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FORMATION OF ICT COMPETENCY OF FUTURE TEACHERS

Abstract. The integration and development of the global information space, including the information-educational space, require students to become equal members of modern society. Such an educational system demands the intensification of activities in this direction by all participants. One of the key pedagogical tasks is to enhance their competencies in the field of ICT to ensure the high-quality training of future specialists at the level of the information society's requirements. Naturally, the solution to this problem must begin during the university education process. The education strategy touches upon many important issues, including the informatization of the educational system: The document highlights the improvement of the pupil-to-computer ratio in secondary education and the enhancement of schools' internet connectivity year by year. This creates new opportunities for the use of modern ICT tools in education. The level of professional competence in the field of ICT among students and teaching staff is determined by the overall efficiency of the informatization process in education. At the same time, the effectiveness of the informatization process in education also depends on the participants' level of ICT competence. The interaction between these two factors requires a comprehensive solution to the issue. In today's world, every person's life is closely intertwined with ICT, regardless of their age or profession. ICT has become a crucial tool for pupils, students and teachers. Without basic computer skills and competence, it is challenging for anyone to achieve substantial success in modern life. ICT is now actively used in many fields. There are also great prospects for the use of ICT in the education sector. ICT competence refers to the practical application of technologies that enable access to, search for, retrieval, processing, and transmission of information. This competence is essential for quality living and successful professional activity in the modern information society. The most suitable subject for

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developing future teachers' ICT competencies is computer science. It is important to differentiate between the concepts of ICT literacy and ICT competence for teachers. ICT literacy refers to general skills such as working independently with software products, using a computer, and efficiently navigating the internet. ICT competence, on the other hand, not only involves managing information but also the practical use of specific information tools and integrating them into the educational process. This also includes addressing informational and communicative tasks during the current stage of development and in practical activities. As is widely recognized, ICT competence is one of the essential skills in the modern teaching profession. The use of ICT improves the quality of subject instruction, makes the learning process more personalized, and increases its overall efficiency. Through teachers' ICT skills, students not only better grasp the material being taught, but their interest in the lessons also grows. Teachers' professional development is continuously enhanced in line with the demands and needs of the information society. Teachers master essential ICT skills to advance their own professionalism and build their ICT competence. This dynamic requires the ongoing refinement of the pedagogical process, driven by the continuous modernization of ICT. In organizing education today, the features, demands, and needs of the information society must be carefully considered.

Keywords: information society; competency; student and teacher; ICT skills; ICT literacy and ICT competence; pedagogical process.

INTRODUCTION / ВСТУП

Statement of the problem / Постановка проблеми. Global informatization has become one of the most important directions of development of modern society. One of the main goals of higher professional education is the formation of students as professional personnel and individuals possessing modern skills as high-level specialists.

Today, higher education faces fundamentally new problems. This is the creation of an integrated model of future specialists with 21st century skills, capable of professional mobility, promptly responding to innovations in scientific and practical activities, as well as determining ways to implement personnel training based on this model. The process of continuous modernization of education plays an important role in the rapid development of science, technology and various areas of production. Modernization of education also has a strong influence on the development of a continuous education

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system that allows citizens to develop a profession, career and personality in accordance with the requirements of the labor market. New, modern high-quality professional training involves the use of the concepts of "competence" and "competence". These concepts allow organizing the educational process based on the competence approach. The concept of competence can replace the concepts of "education", "good behavior", "general culture". In modern pedagogy, new approaches to the concept, criteria and components of educational technology are emerging.

The importance of solving the problem of developing ICT competence is especially emphasized in regulatory documents on education. The content of educational programs involves acquiring practical skills in performing complex professions, high technologies and all areas of the economy related to professional activity. For this purpose, teaching integrative subjects is sometimes considered. The widespread use and intensive development of information technologies, the constant updating of their technical base and software require constant updating of educational programs and methodological materials for studying modern subjects using ICT. The main goal of higher professional education is to train highly qualified specialists of the appropriate level and profile, who know their profession well, who are proficient in areas of activity close to their profession, who have constant professional development, social and professional mobility, and who satisfy the human need for education.

