).

In 2020, the COVID-19 pandemic in the field of education has led to significant changes across the planet. During the quarantine, distance learning was introduced as much as possible in all educational institutions (Kuzminskyi et al., 2018).

As noted by A. Kuzminskyi et al., (2021), during the COVID-19 pandemic, distance learning, based on information-educational technologies. Distance learning is effective both for learning in institutions of higher education and for monitoring.

8. The advantages of distance learning

Supreme contribution of students in monitoring their knowledge, active learning, and improving them as individuals is required by the methodical basis of distance learning, both for the educational process in general and for remote monitoring of achievements during the pandemic (Omonayajo et al., 2022). Let's note the advantages of working in the distance form of education:

– motivates students to bring out competitive professional training using distance education;
– the speed of communication between students and the teacher;
– constant attention of the teacher;
– increasing the number of consultations at a convenient time for those seeking education;
– the creation of opportunities for communication between the teacher and students of education in the form of a forum;
– interpersonal contact among students and the teacher, which provides an opportunity to ensure quality education - in general, and during monitoring activities - in particular.

Consider the possibilities of effectiveness of pedagogical support of monitoring activities

In the process of distance learning, we will consider the possibilities of the effectiveness of pedagogical care of monitoring activities, which is achieved under the following conditions:

– constant improvement of students' computer literacy;
– the possibility of accounting for the psychological features of perception, attention, memory, age-related capabilities of education seekers, their individual and personal regularities;
– implementation of psychological comfort;
– the ability of an individual to engage in dialogue using information technologies;
– the possibility of applying an individual approach to education seekers;
– organization of self-control of education seekers;
– systematic monitoring of the educational process;
– improvement of self-employment skills among students of education;
– effective interaction of distance education components.

We see the necessity of today in the development of the potential of each country. The primary task is to ensure blended learning. From experience, we see that educational institutions should be better prepared for the use of distance education, which will provide an opportunity for more individualized approaches to the educational

space and monitoring of educational activities. More attention must be focused on developing flexible face-to-face or online teaching curricula.

An important condition is that all teachers have a good command of IT devices and direct their efforts to reform education guided by the standards of the European Educational Space. Teachers should perform the following functions:

–   coordination of the educational process,
–   filling the course that is taught,
–   conducting consultations with education seekers during the development of an individual study plan and during the educational process,
–   management of student educational projects,
–   assessment of educational achievements of education seekers and monitoring.

During the COVID-19 pandemic, courses on foreign open resources, which exist and need to be developed, became appropriate, because there are not enough of them. This is confirmed by the Prometheus and VUM platforms in Ukraine, which contain an insufficient number of courses (Semenikhina et al., 2020). Consider the principles of distance education as a system. The principles are different from classical education, they ensure the interconnection of the main aspects of distance education - organizational, technological, value, and pedagogical:

–   the principle of openness - everyone has the right to receive an education without any exams and testing; enrollment in a higher education institution is carried out during the year; the student chooses the place of study himself (study takes place outside the classrooms);
–   flexibility - the learner chooses the educational blocks himself, sets himself a goal; freely chooses the term of study;
–   intensification of educational activities of education seekers - education seekers themselves use their practical experience, already acquired knowledge to master new ones; active forms are widely present during training;
–   the adequacy of learning technologies of the distance education model - is based on the principle of pedagogical expediency: the use of new information technologies;
–   learning mobility - depends and relies on information networks; knowledge bases and banks with the help of which students of education independently adjust their educational program by their needs and level of development;
–   individualization of training – the individual characteristics of the students of education are taken into account and the choice of training terms and training blocks depends on this moment; the possibility of studying outside the study group is allowed, but at the same time there is control of the distance education institution;
–   humanism – the educational process is aimed directly at the person, all conditions are created for students to acquire a high level of knowledge;
–   alternativeness - non-antagonism of distance education conditions the successful functioning of all the above-mentioned principles (Strelnikov & Britchenko, 2013).

Conclusions

The significance education of the possibilities of using information technologies for the improvement of the educational process in higher education institutions is substantiated. We will highlight and describe the main functions inherent in the information provision system of monitoring and organization of the quality of education in a higher education organization and the key mechanisms of information technologies. The quality of education was investigated in three directions: conceptual, theoretical, and system-methodological. The classification of information technologies is shown, which can be founded on several structures: the technique of operation in the information system; grade of coverage of management tasks; technological operations carried out by classes; type of user interface, etc. The importance of multimedia equipment and multimedia products for education is emphasized. The relevance and necessity of distance education are shown and its principles are considered.

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