The Use of Innovative Technologies in Education

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Summary
The use of innovative technologies is one of the promising areas of education development, so the article clarifies the content of the terms "innovation" "pedagogical technology". Our goal is to justify the need to use innovative technologies in education. Innovative technologies are divided into four groups, depending on the appropriate form of educational activity for their use. The development of innovative pedagogical technologies at the present stage of education development should be carried out in accordance with the criteria of technological efficiency, which are presented in the article: scientific; systematic; guaranteed; manageable; mass. Based on the analysis of the process of formation of pedagogical education, the main trends in the information support of teachers in the system of pedagogical education were revealed. Its theoretical and methodological foundations were determined, promising directions and main ways of improving the information support of teachers' education as an organic component of continuous pedagogical education in Ukraine were justified. The conducted study of the state of information support for teachers allowed us to establish that the main functions of scientific and pedagogical information – analytical and predictive, integrative, operational and purposeful informing of various categories of specialists – teachers-are not being implemented enough. This is due to the versatility and complexity of the pedagogical process, the low level and limited range of development of systems of operational differentiated scientific and methodological services for various categories of teachers. Ways to improve the information function of teacher education are determined.

Keywords:
information support, innovative technologies in education, teacher, computer technologies, pedagogical technology, creation of an automated corporate information system, corporate website, information and telecommunications technologies, use of computer technologies.

1. Introduction

The peculiarity of the modern socio-economic and socio-cultural situation in the state is a change in the qualitative requirements for a specialist of any profile, ensuring his demand in the labor market, successful and qualified professional activity, promotion, Social Security and fruitful life in general.

The main direction of personality formation is the use of educational opportunities. Through its means, develops intelligence and increases the level of competence of a person in any field of activity [22]. Therefore, the issue of restructuring higher education and improving the system of training specialists is acute. To this end, it is necessary to solve the problem of modernizing the content and improving the effectiveness of training and education of future specialists with the help of innovative technologies.

The educational process in higher education institutions is organized taking into account the scientific and pedagogical potential, the material and educational base of the higher education institution, and modern information technologies. It focuses on the formation of an educated, harmoniously developed personality capable of constant updating of scientific knowledge, professional mobility and rapid adaptation to dynamic processes in the educational and socio-cultural spheres, branches of techniques and technology, management systems and labor organization in a market economy. [3]

Solving the problem of information support for the introduction of educational innovations in education involves the development and application of a specially organized system designed to provide a unified structural representation of all information elements of the process of introducing educational innovations and its content. [7]

Manuscript received November 5, 2022
Manuscript revised November 20, 2022
https://doi.org/10.22937/IJCSNS.2022.22.11.13

Today, traditional printed sources of information are being replaced by information and telecommunications systems with unlimited capabilities. Information makes it possible to integrate human efforts not only in individual links, but also in all their activities [8].

The purpose of the article is to substantiate the need to use innovative technologies in education.

2. Analysis of recent research and publications

O. Liba points out the need to form the readiness of future teachers to apply innovative teaching technologies at school [18].

O. Kuchai considers the peculiarities of training future teachers by means of multimedia technologies [11].

O. Bida, O. Shevchenko, O. Kuchai describe innovative technologies in physical education and sports [3].

Kotiash, I., Shevchuk, I., Borysonok, M., Matviienko, I., Popov, M., Terekhov, V., Kuchai O. findings that the practice of multimedia technologies in the educational process of higher education institutions lets to move from a passive to an active way of realizing educational activities, in which the student becomes the main participant in the learning process [9].

Shunkov, V., Shevtsova, O., Koval, V., Grygorenko, T., Yefymenko, L., Smolianko, Y., Kuchai, O. discoveries the educational objects of multimedia learning technologies: intensification of all levels of the educational process, improving its efficiency and quality; application of the social order caused by the informatization of modern society (training of specialists in the field of informatics and computer technology; training of the user of multimedia technologies); creation of an open education system that optimizes the dynamics of the trajectory of self-education; regular integration of subject areas of knowledge; progress of creative potential of the student, his ability to communicative actions; construction of skills in organizing and conducting experimental research activities; culture of educational work; change and formation of information culture of students [21].

