The latest foundations for the development of production, science and education – 2023

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The process of informatization of the national education system is more than 30 years old. During this time, there have been significant changes in equipping educational institutions with computer and multimedia equipment, significant progress has been made in the development of software for the educational process, accumulated experience in teaching informatics, systematic work on the information and communication training of future specialists in the energy industry is underway. But, despite this, the expected productive didactic and technological changes in the educational process of the higher school have not yet taken place. Sincerely believing in the great educational possibilities of information and communication technologies (ICT) and realizing the demand for their application in practice, many experts in the technological field are alarmed at their professional incompetence in matters of their application.

In the educational standard of the new generation, the objective necessity of preparing future specialists of the energy industry for life and activity in the conditions of the information society is indicated, the importance of the informatization process in the domestic education system is emphasized. Informatization of education is a complex dynamic process, the tasks of which at the moment are: increasing the efficiency of the student education process based on the use of electronic educational resources while observing the age and psychological and pedagogical characteristics of students; formation of computer literacy among students as a necessary component of the educational, cognitive and educational process of higher education; the use of ICT as a leading tool for universal educational activities [11, 13, 14]; creation of methodological conditions for students to master information literacy and elements of information culture, formation and effective use by each participant of the educational process of the information and educational environment [11].

Thus, in order to implement the requirements of the current educational standard, the need to train specialists in the energy industry with a sufficient level of professional competence in the use of information and communication technologies (ICT-competence) is growing rapidly. By the ICT-competence of a specialist in the energy industry, we understand his ability to effectively use information and communication technologies in the conditions of multi-subject and multifunctional pedagogical activities.

Naturally, the question arises: what does the level of ICT-competence depend on? On the one hand, it is determined by the modernity and relevance of the content of higher education in the field of informatics and technologies and should be significantly higher among graduates, in contrast to teachers with a long work experience. On the other hand, the ICT-competence of a specialist depends on the experience of using such

technologies in the educational process and, therefore, the level of this competence should depend on the length of work. To answer this question and to generalize teachers' opinions about the focus and effectiveness of pedagogical education in the field of informatics and ICT, we conducted a sociological survey of experts in the energy industry.

The analysis of the results of the survey conducted by us and the generalization of our own experience of teaching energy disciplines with the help of ICT in pedagogical higher educational institutions allowed us to draw a number of conclusions. First, basically, all power engineers understand the significance and perspective of the processes of informatization of society and the education system and critically evaluate their ICT-competence, realizing that computer literacy is a necessary, but not sufficient condition for the effective use of information technologies in education and development students'. The success and productivity of professional activity should become a criterion for the level of ICT-competence formed in future specialists of the energy industry in higher education institutions. For this purpose, it is advisable to make training in the field of ICT more practice-oriented, reflecting the specifics of future professional activity.

Secondly, the study of the most modern ICT in professional activities during the student's studies at the higher education institution does not guarantee their relevance even at the time of the graduate's employment, since the rapid pace of software changes, the emergence of new computer technologies gradually reduces the level of competence of a specialist in this field, achieved by study time. Maintaining your competence in the field of information and communication technologies is possible only through constant self-improvement of qualifications in this field.

Thirdly, ICT-competence is formed in the process of higher education, consolidated and developed in technological practice under the condition of systematic application of modern information technologies in educational and methodological activities. Therefore, one of the leading directions of modernization of higher education in this field should be the development of students' ability to independently master new software tools that create conditions for the practical implementation of the idea of continuous education. In this regard, we believe that one of the important components of the training of a future specialist in the energy industry should be the perceived need and ability to independently master new programs and technologies.

To form the ICT-competence of a future specialist in the energy sector, the following courses were provided in the educational process of higher education institutions: "Technical teaching aids", "Informatics", "Modern information technologies in education", "Information technologies" [11, 14]. However, traditional models of forming ICT-competence among students, focused on their interdisciplinary study within the framework of separate specialized courses, no longer meet the modern professional needs of training future specialists in the energy industry, as they do not take into account the peculiarities of their future activities in the conditions of a multi-subject, dynamically changing educational process. There is a problem of creating a model that reflects a unified systematic approach to the formation of ICT-competence of

an energy industry specialist, the interdisciplinary integration of special disciplines of information training and subjects of the professional cycle.

In our opinion, the ICT-competence of an energy industry specialist should be considered in three aspects, namely: universal personal competence in the field of higher education; part of general professional pedagogical competence; methodical competence – special professional pedagogical competence of a specialist in the energy sector.

Universal personal competence is formed throughout a person's life at all levels of education. The task of university education is to ensure the continuity of its development: studying the state of competence of the applicant; correction and development of the student's competence; stimulation and orientation of the graduate on its improvement. The formation and development of this type of competence is correlated with the tasks of each studied discipline within the framework of university education, which is indicated in the programs for the pedagogical direction of training as the first general cultural competence: "the graduate possesses a culture of thinking, is capable of generalization, analysis, perception of information, goal setting and choice ways to achieve it. Thus, the entire informational and educational environment of higher education institutions is working to develop universal personal competence in the future. The universal personal competence of a specialist in the energy sector is formed as well as that of all students within the framework of higher education, however, it acquires specific features, since its development is influenced by the features of the future profession, the content of education and especially the information and communication educational environment of pedagogical higher education institutions.

