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Use of information technologies for quality training of future specialists

Використання інформаційних технологій для якісної підготовки майбутніх фахівців

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Abstract

The article considers the main ways of using information technologies in education (creation of information environments in each educational institution. The factors without which the modern implementation of educational information technologies is impossible are singled out. The purposes of using e-learning, blended learning, and ways of monitoring education using computer testing are revealed. Emphasis is placed on the most effective means of educational multimedia systems in classes (automated learning systems; computer simulators; multimedia presentations; educational films; video demonstrations, etc.). The stages of teacher preparation for classes using computer technologies are singled out and their significance during classes is substantiated, the main functions in the system of training students who perform modern information technologies, the main directions of using

Анотація

У статті розглянуто основні шляхи застосування інформаційних технологій в освіті (створення в кожному освітньому закладі інформаційних середовищ; створення програмних засобів в педагогічному соціумі; застосування інформаційних технологій у процесі здійснення дослідницького, проектного навчання; застосування інформаційних технологій в управлінні освітнім закладом; використання Інтернет засобів з метою розробки в закладах освіти програмно-методичного забезпечення, пошуку інформації, психологічного консультування, професійного становлення; створення в закладах освіти ВЕБ-сайтів; удосконалення в закладах освіти профорієнтаційної роботи; розробка і використання програмних продуктів для контролю і моніторингу освітньої діяльності). Виокремлено чинники без яких неможливе сучасне впровадження інформаційних технологій навчання. Розкрито цілі використання e-learning,

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information technologies in education, pedagogical conditions for effective introduction into the educational process of information technologies, the main goals of training specialists, which are achieved in the process of applying information technologies.

Keywords: information technologies, future specialists, e-learning, blended learning, educational process.

Introduction

The world society carries out constant development of the educational sector, therefore the integration of each country into the international educational community is possible, and hence the expansion of the economic sector, cultural cooperation, and science between states is possible. All these positions determine the need to modernize the training of future specialists, activate ways to improve the quality of education for all branches, and offer modern training of future specialists (Polishchuk, 2021). Today, higher education affects all the processes of human life, and therefore at the global level, it acts as the main component of society and depends on those processes that are carried out in it, therefore, when training specialists, it takes into account the development of personality and influences the formation of a person's views on life. With such an approach, it is necessary to take into account the current state of development and the introduction of information technologies into the education of any country for high-quality training of specialists based on European and national standards of higher education. Information technology is a constantly renewing, inexhaustible resource, which is the main intellectual value of society. They develop too quickly and are a necessary key to learning the material (Kovalenko, 2017).

In the professional training of future specialists, an important factor that optimizes the educational process in modern institutions of higher education is the creation of a favorable environment for the optimal educational activity

blended learning, шляхи здійснення моніторингу освіти за допомогою комп'ютерного тестування. Наголошено на найбільш ефективних засобах освітніх мультимедійних систем на заняттях (автоматизовані навчальні системи; комп'ютерні тренажери; мультимедіа-презентації; навчальні фільми; відео демонстрації тощо). Виокремлено етапи підготовки викладача до занять із використанням комп'ютерних технологій та обґрунтовано їх значущість під час заняття, головні функції у системі підготовки здобувачів освіти, що виконують сучасні інформаційні технології, основні напрямки використання інформаційних технологій у навчанні, педагогічні умови для ефективного запровадження в освітній процес інформаційних технологій, основні цілі підготовки спеціалістів, що досягаються у процесі застосування інформаційних технологій.

Ключові слова: інформаційні технології, майбутні фахівці, e-learning, blended learning, освітній процес.

of future specialists. At the same time, the integration of traditional teaching methods and the latest information technologies is mandatory (Matsuk, 2018).

A high level of qualification, the quality of acquired knowledge of the future specialist, mobility and professional competence are the main principles of rapid and constant development of the economy of any country. Information technologies make it possible to ensure a high-quality educational process and thus contribute to the competitiveness of a specialist, improve the further educational process, make education accessible and effective, and contribute to the quality preparation for life activities of the younger generation in the information society. Therefore, the use of information technologies for high-quality training of future specialists is a priority for the development of education, which ensures constant improvement of the educational process, makes professional training of future specialists accessible and effective (Derevyanko & Sukhovetska, 2015).