Kuchai, O., Skyba, K., Demchenko, A., Savchenko, N, Necheporuk, Y., & Rezvan, O. study the fragment of multimedia education in the progress of the information culture. The information range is skilled both as a separate sector of the economy and as a factor in the innovation of education [14].

I. Dichkivska considers innovative pedagogical technologies, clarifies the content of the terms "innovation" and "pedagogical technology" [5].

A. Nishimchuk, O. Padalka, I. Smolyuk substantiate pedagogical technology as an activity that maximally reflects the objective laws of the subject sphere and therefore ensures the greatest compliance of the result of activity with the set goals for these conditions. [20].

V. Zakharova and L. Filipova consider scientific and informational activity to be a key area of information activity and distinguish the following functions: documentary-factual, analytical-predictive, integrative, differential, transformational, advanced, invariant synthesizing, pragmatic [1].

Y. Mashbits, depending on the management functions, distinguishes between planned, accounting and other information [19].

A. Kuzminsky, O. Bida, A. Chichuk, O. Kuchai argue that information and telecommunications technologies are confidently included in all spheres of pedagogical activity, including the university education system. The problem of informatization has become the core around which the entire system of work of an educational institution is built. [16].

3. Research methods

To solve research problems, a complex of complementary methods was used: System-Historical (to consider the historical prerequisites and evolution of Education), logical-historical (to consider the scientific foundations of Education), chronological and diachronous (to study the process of formation of pedagogical education); functional-structural analysis, which allowed us to trace the cause-effect and historical conditionality of the problem under study; systematization and generalization of processed materials for the formulation of conclusions.

4. Results and discussion

Presentation of the main material. For modern society, the introduction of innovative technologies in education is not so much theoretical as pragmatic, since in the context of globalization it concerns its historical development and prospects associated with the so-called "high technologies".

Nowadays, the term "technology" is widely used in the field of Education. At the same time, the growing requirements for professional training of a specialist require qualitatively new theoretical and methodological approaches to the training of students, which will allow them in the conditions of higher education institutions not only to master the basics of Science and professional skills, but also new pedagogical achievements, innovative technologies. Successful mastering of innovative technologies by students will help them organically get involved in teaching activities and immediately start practical application of scientific knowledge in the workplace.

One of the main tasks of training educational personnel is to systematically improve the quality of education on an innovative basis [18].

In modern pedagogy, the forms and methods of teaching are divided into traditional and non-traditional. The task of teachers of higher education institutions is to choose such forms and methods of teaching that would allow each student to show activity and creativity. That is, along with traditional forms and methods of teaching, there are specific [11]. These include informational (conversation, team training, demonstration, consulting, lecture, expertise), operational (algorithm, video confrontation, self-criticism, "do as I do", laboratory exercises), search (analysis of specific situations, business game, business basket, discussion, forum, maze of actions, brainstorming, audience reaction, creative dialogue, design, etc.) and independent training. These forms and methods can be used both for mastering new material and for testing students' knowledge. The choice of forms and methods depends on the purpose, content and objectives of the educational process, which is aimed at preparing students for teaching activities. The essence of interactive learning lies precisely in the fact that the educational process takes place in conditions of constant active interaction of all students. All interactive technologies can be divided into four groups, depending on the appropriate form of educational activity for their use:

1. Pair (work of the subject with a teacher or peers one-on-one).
2. Frontal (the teacher teaches a group of subjects at the same time).
3. Group or cooperative (all subjects teach each other).
4. Individual (independent work of the subject).