Pedagogical ICT-competence is based on the universal component of this competence, in particular, on its components such as: valuable, communicative, technical, technological and all general professional competences outlined in the educational standard of the new generation. The task of training a specialist in the energy sector within the framework of higher education is the comprehensive formation of the aspect of competence throughout the entire process of education in higher education institutions through the study of both special informational disciplines and professional training disciplines. Pedagogical ICT-competence of a specialist in the energy sector, while preserving common features from any other pedagogical specialty, has significant features characterized by the multifaceted nature of its refraction in the multi-subject training of the energy industry and the psychological, pedagogical and physiological characteristics of the individual.

Methodical ICT-competence is determined by the specifics of the educational activity of a specialist in the energy industry, which is based on such components as: valuable, communicative, motivational and all professional competences prescribed in the educational standard of the new generation.

The task of university education is the formation of this aspect of competence based on the integration of special informational disciplines with the disciplines of technical and methodical training. Methodical ICT-competence of a specialist involves:

the ability to distinguish between educational resources aimed at students; the ability to master ready-made software and methodological complexes; the ability to adapt ready-made software to the peculiarities of the pedagogical process and didactic requirements of the higher school; the ability to design solutions to pedagogical problems and practical tasks of the educational process, taking into account the psychological and pedagogical characteristics of the person; the ability to organize the educational process using computer and multimedia technologies, taking into account the laws of physiological development of students and applying health-preserving technologies; the ability to maintain electronic documentation, etc.

The considered approaches to the technology of forming the competence of an energy industry specialist in the use of ICT necessarily require a number of conditions for their implementation. First of all, it is the desire, consolidation and preparedness of the teaching staff to solve the problems of increasing the efficiency of the educational process on the basis of modern technical means. This is facilitated by the organization and conduct of training courses for the teaching staff, the work of faculty methodical seminars, open classes, participation in conferences on the use of ICT in the educational process, master classes on the presentation of new equipment and software, etc. Also, an important condition for the effective development of ICT-competence of a specialist in the energy industry is the constant expansion of the scope of application in the educational process of the possibilities of the information and communication environment of higher educational institutions. We are talking about the use of automated educational subject environments; electronic catalogs, libraries, reference systems; a set of educational and methodical materials developed by teachers for the organization of students' educational activities; electronic rating journals of students, by which they can monitor their level of success, etc.

Another fundamental condition is the availability of informational and methodological support for the process of teaching students in the field of ICT use, which would allow teachers of various disciplines to implement the principle of multi-functionality.

3.2. Aspects of Teaching Energy Cycle Disciplines Using Multimedia Tools During the Professional Training of Future Specialists in the Energy Industry

The main goal of teaching any discipline is undoubtedly the accessible presentation of material and, accordingly, the maximum degree of its assimilation by students or pupils, and as a result – the training of qualified workers, competitive on the labor market, competent, responsible, creative, mobile, fluent by their profession, able to work both in fairly stable conditions and in variable conditions in relation to the economy and production.

It is known that most people remember 5% of what they hear and 20% of what they see. Simultaneous use of audio and video information increases learning by 40-50%. Therefore, the use of computer equipment and other multimedia equipment is an excellent help. The use of multimedia in the field of education in Ukraine is already quite successful and has such areas as: video encyclopedias; simulators; situational role-

playing games; electronic lectures; personal intellectual guides in various scientific disciplines, which are educational systems using computer technology; research training in modeling the researched process in an analog or abstract form; systems of self-testing of knowledge; modeling the situation of certain production conditions.

The use of information technologies and multimedia technologies in education can greatly change the existing education system. The insufficiency of illustrative material and, in general, teaching aids in the Ukrainian language on energy cycle disciplines in pedagogical higher education institutions is solved by using multimedia equipment. The organization of the educational process can become more progressive in the sense that analytical, practical and experimental principles of learning will be widely applied, which will allow the entire learning process to be oriented to each individual student.

The use of information and communication technologies in the educational process has a number of advantages: the possibilities of providing educational information are expanded; the use of color, graphics, and sound allow you to reproduce the real environment of the activity; increase students' motivation to study; involve students in the educational process, contributing to the disclosure of their abilities, activation of mental activity; allow to qualitatively change the control of students' activities.

The disciplines of the energy cycle are the basis for obtaining professional skills, therefore, as a specialist in the energy industry, one of my main tasks is the formation of students' persistent interest in the chosen profession, interest in disciplines that explain various phenomena not only in practical activities, but also in real life Therefore, we use a variety of multimedia resources in classes on the discipline "Energy Machines": electronic textbooks; media lessons using Power Point presentations and flash animations.

Possibilities of using information and communication technologies.

For students	For the teacher
Memory and emotional perception are activated. Interest and degree of motivation increases. Students are constantly involved in the process of studying the material. An individual and differentiated approach is used. Independence of decision-making is produced.	Psycho-emotional tension and physical stress are reduced. Systematization and brevity of educational material. Differentiated education is being improved. Students and the teacher interact in the process of the dialogic form of organizing the lesson. The content of the educational material changes in time (as necessary). The teacher's time is saved. Computer skills are formed. The level of students' education increases due to the use of operational information.