Literature Review

A. Polishchuk (2021) provided a solid groundwork for the application of foreign language competence in future professionals using information technologies. He explored the potential of the educational process and the principles of implementing foreign language competence. The reasons for inadequate and

underutilization of information technologies in higher education institutions were demonstrated. The author also proposed progressive and effective measures for incorporating information technologies into the educational processes of these institutions.

E. Borodina et al., (2019) performed a scientific analysis, studied and highlighted the benefits of mobile applications, and information technologies for training future specialists in higher education institutions. They examined the key challenges that arise during the training of specialists within a mobile application environment. The study showcased the potential of using mobile devices in the educational process, which promotes the shift from traditional forms of education to the application of innovative technologies. They disclosed potential methods for acquiring an information-based education using Google Apps services. The research proved that information technologies make learning interactive, increase educational intensity, and introduce new educational content components required for training competitive specialists.

S. Ghavifekr & W.A.W. Rosdy (2015) confirmed that information technologies enhance the teaching and learning environment by making it more active and dynamic. They further contributed to the consistent engagement of teachers in the day-to-day educational process. In their view, teachers are essential players in the educational process, utilizing information technologies.

L. Matsuk (2018) advocated for the necessity of using information technologies in the professional training of future specialists. This is essential for preparing future specialists to use specialized computer programs at various stages of their educational work. The study highlights key areas of student professional training when acquainting themselves with computer usage rules during remedial classes. The possibilities of harmoniously combining information technologies with traditional speech therapy technologies for children are shown. The study demonstrated the advantages of using information technologies in a specialist's future professional activities.

T. Vasenok, A. Zinchenko, & I. Marynchenko (2021) described the contextual content of forming professional competence in future sewing specialists when applying information technologies in modern society. They emphasized the need to use modern information

technologies, and automated clothing design systems, which contribute to improving the quality of work in sewing enterprises. Innovative approaches based on the use of modern information technologies are characterized as essential in the professional training of future specialists in vocational education.

M. Kademiya & I. Shahina (2011) demonstrated the significance of integrating information technologies in the educational processes of higher education institutions, and in management activities. They showed how the implementation of information technologies in the educational process of higher education institutions and the management of the educational process improves the quality of both categories and pedagogical efficiency.

O. Korets (2018) pointed out the necessity for future technological field teachers to use modern information technologies. They proposed a potential approach for using information technologies for studying technical and technological disciplines that implement technical calculations.

V. Kovalenko (2017) substantiated the potential of using information technologies in higher education systems. He demonstrated ways of using these technologies and proved their effectiveness in increasing the efficiency of the education and self-education process, enabling the transition to continuous education.

O. Derevyanko, & S. Suhovetska (2015) presented the primary aspects of utilizing information technologies in the educational process. They affirmed that the environment of information technologies promotes creative personality development, self-realization, and provides high-quality professional training for future specialists.

The purpose of the study is to consider the primary methods of using information technologies for the quality training of future specialists.

Methodology

In order to accomplish the research objective, a range of complementary methods have been utilized to gain a comprehensive understanding of the topic:

- Theoretical methods, comprising the analysis of philosophical, psychological, and pedagogical studies, were employed.

These methods served to substantiate the conceptual underpinnings of the research. The interpretive-analytical method facilitated the systematization, synthesis, analysis, and generalization of scientific statements. Additionally, comparative-historical analysis allowed for a comparison between international and domestic content in professional specialist training.

- Empirical methods were used to determine the training level of future specialists. These methods included questionnaires, observations, and interviews.
- The prognostic method was applied to incorporate developed educational and methodological materials related to the use of information technologies for quality training of future specialists into the educational process.

The study's methodological concept shows varying approaches of both specific scientific and general scientific methodology. These are the foundations upon which professional development and self-improvement of future specialists are conducted. An ongoing interrelation of approaches is observed. These include:

- The synergistic approach: This forms a holistic view on the professional training of a specialist, allows the consideration of the dynamics of information technology use for the qualitative training of future specialists, and leads to the development of professional self-improvement technologies.
- The metacognitive approach: This encourages subject-subject interaction, expands metacognitive strategies of self-study in students, and develops the reflective abilities of future specialists.
- The competence approach: This facilitates the formation of a competence-based experience in the subject of self-education activity, enables professional self-improvement, and ensures the enhancement of professional and pedagogical skills and qualities.
- The individual-typological approach: This guarantees the formation of a valuable perspective among students towards independent work, is founded upon the principles of differentiation, individualization, independence, and consciousness of professional self-improvement, considering their individual-typological features.