Thanks to the processes of interaction, non-standard, unconventional thinking is formed. This is because the educational process is a system of pedagogical situations that are constantly changing and cause the need to provide an appropriate flexible, intensive, conceptually rich professional thinking of the teacher. The formation of professional thinking is much more difficult than mastering knowledge, since quite often students are not able to make independent decisions, move away from the studied sample, express independent judgments in certain pedagogical situations, and anticipate possible results of interaction with the team, an individual. [24]

G. Dewey was one of the first to develop the concept of educational content with elements of innovation, which was an impetus for the use of innovative technologies in schools:

- the reality of educational material (those things that are of vital importance for the child are studied);
- integrity (combining the child's mental, physical and emotional-volitional forces in cognitive activity);
- activity-based approach to learning (introduction of projects to curricula);
- problems in learning as a prerequisite for the development of independent and critical thinking;
- game activity as an important means of educating younger schoolchildren;
- taking into account the interests of the child as a primary factor influencing learning.

The reform of education in Ukraine encourages the use of innovative technologies in education, which is one of its promising areas of development [3].

Let us clarify the content of the terms "innovation" and "pedagogical technology". According to the interpretation of I. Dichkivska, innovation (Latin: innovation – renewal, change) is a novelty, change, renewal; a new approach, the creation of a qualitatively new one, the use of what is known for other purposes [5]. The word "innovation" consists of two forms: the idea itself and the process of its practical implementation [6]. In the Law of Ukraine "On innovation activity" [17], innovations are newly created and improved technologies, as well as organizational and technical solutions that significantly improve the structure of the educational sphere.

Researchers consider innovation in two aspects: as a process and as a product (result) [2; 5].

Technology in any field is an activity that reflects the objective laws of the subject sphere as much as possible and therefore provides the greatest compliance of the result of activity with the set goals for these conditions. [20]

The development of innovative pedagogical technologies in education at the present stage of its development should be carried out in accordance with the criteria of technological efficiency: scientific, systematic, guaranteed, manageable, mass. [18].

The information activity, which is an integral part of all spheres of public life, has certain goals and objectives, for the implementation of which there are specific methods and means that contribute to obtaining the necessary results. There are special information institutions that make up a system for providing users with documentary information of universal, industry-specific, problem-specific content. Conditions are also being created for obtaining special professional education in this area – training specialists to work in information departments. At the same time, information structures are formed as organic components of many institutions, organizations and firms. Information activities cover all branches of Science, Education, production, as well as economics, politics, culture, technology, Natural Science, etc. Therefore, it is not only a separate function of society, but also an integral element of human life.

Scientific and informational activity is considered a key area of information activity [25]. The analysis of scientific and information activities in the field of Education allows us to distinguish the following functions: documentary-factual, analytical-predictive, integrative, differential, transformational, advanced, invariant-synthesis and pragmatic.

The above functions emphasize the growing role of scientific and pedagogical information in the educational system. Operational, complete, accurate, targeted

information that meets objective and subjective needs becomes an important link between the field of management, pedagogical science and practice [16].

The above requires revision and critical understanding of the functioning of the branch system of scientific and pedagogical information and information activities of teacher education institutions. The results of the study show that its current level does not ensure the implementation of these functions, since Teacher Education does not have a unified information system. As a rule, information systems are developed in the following industries: higher, vocational, and general secondary education. The current branch system of scientific and pedagogical information does not fully fulfill its communicative functions: methods and technology of information preparation and dissemination are not effective enough, there is no necessary coordination of scientific and information activities, and there is an unjustified duplication of individual actions, a low level of technical support for information bodies and their interaction. This negatively affects the Information Service of various categories of teachers in the process of carrying out their professional activities. In this regard, the development of the information system of pedagogical education and its institutions, the creation of a corporate website for organizing remote search and delivery of electronic copies from the funds of the State Scientific and pedagogical library, libraries of educational institutions, the exchange of electronic resources with other libraries and organizations is relevant. [15].