If when studying the disciplines of the energy cycle, slides, diagrams, digitized films fully justify themselves, when teaching material on the subject "Energy Machines", especially when considering such rather abstract concepts as compression of liquids and gases, laws of hydrostatics and hydrodynamics, hydraulic shock, isothermal process, adiabatic process, heat exchange devices, etc., we use the "Educational and Methodological Complex". In addition to theoretical material, laboratory work, independent and individual tasks, tables, diagrams, it also widely presents animated clips, videos and tools for testing students' acquired knowledge and skills. It should be noted that animation is often more effective than just educational films, as it allows you to consider certain processes, phenomena from the inside, consistently revealing the essence of the phenomenon or process in this way.

Graphic schemes, diagrams, and samples of mechanisms are used for high-quality conducting of classes in the disciplines of the energy cycle.

These materials are used:

– during theoretical classes as an illustration;
– during laboratory-practical classes to reproduce theoretical material;
– during oral and written interviews.

There are some conditions for effective visualization in class:

– there should be as many visual elements as are needed to study the material;
– clarity is demonstrated when it is necessary in terms of time and the content of the material being taught;
– a clear selection of the main, main when showing;
– the need for a rational combination of demonstration and comments;
– comments open, accompany and summarize the demonstration;
– detailed thinking of the explanations (introductory, during the demonstration, and final) necessary to clarify the essence of the demonstration phenomena, as well as to generalize the learned educational information;
– the systematic use of visual aids in the form of a presentation contributes to the formation of students' skills in working with them;
– to involve the students themselves in finding the desired information, setting before them problematic tasks of a visual nature.

Content selection criteria can be reduced to the following provisions:

– the material used must correspond to the thematic plan;
– the material used must be adapted to the students;
– the selected material should include various types of visibility.

In addition to general requirements, there are also special requirements - requirements for the content, structure and technical execution of the presentation:

– sufficient amount of material,
– relevance, novelty and originality;
– practical content,
– systematicity, integrity.

Both the quality of visibility and its meaningful content increase. There is an opportunity to concentrate large volumes of educational material from various sources,

presented in various forms, optimally selected and arranged by the teacher depending on the needs of students and the features of the program.

Undoubtedly, the use of such visualization makes the learning process more alive and interesting, increases the motivation of learning, and promotes the activation of students' mental activity. Stimulation of students' cognitive interests is caused by the novelty of visual teaching aids.

Computer software allows you to simulate various physical processes, phenomena, technical devices, fundamental experiences and conduct virtual experiments. Classes using electronic media with programs can be held in a classroom equipped with a computer with a display.

With a small audience, a laptop connected to a computer display justifies itself well, i.e., the demonstration of video materials is conducted on two screens. An even more convenient option is to use a laptop or a computer processor unit with a connection via a VGA connector to a new generation TV with an LED or LCD screen that provides a bright, contrasting image. As experience shows, a 32" screen is enough for average audience sizes.

These methods are convenient not only from the standpoint of visualization of the taught material, but also from the standpoint of ease of connection, management, and mobility. These options have been tested by us and are offered as an alternative to more expensive multimedia projectors and interactive whiteboards.

Our experience of conducting classes using electronic learning tools shows that:

– a high-quality software product allows you to demonstrate visual dynamic models that are understandable to students;

– since electronic media are on sale, and most students have computers at home, they have the opportunity to work on the material outside the institutions on their own.

– it is simplified to carry out a number of laboratory and practical works, requirements for safety equipment during their performance, as well as energy resources.

Individual work with high-quality programs educates students in the culture of communication with computer technology and a serious attitude to this technology, that is, it forms the readiness of students to use these tools in their further activities.

It is clear to everyone that computerization of modern education is necessary to one degree or another. The main thing is to find the right balance between teaching in traditional and new informational forms of education.

The necessity of using multimedia technologies in classes on the energy cycle disciplines is due to the fact that they provide a high level of clarity of students' perception of educational information, the formation of a correct and imaginative idea of complex technical devices (systems), dynamic processes (phenomena), abstract concepts.

The didactic essence of a problem-based lesson using information and communication technologies is that, teaching these or other facts, the teacher initiates the process of cognition, the movement of knowledge from one level to another, involves students in scientific and cognitive activities (control of the movement of

someone else's thoughts and participation in him). When conducting such a lesson, it is desirable to follow the methodology that allows students to build deductive and inductive conclusions, confidence in their own abilities when solving educational tasks, and then professional.

The main functions of classes using multimedia technologies are: cognitive (educational), developing, educational and organizing. The cognitive function is expressed in students mastering the basics of scientific knowledge, determining the most effective ways to solve problematic tasks. The developmental function is not focused on memory, but on thinking, that is, on the ability to think logically, reason, and think scientifically. The educational function can be implemented only if, in addition to imparting factual knowledge to students in a specific professional field, general scientific and humanitarian information is provided to them. The organizing function involves managing the independent work of students both in class and during self-training.