The theoretical concept of the research justifies the definitions of the main research concepts concerning the use of information technologies for the qualitative training of future specialists. It also defines the structure of information technologies for quality training of future specialists and ensures the training outcome – the readiness for competitiveness.

The process of using information technologies for quality training of future specialists is anchored in the philosophies and methodologies of scientific knowledge, and the principles of metacognitive, synergistic, individual-typological, and competence-based approaches. It also includes principles of systematicity, self-development, individualization, and specific principles like scientificity, structuring, accessibility, fundamentalization, integration, professionalization, optimality, problem-solving, relaxation, and mobilization.

The methodical concept introduces the method of using information technologies for quality training of future specialists, which involves a step-by-step process of mastering training methods, content, and forms. This concept also covers the application of innovative training technologies and methods, the development of self-study skills, and the creation of a complex of educational and methodological support.

The practical concept takes into account the experience of using information technologies for the quality training of future specialists.

Results and Discussion

Various scientists define the concept of "educational information technologies" differently.

T. Vasenok, A. Zinchenko, & I. Marynchenko (2021) describe information technologies as "the management and processing of data utilizing computer technology."

I. Bulah (1995) contends that "information technology is a system of tools and methodologies that guarantee the optimization of work with information based on computer technology."

M. Zhaldak (1991) asserts that "information technology comprises methods and technical means for collecting, organizing, storing, processing, transmitting, and presenting information that enhances people's knowledge

and hones their ability to manage technical and social processes."

I. Sokolova (2004) identifies the use of information technologies for the high-quality training of future specialists as "a system of general didactic, psychological, and technological procedures of interaction among the participants of the educational process in higher education. This system takes into account technical and human resources, and aims at developing the information competence of future specialists."

Broadly speaking, information technologies for quality training of future specialists encompass:

- A comprehensive aspect related to socio-pedagogical transformations, infused with information products, educational processes, technologies, and tools.
- The implementation of information products, tools, and the most recent pedagogical technologies based on information tools in institutions of higher education.

Educational information technologies for high-quality training of future specialists constitute an educational, methodological, and technological process. The principal element of this process, as a newly evolving educational tool, is the computer with its innovative capabilities, leading to significant modifications in the system of teaching methods and forms. In the context of high-quality training of future specialists, we interpret information technologies as a system that scientifically underpins quality professional training in higher education institutions. This system aims to boost efficiency and optimize the educational process, and it is predicated on the utilization of the higher educational institution's educational portal, the incorporation of cutting-edge technological and scientific advancements, and the upgrade of the institution's material and technical foundation (Kuchai et al., 2021).

Key to high-quality training of future specialists is the expansion of new information technologies in education, which are underpinned by new interactive methods and a modern computer base. This includes tools for distance learning, technical learning tools, computer educational programs, audio-video equipment, teleconferences, and more. Information technology tools for high-quality training of future specialists encompass artificial intelligence systems, information input devices, terminal equipment, information archiving tools,

local computer networks, information manipulation devices, contemporary communication systems, software suites, and others.

The following have gained widespread use for implementing information technologies and ensuring high-quality training of future specialists:

- Computer training programs
- Databases
- Diagnostic and testing systems
- Consulting and information systems
- Computer textbooks
- Expert systems
- Laboratory complexes
- Application programs for managing information processing.

The utilization of information technologies substantially transforms the roles and functions of the teacher and students with the objective of enhancing the quality of training for future specialists, thus significantly improving all components of the educational process (Shchyrbul et al., 2022). This change catalyzes the development of a need for self-learning, self-determination, self-improvement, and an increase in the motivation for cognitive activity among students. The teacher, adopting principles of cooperative pedagogy and new thinking, assists students in designing and redesigning their activities. They help students consider their individual characteristics through the use of information technologies, thus ensuring the personalization of education, taking into account the cognitive capabilities of each student (Derevyanko & Sukhovetska, 2015).