Quite apt statement of Professor of Columbia University (USA) G. O'Shaughnessy said that the information performs the same function in driving as the driver's headlights at night. Headlights illuminate the road ahead, but do not eliminate the need to make the right decisions. The information system really affects planning and organization. It should influence the choice of decision. In addition, since information needs to be transmitted for its intended purpose, it outlines a communication network, which, in turn, strengthens or weakens the organizational structure. The need for information may determine the need for the organization of special departments, whose function is to provide management with relevant information.

The information used in the management process can be classified according to many options: external (scientific and methodological, directive and recommendation) and internal. External information includes information that comes from scientific institutions, government bodies, and other organizations, curricula and programs, socio-political, scientific, pedagogical, and methodological information. Internal is data on the state of activity of the institution, laboratory (Office). Internal information is a complex system of numerous data that covers all aspects of the institution's activities and management. In this system, it is necessary to distinguish the main link – the core of information, around which the system of intra-university information is united [16].

According to the degree of stability, information can be divided into constant and variable. The first category includes instructions, standards, curricula, and programs. The second category includes current information and information about the results of your work. The information must ensure that three conditions are met: timely receipt of Information, its fullness and completeness. Therefore, information is a set of data, considerations that reflect various aspects of the processes carried out in the management system and are necessary for the performance of its functions and the life of the institution [23].

The administration, employees of the higher education system should have diverse information about all areas of functioning of the educational institution. There are the quality of classes, academic performance and attendance of students, educational activities, material and technical base, medical and biological data on students, employees, their family and living conditions, relationships in the team and the creation of favorable conditions for their activities. To improve the efficiency of management, theoretical and practical mastery of the processes of obtaining, storing, processing, and transmitting information is necessary. The theory and practice of information transmission has become the subject of research relatively recently. The main directions of development of communications and the information process in the educational system unite the efforts of psychologists, sociologists, teachers, and programmers. The main thing, probably, is that each employee, the subject of the educational process, is both a source of information and its consumer – depending on the relationship and the nature of functional connections. That is, an employee of the education system (as well as any enterprise or institution) needs to know when, what and to whom to report, as well as what means to use to transmit information, including both formal and informal channels. For effective management of the activities of the teaching staff, variable, current information is important, reflecting the dynamism of the educational, scientific and methodological process. Collecting this type of information is quite a complex task. Effective use of information requires a high speed of its processing. Variable information, as well as conditionally constant information, can be primary or derived. Primary information is information that is formed in the course of the institution's activities and is not subject to processing for response. In management practice, derived (secondary) information obtained because of processing conditionally constant and variable information in accordance with a given program is mainly used. Derived information is mainly used for decision-making [16].

Depending on the management functions, there is a distinction between planned, accounting, and other information. The education system is characterized by the

following structure: up to 70% of all information falls on educational and methodological information, up to 20% - on planned information, and 10% – on analytical, forecast, and regulatory calculations. The high share of unsystematic information in the field of education is explained by the peculiarity of the educational and methodological process. This is due to the high number of educational institutions, managerial, power, related institutions that deal with certain issues together with educational institutions, there are many of them, they are different categories, as well as a low level of mechanization of information data processing. The growing dynamism of the educational process requires a further reduction in the time required for information processing and decision-making. Under these conditions, the existing accounting and reporting in the education system does not provide a quick and objective collection of Information, its processing, and therefore it sometimes loses its value at the time of entry into the field of management. A positive solution to this problem is associated with the use in the system of modern complex methods of processing and transmitting information based on its standardization, mechanization and automation of basic processes using such tools as electronic computing, video, faxes, microfilms, etc. [19].

Comprehensive information processing also involves the use of the only forms (standards) of primary documents that meet the requirements of all links and sections. The transition of the process of collecting and processing information to this method is possible if the primary documents are unified, therefore, the unification of documents is an important condition for the effective organization of the information system.

In practice, there are simple (direct) and complex (indirect) information systems. In a simple Information System, information is sent directly from the place of its collection to the place of use. Such information is transmitted through communication channels as a one-time message. It is typical for a lower level of management. Usually, when such information appears, a management order is issued without detailed data processing. Sometimes, when one-time information is received, the simplest processing is carried out recording the received data, comparing it etc.