Problematic points should also be noted:

– some students are not able to take advantage of the freedom of action provided by independent learning with the help of multimedia materials based on hypertext;

– the complexity of creating materials. Creating audio, video and graphics is much more difficult and expensive than writing a normal textbook text.

– difficulties with software and hardware. Software and hardware must be properly configured to ensure transparent use of learning materials.

Multimedia applications have higher system requirements than simple text editors, etc.

The integration of multimedia means requires a deep analytical, practical and experimental approach, which puts the student at the center of the learning process. The fact that the learning process is student-centered means that they must develop the skills to independently find the information necessary for the formation of knowledge. Therefore, it is necessary to use different methods of individual learning, which would allow each of them to become an active participant in the learning process and critically approach the material being studied.

The use of information and communication technologies in the teaching of energy cycle disciplines significantly increases students' interest in learning, increases the quality of assimilation of educational material, activates mental and cognitive activity, updates visual and logical memory and, in general, allows to obtain specialists capable of solving professional problems tasks with the use of professional knowledge, abilities, skills in standard and non-standard situations, as well as to form the professional competence of the future specialist in the energy industry.

3.3. The Use of ICT in the Teaching of Energy Cycle Disciplines During the Training of Future Specialists in the Energy Industry

The growing role of information technologies is characteristic of modern society. This is evidenced by the Laws of Ukraine "On Information", "On Protection of

Information in Automated Systems", "On the Concept of the National Informatization Program", "On the National Informatization Program" and the decrees of the President of Ukraine "On Measures for the Development of the National Component of the Global Information Network Internet and Provision wide access to this network in Ukraine", "On measures to improve the state information policy and ensure information security of Ukraine" and others.

Informatization of education requires compliance of the professional training of specialists in the energy industry with the modern level of informatization of society. Therefore, one of the directions of informatization of education is the training of future specialists in the energy industry who possess a high level of information competences and are ready to use information and communication technologies in the educational process. Information competences are considered by us as an integrated personal education and involve the integral formation of a motivational component (need and interest in acquiring knowledge, skills and abilities); aggregates of knowledge reflecting the system of the modern information society; knowledge that constitutes the informative basis of search cognitive activity; methods and actions that determine the operational basis of search cognitive activity; experience in search activities in the field of creating software and technical resources and human-computer relations.

The use of information and communication technologies in education is devoted to the works of scientists: M. Aldan, V. Bykov, B. Gershunsky, R. Gurevich, I. Zakharova, M. Kademia, N. Morse, E. Polat, I. Robert, L. Solovyova, Yu. Ramskyi, V. Sumskyi, Yu. Mashbytsa, etc. [4, 9, 17]. In these works, considerable attention is paid to the technologies for the development of automated educational systems, electronic educational and methodical complexes, textbooks, manuals, etc. for the training of pupils and students.

The purpose of the article is to reveal the potential possibilities of using information and communication technologies in the teaching of energy cycle disciplines during the training of future specialists in the energy industry.

One of the priority directions for increasing the effectiveness of professional training is the improvement of pedagogical skills through the introduction of modern pedagogical technologies. Among the many technologies, the most optimal, in our opinion, are information and communication technologies, interactive, design and effective.

Therefore, there is already a need to organize the learning process on the basis of modern information and communication technologies, where electronic means are increasingly used as sources of information. And if we want to see Ukraine among the leading countries of the world, if we want our children to be able to build not only their own destiny, but also the destiny of Ukraine, we must look for and find ways to pedagogically solve the pressing problems of education. I think that new pedagogical and, of course, information technologies can help us in this. It is impossible to separate one from the other, because only the widespread introduction of new pedagogical technologies will allow changing the very paradigm of education, and only new

information technologies will allow the most effective implementation of the opportunities inherent in new pedagogical technologies.

The introduction of information and communication technologies into the educational process and combining them with traditional teaching methods puts students in front of the need to be ready for changing forms of education, for the perception of the improved content of the energy cycle disciplines.

The use of ICT in the educational process has a number of advantages: they expand the possibilities of presenting educational information; the use of color, graphics, and sound allow you to reproduce the real environment of the activity; increase students' motivation to study; involve students in the educational process, contributing to the disclosure of their abilities, activation of mental activity; allow to qualitatively change the control of students' activities, while ensuring the flexibility of managing the educational process [4].

Interactive multimedia textbooks are a powerful tool for learning, which make our learning process more effective, individualized, reduce learning time and generally more "productive".

The material in the multimedia textbook is presented taking into account the peculiarities of human reproduction and memory. The simultaneous presentation of information in audio and visual forms, using all the wealth of means presented by the computer, makes it easier for the student to remember the material. Interactivity, that is, the ability for the student to control the speed and importance of learning, and the presence of control blocks, allows you to check how much the student has learned the information and, if necessary, to work on errors and, based on the above, allows you to use this textbook for independent learning [9].