The main applications of information technologies in education are as follows:

- Development of information environments in each educational institution
- Creation of software tools in the pedagogical community
- Utilization of information technologies in conducting research and project-based learning
- Use of multimedia tools in education
- Introduction of distance courses in the educational landscape
- Application of information technologies in managing an educational institution
- Use of internet tools for software and methodological support development in educational institutions, information

- searches, psychological counseling, and professional development
- Creation of websites for educational institutions
- Enhancement of career guidance work in educational institutions
- Development and use of software products for controlling and monitoring educational activities (Kademiya & Shahina, 2011)

Modern application of educational information technologies for educational sector planning is impossible without the following factors:

- Individual's professional development
- Supportive policy
- Coherence
- Availability
- Training of skilled teachers to instruct students
- Student-centered teaching
- Technical support for all staff and educators
- Update of training program resources
- Educational content standards
- Monitoring of educational policy.

E-learning and blended learning are potent tools for aiding the growth of education. To ensure the effectiveness of e-learning and blended learning in self-education and continuous human education, the rules of integrated programs, usage of information technologies, and application of multimedia technologies in education are taken into account.

E-learning and blended learning blend traditional and distance learning methods with the capabilities of information technologies, which can significantly reduce training costs and enhance the efficiency of the educational process. However, e-learning and blended learning are not the only methods for obtaining continuous education—they are just one component of the educational process.

The objectives of utilizing e-learning and blended learning are:

- Conducting conferences and meetings
- Implementing remote monitoring by education experts
- Remote interaction among education participants – Independent work with electronic materials using a computer, mobile phone, etc.
- Creation of a distributed community of education seekers

- Timely delivery of electronic educational materials, which happens continuously
- Popularization, assimilation, and transfer of information technologies
- Increasing the effectiveness of teachers' activities
- Development of educational web resources
- Offering consultations, regardless of time
- Implementation of joint virtual educational activities
- Standardization of electronic materials for education
- Certification of distance learning tools
- Cultivation of an informational culture of the educational process among students
- Opportunity to obtain modern knowledge from any place and at any time
- Provision of quality education for individuals with physical disabilities (Gurevich et al., 2012)

Modern education allows for the creation of an educational environment using e-learning technology, where both teachers and students can access education from any location, independent of a stationary computer, and study at a time that suits them. This has been made possible by modern technology like tablets and iPads.

An analysis of training plans for future specialists in higher education institutions indicates a lack of educational disciplines that form the information and communication competence of future competitive specialists. In most higher education institutions, the development of information and communication competence in students only occurs in the final course of study. This doesn't always facilitate the effective use of information technologies when writing course projects and qualification papers, in extracurricular work, or during pedagogical practice. The formation of information and communication competence should be a consistent and systematic process (Shunkov et al., 2022).

In the professional training of future specialists, the use of information technologies ensures students are prepared to implement computer programs specific to their professional activities (Matsuk, 2018).

The importance of combining pedagogical technologies with information technologies in higher education is becoming increasingly recognized. This approach helps to develop skills, creative thinking, and the ability to creatively approach emerging problems,

navigate information, utilize communication, and expand students' self-education (Kovalenko, 2017).

The use of information technologies in the higher education system allows teachers to alter their methods, educational content, and organizational forms. The digitalization of the educational process in higher education aids future specialists in adapting to competitive professional activity, thereby enhancing the quality of their professional training. As a result, students are better able to navigate modern society and their specific professional activities. A higher education institution acts both as a consumer and an active producer of information technologies. The digitalization of the educational process demands computer literacy from students and teachers, as information technologies are increasingly becoming vital tools in education. They foster innovation in the educational and creative activities of students and promote competitiveness in their future professional endeavors (Kotiash et al., 2022).

Video materials and other multimedia tools are used in higher education institutions to bridge gaps in education. Multimedia teaching tools are versatile as they can be utilized at different stages of the lesson: during problem setting, before learning new material as motivation, during the explanation of new material as illustration, and throughout the process of consolidating material and generalizing students' knowledge. The most effective means of educational multimedia systems in classes include automated educational systems, computer simulators, multimedia presentations, educational films, and demo videos.