Manual processing of information does not always allow you to prepare an order in a timely manner that would make it possible to analyze the event that occurred. In the current dynamic pace of development of phenomena and their rapid changes, untimely receipt of information is harmful. With mechanized processing, the gap is much smaller, and the cost of mechanization is quickly reimbursed.

Complex information systems can be classified according to various criteria. However, the level of mechanization and automation of information processing is crucial, which improves its quality and, accordingly, the quality of management. The widespread use of modern computer technology for information processing makes it possible to achieve synchronicity of its collection and processing.

Information systems, depending on the processing of information, are divided into centralized and decentralized. By volume – into complex ones, which combine the entire management complex, and local ones – to determine individual management functions. As the experience of many institutions and educational management bodies shows, the provision of information is improved by establishing linear and functional links of various types and specific, clear deadlines for feedback.

Improving the information support system in the field of education implies a qualitative improvement of Information Systems in general, but this goal can only be achieved if the scientific principles of information organization are applied. These include optimal composition of indicators and documents, maximum information content, sufficiency of documents, and acceleration of information transfer. These and other principles define ways to improve information management. The main ones are improving the organizational structure of Information Systems, rationalizing document flow, unifying document forms, and mechanizing information-processing processes.

Information and telecommunications technologies are confidently entering all spheres of pedagogical activity, including the university education system. The problem of informatization has become the core around which the entire system of work of an educational institution is built [16].

Taking into account new achievements and trends in the development of Information Technologies, the possibility of connecting to the global computer network Internet, the main functional tasks of structural divisions of educational institutions are changing, and their advisory function is being strengthened. The widespread use of information technologies in the education system based on end-to-end computer training of specialists increases their competitiveness in the labor market. Therefore, special courses are recommended for specialists, the study of which increases their information culture. These are, in particular, "Modern Information Technologies in Education", "Information Technologies of Training", "Pedagogical Foundations of the Use of Computer Technologies", etc. For future specialists, permanent scientific and methodological seminars are held on the problems of informatization of the educational process. Students must be introduced to the advantages of using the Internet, and the possibility of accessing the latest sources of information and research results is clarified. Thanks to the Internet, the introduction of distance learning has become a reality. The possibility of intensive communication between the student and the teacher, individualization of training takes this form to a qualitatively new level in the education system. One of

the main components of Information Technologies of distance learning is a virtual learning environment as a system-organized set of means of transmitting and processing information, information resources, hardware, and software, organizational and methodological support, which is focused on meeting the educational needs of teachers. Such an environment provides wide access to educational materials from various courses, supports communication between participants in the distance learning process.

According to research, the use of modern information technologies allows to increase the awareness of specialists, their professionalism, quality and depth of intersubjective relations, improve the content of education, methods and forms of the educational process. [4; 10; 15].

For higher education institutions, the social order of the information society should be considered to ensure the proper level of Information Culture of specialists necessary for professional activity, which we define as the ability to purposefully work with information, use computer information technologies, modern technical means and methods for its receipt, processing, storage, transmission. Integral components of the teacher's Information Culture are to understand the essence of concepts, the ability to work with reference, scientific, methodological, abstract literature and periodicals; knowledge of information technologies; use of the Internet, in particular the cloud technology base. [12; 13; 15]

When processing the flows of scientific, pedagogical and methodological information and selecting materials, it is necessary to be guided by the principles of science, concreteness, planning, control and self-control, consciousness and independence, efficiency, which creates appropriate conditions for the optimal functioning of the educational system. Creating appropriate conditions for improving the professional skills of specialists and expanding their awareness allows us to achieve the effectiveness of the process, taking into account the specifics of their professional activities, by bringing the necessary amounts of information in the period of time allocated for course training, and provides for the mandatory definition of the thesaurus of specialists to interact with the education system.