The necessary elements of such a textbook are:

1. Sound accompaniment. The announcer's language, music, sounds accompanying the animation on the screen.
2. High-quality graphics drawn by a professional artist or photos. Animated inserts, movies, "live schemes" and others are possible.
3. The only design selected by the designer taking into account the selected theme.
4. Dynamic frame deployment. A static frame is worse remembered than a frame that develops during explanations.
5. Availability of a pause for independent study. The student himself decides when to go to the next frame by pressing the "next" button.
6. The possibility of repeating the explanations of the current frame and "rewinding" back several frames.
7. Control unit. It can be found after each topic, or divided into blocks of two or three questions for each topic. Failure to pass the control may return the student to either scoring or returning to the frame containing the correct answer.
8. Glossary. The student can have access to the term words without breaking away from the study.

The introduction of ICT into the educational process of the training of specialists in the energy sector of the Faculty of Physical, Mathematical, Computer and Technological Education of the BSPU was carried out within the framework of work on a single comprehensive topic "Formation of professional competence of future specialists in the fields of technological and professional education". The main goal of our activity is to stimulate and support the interest of students in mastering the disciplines of the energy cycle through the use of ICT in the educational process and the training of highly qualified specialists.

The disciplines of the energy cycle are the basis for all technical disciplines, therefore, as teachers of technical disciplines, one of our main tasks is the formation of students' persistent interest in the chosen profession, interest in disciplines that explain various phenomena not only during practical activities, but also in real life. That is why we use various multimedia resources in classes on energy cycle disciplines: electronic textbooks, video and audio encyclopedias; media lessons using Power Point presentations and flash animations; text and graphic editors; thematic Internet resources; interactive tests that are available on the Internet or developed within the NMC.

The lack of illustrative material on energy cycle disciplines in higher education is solved by using multimedia equipment. For example, the teaching of the disciplines "Energy machines", "Mechanotronics", "Hydro-pneumatic devices of mechatronic systems", "Information machines and cybernetic systems" is accompanied by the use of educational electronic visual aids and presentations in classes. These manuals contain didactic materials: drawings, diagrams, definitions and tables by discipline, intended for demonstration by the teacher during lectures through a multimedia projector.

Video materials, dynamic diagrams, graphs are used in classes on the discipline "Energy Machines".

Active work of students in classes instead of passive note-taking of received information undoubtedly gives good results. The techniques of information and communication technologies can also help in this. For example, after explaining the content of one or another section of the course, we suggest that students use the information they just received to perform the tasks offered with the help of a projector. First, we offer an algorithm for performing one or another task, after which students proceed to independently perform similar tasks. Students willingly work on the proposed tasks; they are happy to solve easy tasks and are even ready to expand the volume of tasks performed. After this activity, students are offered a benchmark of the completed task on the slides. That helps them independently analyze the work done, identify shortcomings, and correct mistakes.

At the moment, several information and communication technologies have been selected that can be used in the educational process during the study of energy cycle disciplines [4]:

– technology of computer presentations. The main merit of this technology is that it can fit into any class and effectively help the teacher and the student;

– laboratory and computer workshop. This technology is more time-consuming for the teacher and requires special training. This technology assumes an active role of the student and is effective for his creative development

– computer testing. This is practically traditional testing, only the use of computers and modern programs for processing test results makes it technological.

Therefore, the introduction of ICT in the educational process allows for variation:

1. Ways of presenting the material that cause students to be active in different modalities (visual, auditory, motor).
2. Forms of presenting the material (in the form of text, formulas, drawings, graphs, diagrams, etc.).
3. The nature of cognitive tasks (some tasks required practical actions of students; others required different levels of mental operations).
4. Logical schemes of the presented material.
5. Connections between key concepts [4].

Thus, the use of ICT in the classes of the energy cycle disciplines is based on many developed methods that begin to work at the same time - this is research, and problem-based learning, and work on projects, and simulation of some actions. With the help of multimedia, students can achieve a deep understanding of the subject being studied. The use of multimedia is one of the main means of implementing the principle of visibility in education, it creates the necessary conditions for the formation of a technological worldview when studying technology, convincing in the recognizability of phenomena and laws of real reality.

In the future, the substantiation and experimental verification of the didactic and methodological support of the methodology of teaching energy disciplines in higher education institutions is envisaged.

3.4. Formation of Professional Competence of the Future Specialist in the Energy Industry by Means of ICT

The modern period of the development of society is characterized by a strong influence on it of computer technologies, which penetrate into all spheres of human activity, ensure the spread of information flows in society, forming a global information space.

Society is in a state of transition from the industrial age to the information age, it is interested in citizens being able to act independently and actively, make decisions, flexibly adapt to changing living conditions. Computer and communication technologies are a completely obvious manifestation of the information revolution. Moreover, it can be argued that the formation of the professional competence of a future specialist in the energy industry, who has modern information and communication technologies (ICT), is a social order of this stage of development - the transition to the informatization of society.

Computerization of education is an integral and important part of these processes. Currently, Ukrainian education is undergoing a process of transition to the standards of a new generation, at the same time the role of informatization is determined and the

fact of humanity's entry into the era of globalization of information processes is confirmed. This process is accompanied by significant changes in the pedagogical theory and practice of the educational process, related to the introduction of corrections to the content of learning technologies, which should be adequate to modern technical capabilities, and contribute to the formation of the professional competence of the future specialist in the energy industry.