The preparation of teachers for classes using computer technologies can be delineated into several stages, each with its significance (Savchenko, 2013):

- **Organizational Stage:** This involves creating a conducive psychological atmosphere in the class to enhance the success of educational activities.
- **Checking Independent Work:** This entails assessing students' basic knowledge.
- **Topic Announcement:** Teachers announce the topic and objectives of the lesson, often through a multimedia presentation.
- **Assimilation of New Knowledge:** Students are introduced to new information, often supported by multimedia presentations and practical examples.

- **Informing Students About Independent Work:** Teachers instruct students about the upcoming independent work and provide necessary didactic materials.
- **Familiarization with Equipment:** Teachers introduce students to the necessary technical and material equipment.
- **Summary:** The class concludes with a summary of the key points.

The development of classes using information technologies necessitates the availability of software, electronic resources, presentations, and Internet materials (Kovalenko, 2017).

Modern information technologies serve several functions in the education system: modifying, modernizing, and rationalizing the traditional educational process; radically transforming the educational process; and offering a combination of elements from the traditional and innovative educational process.

Computer technology plays a crucial role in the educational process, both for teaching and for assessing knowledge. The advantages of computer-based testing include objectivity, convenience in recording and storing test results, rapid implementation of individualized testing, and automatic processing of results (Kuchai et al., 2022).

The most significant information technology device in contemporary education is a computer equipped with telecommunications and innovative programs. Key uses of information technology in education include visual representation of socio-cultural phenomena and processes, training in the use of educational material, collection and processing of statistical information, modeling, monitoring skill formation levels, and facilitating dialogue and communication through computer networks (Zayarna, 2015).

To integrate information technologies effectively into the educational process, it's necessary to meet certain pedagogical conditions. These include providing higher education institutions with Internet services, multimedia tools, and telecommunications programs, training teachers to work in computerized educational environments, and preparing future professionals to work with electronic database platforms (Burovytska & Polishchuk, 2021).

The primary goals of training specialists, achieved through the application of information

technologies (Litvinchuk, 2015), include the following:

1. Enhancing the efficiency of the educational process through individualization and intensification.
2. Improving training by using available information.
3. Achieving a productive level of professional training by applying information technologies during the study of professional disciplines.
4. Focusing on anticipatory, developmental education, and implementing promising forms of education and methods.
5. Integrating types of educational activities within a single methodology during the study of professional disciplines, based on the application of information technologies.
6. Preparing students for future professional activities in the conditions of the information society.
7. Implementing innovative teaching methods and forms with an orientation towards anticipatory, developing education.
8. Increasing the effectiveness of the educational process based on its intensification and individualization.

Conclusions

Absolutely, information technologies offer a wealth of tools and methodologies that can enhance education, such as creative technologies (e.g., electronic textbooks, hypertext, computer graphics, and geoinformation systems), virtual reality, and computer networks. All these tools play a crucial role in modernizing and enhancing the educational process.

However, as you rightly pointed out, the effective integration of these tools is not without challenges. These challenges can include:

1. **Level of Difficulty:** Choosing the appropriate level of difficulty for tasks can be a challenge. Not every student learns at the same pace or in the same way, so it can be difficult to ensure that educational materials are adequately challenging but not overwhelming.
2. **Monitoring:** While technology can make it easier to track student progress, it may not be as effective in understanding the nuances of student engagement and performance as traditional, in-person monitoring methods.
3. **Pace Control:** Technology can allow students to learn at their own pace, which can be both a benefit and a challenge. It can

be difficult to ensure that all students are keeping up and not falling behind.

4. **Visualization:** While technology can provide visually appealing and engaging content, the quality and effectiveness of these materials can vary greatly. In some cases, poorly designed materials could even hinder learning rather than help it.
5. **Personal Activity and Motivation:** It can be challenging to cater to the individual needs, motives, and requirements of students in a computerized environment.
6. **Depth of Knowledge:** Assessing the depth of knowledge and understanding that a student has gained from computerized learning can be difficult.

While information technologies can greatly enhance the educational process, it's crucial to find a balance between traditional and technological methods. Educators and researchers need to consider how to best incorporate these technologies into existing pedagogical approaches to enhance, rather than hinder, learning. Further research into how to optimize this balance is indeed a vital area for exploration. The goal is to create an educational environment that leverages the best of both traditional and digital tools to deliver engaging, effective, and personalized education for every student.

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