Our analysis of the structure and principles of functioning of the education system shows that the leading role in this matter is played by the choice of the optimal mode of information support for specialists both in the course and inter-course periods. After all, the basis of this system is independent work, self-education.

The study and generalization of the experience of organizing professional development allows us to conclude that there are necessary conditions and positions for the implementation of an Adaptive Information support system in accordance with the needs of specialists during the course and inter-course periods. Adaptive Information Support is understood as the application of a system for communicating the flows of scientific, pedagogical and methodological information to each specialist, taking into account his cognitive capabilities, the thesaurus with which he begins interaction with this system, the period of professional development, objective and subjective information needs identified based on the methodology proposed by us.

Based on observations, experimental work and creative search, a program for organizing optimal information support for employees has been developed, which provides for consideration in unity of the process of improving the qualifications of specialists, bringing the flow of scientific, pedagogical and methodological information, studying information needs and consequences of educational activities. Because of the analysis of materials for the implementation of the program, a model for the formation of Information requests from heads of educational institutions and educational bodies has been developed, which consists of the following motives for the need for information: for making managerial decisions, improving professional level, implementing innovative technologies, fulfilling individual assignments.

The conducted research shows that in different periods of postgraduate education, the maximum volume of Information requests from specialists is possible because of effective use of scientific, pedagogical and methodological information flows. The research results confirmed that during the inter-course period, for the successful implementation of post-course tasks and self-education of specialists, it is advisable to introduce advanced thematic information based on the coordination plans of each division of the postgraduate education institution [16].

Conclusions

To meet the modern requirements of employers for specialists, a new approach to the personality of a new formation is necessary, to a creative, mobile, competitive, morally mature, professional and cultural professional who is ready for active life in the conditions of modern socio-cultural realities, which are formed in the process of training. Therefore, teaching students by means of interactive technologies is extremely necessary in the present.

Based on the analysis of information support of specialists in the education system, it is established that information support of specialists as a component of the activities of higher educational institutions is an important organizational, pedagogical, methodological and scientific prerequisite for the effectiveness of the functioning of the entire educational sphere. Taking into account the numerous and wide-category composition of users of information on education issues, the thematic breadth of objective and subjective information needs. It is necessary

to develop large – scale information systems based on the use of new information technologies; the main functions of scientific and pedagogical information – analytical and predictive, integration, operational and purposeful informing of various categories of specialists-teachers – are not implemented enough. This is due to the versatility, complexity of the pedagogical process, as well as the low level and limited range of development of systems of operational differentiated service for different categories of employees. Based on observations, experimental work, creative search, a model for forming and meeting information requests of heads of educational institutions for making managerial decisions, improving professional levels and implementing innovative processes has been developed.

We see prospects for further research in this direction in the further use of interactive and information technology tools by students.

References

[1] Basics of information and analytical activity K.: "Center of educational literature". 336.

[2] Bida O. (2011). Search for effective ways to improve the quality of educational services in universities. Native school. 10. 8–10.

[3] Bida O. A., Shevchenko O. V., Kuchai O. V. (2018). Innovative technologies in physical education and sports. Collection of scientific works: Scientific Bulletin of the Mykolaiv National University named after V. O. Sukhomlynskyi. Series: Pedagogical sciences. Issue 3 (62). T.2. Mykolaiv: MNU named after V.O. Sukhomlynskyi. 19–24.

[4] Bykov V. (2012). ICT Outsourcing and New Functions of ICT Departments of Educational and Scientific Institutions. Information Technologies and Learning Tools. 30(4). URL: Available:http://journal.iitta.gov.ua/index.php/itlt/article/view/717.

[5] Dychkivska I. M. (2004). Innovative pedagogical technologies: teaching. manual K.: Akademvydav. 352.

[6] Encyclopedia of education / Acad. ped. Sciences of Ukraine; chief ed. V. G. Kremen. K.: Yurinkom Inter, 2008. 1040.

[7] Horash K.V. (2010). The system of information support for the introduction of educational innovations in the professional development of pedagogical workers. Theory and methodology of education management. 3. 1–11.