The essence of the new concept of the use of ICT in the educational process is to realize the potential of ICT for the personally-oriented development of all participants in the pedagogical process of higher education institutions: students, teachers, administration, that is, the methodology of designing samples of new information technology as a system of educational activities of the type is used "teacher – computer – student (group of students)" [15].

The use of ICT significantly changes the role and functions of the teacher, the results of his professional activity, which today is the most radical of the many possible ways of organizing and developing the practice of education in its various types and types [1]. All components of the educational process are affected:

– its very nature, place and methods of joint activities of teachers and students are changing;

– the ratio of didactic functions implemented in the "teacher – ICT – student" system;

– programs and methods of teaching various disciplines are becoming more complicated;

– the methods and forms of conducting educational classes are changing.

The problem of the widespread use of computer technologies in the field of education in the last decade has caused increased interest in domestic pedagogical science. A great contribution to solving the problem of computer technology of education was made by domestic and foreign scientists: R. Gurevich, M. Kademia, N. Morse, E. Polat, I. Robert, Y. Mashbytsia, G. Gromova, V. Gritsenko, V. Sholokhovich, O. Agapova, S. Papert, G. Kleiman, B. Sandov, B. Hunter, and others [1, 15].

The introduction of information and communication technologies into the educational process of a higher school entails not only the appearance of modern technical means, but also new forms and methods of education. Various didactic problems of computerization of education were reflected in the works of A. Ershov, A. Kuznetsov, T. Sergeeva, I. Robert; methodical – B. Gershunskyi, E. Mashbits; psychological – V. Rubtsova, V. Tikhomirova and others [15].

The purpose of the article is an attempt to understand the indicated problem, to develop the conceptual foundations of the effective use of ICT in the educational process of a higher school for the formation of the professional competence of a future specialist in the energy industry.

In the scientific and scientific-methodological literature devoted to the problems of informatization of higher professional education (B. Gershunsky, A. Tikhonov, O. Semenova), such synonymous concepts as "new information technologies",

"computer learning technologies", "information – communication technologies", "computer pedagogical technologies". This indicates that the terminology in this area of research and the concepts corresponding to it have not yet been established. The emergence of new hardware and software tools that increase the capabilities of the computer gradually led to the replacement of the term "computer technology" by the concept of "latest information technologies", which mean the processes of accumulating, processing, presenting and using information using electronic means.

Today, the specialist remains a key figure in the educational process and, at the same time, a key figure in the program of introducing information and communication technologies into education. Therefore, the professional profile of the teacher and the level of his professional competence are changing. Strengthening the role of informatization in education makes it necessary to form the professional competence of a specialist in the energy industry. Possessing the skills of searching and systematizing information, its electronic processing, translation from one sign system to another (text, map, table, diagram, audiovisual series), participation in the discussion of problems, formulating one's own position on the discussed issues and using information for its argumentation, the ability present the results of one's work, selecting adequate forms and methods of presentation, the ability to navigate modern means of communication, use information resources for self-development and self-improvement, apply information and communication technologies to solve professional problems and tasks in real situations of professional activity, contributes to the realization of a person-oriented paradigm of education.

According to this terminology, some researchers propose to consider ICT as a set of electronic means and methods of their functioning, for use in the implementation of educational activities. They include hardware, software, and information components as part of electronic means, as well as methods of their application, which are specified in the methodical provision of ICT [16].

Let's consider how the use of ICT affects the formation of the professional competence of a future specialist in the energy industry.

In modern conditions, the following trends can be distinguished: the teacher is increasingly freed from some didactic functions, his role is changing significantly, and opportunities for managing students' cognitive activities are expanding. The qualitative characteristics of educational activities are changing. New didactic functions are transferred to the computer: teaching of educational information, demonstration of processes and phenomena. The requirements for computer training of pedagogues are increasing [15].

It should be noted that the role of the teacher in the conditions of the use of ICT remains not only leading, but also becomes even more complicated:

– there is a need to develop the structure and algorithms of interaction with information systems;
– the content of work changes;
– there is a need for constant renewal of knowledge and professional growth, formation of broad methodical competence.

Under such conditions, computer culture becomes the most important condition for the efficiency of the professional activity of an energy industry specialist. This is especially important when it comes to the formation of the professional competence of an energy industry specialist through the use of information and communication technologies, which today should be considered as a system-creating component of the specialist's work. A specialist who uses information and communication technologies in planning his professional activity must know the capabilities of the computer in his subject area and have the skills to work in the conditions of the use of ICT, be able to select and appropriately compose the material based on the design goals, write his own or in cooperation with program programmers, electronic textbooks, electronic manuals, to be able to intelligently combine the use of computer systems with other types of pedagogical activity.

Carrying out computer training of specialists in the energy industry is effective only if the formation of computer culture is considered as an important component of professional skill. Only then does it acquire a clearly expressed and professionally defined target instruction, and the motives become socially weighty and more sustainable.

An indispensable condition for the use of ICT is the specialist's interest in their use. This means that the teacher should feel that this technology helps him solve the tasks of preparing for classes more effectively. From the above, the conclusion follows that the computer culture of an energy industry specialist becomes a decisive condition for the successful use of ICT for the formation of professional competence.

Unfortunately, the preparedness of energy industry specialists for the use of ICT today lags far behind the requirements of the time. This situation requires special study and development of practical recommendations for its change.

Analysis of the work experience of the leading higher education institutions shows that currently the psychological and pedagogical training of the teaching staff is conducted in various forms: faculties of professional development, educational and methodical meetings, exchanges of leading experience, schools of young teachers. Training programs here cover practically all the main sections of pedagogy and psychology of higher education. At the same time, the breadth of coverage, the richness of the programs do not allow for a more in-depth study of many important issues of modern pedagogy and, in particular, the use of information and communication technologies in the educational process of a higher school within the allotted time. Seminars and practical classes on these issues are often not included in the programs. In addition, they do not take into account the specifics of the teaching staff of various departments and the level of training of teachers.

Thus, there is a need for the creation and subsequent implementation of a program for training professors and teaching staff for the use of ICT, taking into account the frontal-differentiated principle, according to which the teacher must acquire general didactic and special knowledge, skills and abilities. In the general didactic part of the training of specialists in the energy industry, it is necessary to form a system of generalized knowledge, skills and abilities to use ICT, and in the special part - their

consolidation, concretization and transfer to new conditions. The final phase of training future specialists in the energy industry and checking the degree of their readiness to use ICT is the practical implementation of the acquired knowledge, skills and abilities in the course of classes. In this way, the training of specialists in the energy sector receives its logical completion.

The effectiveness of the preparedness of the future specialist in the energy industry for the use of ICT will increase due to the use of electronic manuals in his professional activity.

We have developed an electronic manual for the discipline "Mechanotronics". Its content included: curriculum, course of lectures, laboratory works, methodological recommendations for individual and independent work of students, methodological recommendations for the implementation of a course project, a list of questions for intermediate control, as well as final tests.

In our opinion, the introduction of an electronic manual into the educational process complements the structure of a traditional textbook with educational material in a more convenient form - with the help of terms, key concepts, tables, interactive tasks, multimedia illustrative material, tests, various dictionaries, hypertexts, hyperlinks. V. Bespalko emphasizes that "the traditional education system can only guide students in the content of the subject, but cannot ensure the formation of a high level of knowledge" [15]. Frontal work with the help of an electronic manual, in addition to the educational session, continues during homework or independent work, generalization or repetition of educational material, work with additional material designed for the performance of laboratory tasks. The use of an electronic manual not only saves time for the teacher during preparation for classes, but also effectively affects the work capacity of students during the processing of theoretical material, performance of laboratory tasks, work with auxiliary material, independent analysis of the acquired knowledge, helps to achieve the expected results in education.

Visualization of initial and intermediate processing data of current and final results, displayed in a user-friendly form, reproduction of theoretical and practical material using computer animation methods, video fragments, tests, individual tasks for self-analysis and self-control - all this contributes to the constant dynamic updating of methods and forms of use electronic manual in the educational process. The optimal way to use the electronic manual in classes on the discipline "Mechanotronics" (with a professional direction) is to display the information on the computer screen. At the same time, a large-scale visual representation of educational information is achieved. This form of work organization maximizes the possibilities of multimedia. This is not only an opportunity to combine information presented in various forms (text, sound, video) and an interactive method of working with the provided information, but also to increase the effectiveness of the learning process; the ability to independently master educational material; combination with telecommunication technologies, which significantly diversifies the form of presentation of educational material.

Information and communication technologies certainly improve the level and quality of acquired knowledge, with further encouragement to improve one's own

abilities and skills; save classroom time. For the further effective use of ICT as the main means of learning in the educational space, we must have an appropriate level of information culture. As noted by M. Zhaldak and O. Khomik, one of the most important elements of culture in general, which characterizes the material and spiritual development of society, is information culture, which determines the achieved level of organization of information processes, the degree of satisfaction of people's needs in information communication, in timely, reliable and comprehensive information that provides a holistic vision of the world [1].

The use of ICT in the educational process is considered not only as an element of the educational space for the development of students, but also as a space for intensifying the innovative activity of all subjects of interaction and taking into account the professional experience of the teacher, the information-subject component of his activity, contributes to the formation of professional competence, readiness in choosing and the independent creation of educational and methodological support for the content of education and the introduction of new pedagogical technologies into the education process.

Mastering the basics of the culture of information activity allows the teacher to carry out his own project-pedagogical activity more professionally, to prepare students for creative independent work at the level of student projects, which contain elements characteristic of scientific research work: definition of problems and tasks of activity; proposing hypotheses; definition of research methods; collection, systematization of received data; summarizing the results, processing the results, as well as the subsequent successful presentation of these projects at specialized competitions. The main goals of teacher training are: mastering the project method as a means of developing the educational space, based on the application of information and communication technologies; development of culture and professional competence within project, design and management activities; creation of conditions for self-development, self-organization, self-realization of each participant of the educational space.