[8] Klyasen N. L., Lytvynenko G. M. (2014). Information support of the educational process by the network of special libraries of Ukraine. Scientific Journal "ScienceRise" No. 5/1(5).61–65.

[9] Kotiash, I., Shevchuk, I., Borysonok, M., Matviienko, I., Popov, M., Terekhov, V., Kuchai O. (2022). Possibilities of Using Multimedia Technologies in Education. *International Journal of Computer Science and Network Security,* 22(6), 727-732.

[10] Kuchai O. (2010). Formation of informational competence is one of the leading tasks of training the future teacher. Science vector of Tolyatti State University. Series: "Pedagogy and psychology". 1(1). 23-25.

[11] Kuchai O. (2012). Peculiarities of training future primary school teachers using multimedia technologies. Herald of Cherkasy University. Series: Pedagogical sciences. 34(247). 137-140.

[12] Kuchai O. V. (2014). Theoretical and methodological principles of training future primary school teachers using multimedia technologies in higher educational institutions of Poland / edited by A.I. Kuzminsky Cherkasy: publisher Chabanenko Yu. A. 361.

[13] Kuchai O. V. (2015). Use of multimedia technologies in the training of primary school teachers: a study guide. Cherkasy: publisher Chabanenko Yu. A. 52.

[14] Kuchai, O., Skyba, K., Demchenko, A., Savchenko, N, Necheporuk, Y., & Rezvan, O. (2022). The Importance of Multimedia Education in the Informatization of Society. *International Journal of Computer Science and Network Security,* 22(4), 797-803.

[15] Kuzminskyi A. (2003). Theoretical and methodological foundations of postgraduate pedagogical education in Ukraine: thesis... Dr. Ped. Sciences: 13.00.04. K. 443.

[16] Kuzminskyi A., Bida O., Chychuk A., Kuchai O. (2020). Information provision of pedagogical workers. Modern information technologies and innovative teaching methods in the training of specialists: methodology, theory, experience, problems: a collection of scientific works. Vinnytsia: "Druk plus" LLC. Vol. 56. 78-90.

[17] Law of Ukraine "On innovative activity. Information of the Verkhovna Rada of Ukraine". 2002. No. 36.

[18] Liba O. (2016). Formation of readiness of future primary school teachers to use innovative technologies for teaching mathematics at school. Dissertation of the Candidate of Pedagogical Sciences. 13.00.04. Khmelnytskyi. 358.

[19] Mashbyts Yu.I. etc. (1997). Basics of new, informational learning technologies. K.: Knowledge. 262.

[20] Nisimchuk A.S. (2013). Pedagogical technology: textbook. / A. S. Nisimchuk, O. S. Padalka, I. O. Smolyuk. K.: The fourth wave. 224.

[21] Shunkov, V., Shevtsova, O., Koval, V., Grygorenko, T., Yefymenko, L., Smolianko, Y., Kuchai, O. (2022). Prospective Directions of Using Multimedia Technologies in the Training of Future Specialists. *International Journal of Computer Science and Network Security*, 22(6), 739-746.

[22] Tsekhmister Y.V. (2002). Pre-professional training of students in a medical lyceum: theory and practice: Monograph. K.: Scientific opinion. 620.

[23] Vasylkov L.M., Prokopenko L.I. (1980). Modeling situations in the practice of professional development of personnel. Soviet school. 8. 81–84.

[24] Veselivskyi R.B. , Zinchenko S.V., Sukach Y.G. (2015). Formation of communication culture in the process of professional training of students of higher pedagogical educational institutions. Information and communication technologies in modern education: experience, problems, prospects: coll. of science works

/ edited by S.M. Kozyara, N.G. Nichkalo – K.-L.: LSU BZD.–Issue. 4. Part 1. 137-140.

[25] Zakharova V.I., Filipova L.Ya. (2013). Basics of information and analytical activity K.: "Center of educational literature". 336.