For the successful assimilation of information and the organization of one's own pedagogical activity, it is necessary to create an appropriate educational environment for students; organize work on mastering information and communication technologies as a means of interaction; to provide a theoretical, methodological and practical basis for the implementation of pedagogical activities using ICT; to create the necessary conditions for the development of practical skills in designing educational activities and implementing individual educational programs.

The use of ICT in the educational process of a higher school is considered not only as an element of the educational space for the development of students, but also as a space for intensifying the innovative activity of all subjects of interaction, helps to apply the teacher's pedagogical experience in new conditions. The use of ICT creates a basis for continuous self-improvement of teachers and creative searches aimed at improving the training of students, as well as at the formation of professional competence. Here, special importance should be given to the cathedral's research and methodical work. In our opinion, special attention should be paid to the training of young teachers who are

just beginning their teaching career. It is very important for them to obtain a maximum of psychological and pedagogical knowledge about the use of ICT already at the initial stage of their professional development.

Thus, for the formation and development of the professional competence of the future specialist in the energy industry with the help of information and communication technologies, there are currently wide opportunities. However, the success of the process of informatization of education depends on many factors, including the provision of information and communication technologies to all educational institutions, the improvement of the information and educational environment (formation of a collection of high-quality educational resources), systematic targeted training of teaching staff in the field of information and communication technologies and modern pedagogical technologies for the purpose of forming the professional competence of a future specialist in the energy industry.

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ANNOTATION

CHAPTER 1. MODERN BASICS OF ECONOMICS, MANAGEMENT AND TOURISM

1.1. Nataliia Petryshyn, Podra Olha USE OF THE TARGET APPROACH TO THE MANAGEMENT OF THE CUSTOMS DIVISION AT THE ENTERPRISE

The theoretical foundations of the target approach in management, which are based on the definition of a key goal, a system of strategic, tactical and operational goals that are interconnected with plans, projects, and budgets, have been studied. The essence and meaning of managerial work has been studied, the range of functional management tasks of the head of the customs department of the enterprise has been determined. The necessity of applying a model of organizing management activity at the customs division of the enterprise based on a target approach, according to which management activity should be organized according to the developed plans and provides for the sequential implementation of the main stages, is substantiated. It has been established that the organization of management activities at the customs division of the enterprise based on a targeted approach should ensure the maximum increase in the effectiveness of the management work of the head of the customs division with minimal incurred costs.

Keywords: target approach, management activity, customs department, management model.

1.2. Oksana Radchenko, Svitlana Kiryan, Serhii Leontovych ADAPTABILITY OF BUDGET INSTRUMENTS UNDER MILITARY CONDITIONS: EXPERIENCE OF UKRAINE

The necessity of a radical transformation of public finances as a result of martial law is substantiated. Based on the use of open data, the need and strategy for the transformation of budgetary instruments are identified. The types of strategies, the dynamics and structure of budget revenues and expenditures, individual macro-indicators and sub-indicators of budget security for 2012-2022 have been established.

Keywords: budget, instruments, adaptive capacity, macroeconomics, financial policy.

CHAPTER 2. INNOVATIVE AND MODERN FOUNDATIONS OF PEDAGOGY AND PSYCHOLOGY

2.1. Iryna Pinchuk TEACHERS' ACADEMIC FREEDOM IN MODERN UKRAINIAN EDUCATION

The article deals with the academic freedom of the teacher that is recognized as a necessary condition for the professional development, as well as a characteristic of a modern teacher of the New Ukrainian School. It was studied and substantiated the phenomenon of academic freedom of the primary school teacher. The typology of academic freedoms of a teacher was offered. The rights of a teacher given in the law of Ukraine "On Education" were classified into three groups: the freedom of teaching, the freedom to acquiring knowledge, the freedom of individual activities.

Keywords: academic freedom of the teacher, primary school teacher, autonomy of the educational institution

CHAPTER 3. Serhii Onyshchenko FORMATION OF ICT-COMPETENCE OF THE FUTURE SPECIALIST IN THE ENERGY INDUSTRY IN THE CONDITIONS OF INFORMATIZATION OF EDUCATION (DISTANCE EDUCATION)

The section of the collective monograph is dedicated to the study of the existing experience in the creation and use of information and communication technologies in the educational process of the higher school, the possibilities of their application for the formation of the professional competence of the future specialist in the energy profile are considered. The method of organizing professional training of energy specialists for the effective use of information and communication technologies in professional activities is proposed.

The section of the collective monograph is a generalization of work experience in the use of ICT in teaching the disciplines of the energy cycle. The lack of illustrative material on energy cycle disciplines in higher education is solved by using multimedia equipment. Therefore, the main purpose of using ICT in the educational process is to stimulate and support the interest of students in mastering the disciplines of the energy cycle.

The organization of the educational process with the use of multimedia tools during the study of the energy cycle disciplines can become more progressive in the sense that analytical, practical and experimental learning principles will be widely applied, which will allow the entire educational process to be oriented to each individual student.

Examples of the use of various multimedia resources in classes are described. The significance of the use of ICT in teaching energy cycle disciplines is revealed.

Keywords: computer, professional activity, professional competence, information and communication technologies, energy cycle disciplines, multimedia resources.

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