Today, there are opportunities to use various ICT tools in the educational process. These are information banks, Internet resources, numerous electronic learning tools, dictionaries and quizzes, didactic materials, presentations, programs that automate knowledge testing (electronic tests, questionnaires prepared using the programming languages MS Excel, MS Power Point, etc.), communication forums and many other tools.

Today the world has become dependent on ICT. Future teachers need to have various competencies, especially ICT competencies, including pedagogical and psychological knowledge. The labor market requires extensive knowledge and fast projects based on ready-made solutions. At the same time, the teacher teaches students, develops them, receives a strong incentive for self-education, professional and creative development using ICT. By mastering ICT, teachers become an active member of the information society, using ICT in the process of training future specialists, improve the quality of education, the level of training of specialists and their own professionalism.

Analysis of (major) recent research and publications / Аналіз (основних) останніх досліджень і публікацій. In our country, research has been conducted in the field of studying the competencies of primary school

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teachers, ICT competencies and the use of innovative technologies in the training of these teachers. Let's look at some of these studies.

F. Ibragimov [6] in his research notes that competent training of teachers, the use of ICT, and the rapid growth of information require the training of professional teachers who are able to teach their students to learn [6]. In her dissertation, G. Mamedova [9] studied the readiness of future primary school teachers for innovative activities, and determined the content and characteristics of innovative teacher activities [9]. N. Kazimov [8] included the concept of "ICT competence" in his research, touching upon the professional activities of future teachers, and explained the essence of ICT competence [8]. H. Akhmedov [3] in his article "The problem of increasing the ICT competence of teaching staff has not yet found a real solution" notes: "Many teaching staff have weak work competence and psychological training in the new information and educational environment. The problem of increasing the ICT competence of teaching staff has not yet found a real solution" [3].

AIM AND TASKS / МЕТА ТА ЗАВДАННЯ

The ***purpose*** of the study is to develop a methodological system for the formation of ICT competence in teaching computer science to future teachers based on a competency-based approach.

In accordance with the specified goal, the following ***tasks*** are set in the:

- taking into account the structure of the pedagogical system, analyzing ICT professional training that ensures the formation of ICT competence of future teachers and, on this basis, determining their requirements for professional training;
- to prepare a standard project for the formation of ICT competence of future teachers in teaching computer science based on the ideas of the competence and contextual approach;
- to develop a methodological system for the formation of ICT competence in teaching computer science to future teachers;

THEORETICAL FRAMEWORK / ТЕОРЕТИЧНІ ОСНОВИ

The concept of modern ICT competence occupies a special place in the educational standards of many countries. These documents indicate that one of the main indicators of professional competence is ICT competence.

They note the following as the main aspects of ICT competence:

1. Have sufficient functional ICT literacy;
2. Effective use of ICT in professional activities and solving professional

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problems, educational activities;

3. ICT is the basis of a new educational paradigm for personnel development.

Teachers always need to improve their ICT competence. Professional development of a teacher is impossible without taking into account the modern ICT factor. Because ICT competence of a teacher today is an important component of pedagogical activity. The modern world is developing dynamically, this development is characterized by intensive information processes. Teachers should have the opportunity to build their professional activity on a scientific basis. Without this, the development of ICT competence of students is impossible [11].

The structure of ICT competence of a teacher includes the following components:

1. Understanding the need to use ICT in education;
2. Studying the possibilities of ICT and using these possibilities in the educational process;
3. Organizing and managing the process of basic training in the field of ICT;
4. Continuous professional development in the field of ICT [10].

To assess the ICT competence of a teacher, the following components should be taken into account:

1. Electronic resources reflecting the specifics of the subject taught, information about additional educational resources located on the Internet;
2. The ability to use the necessary educational programs in teaching, search, find, download them to computers, practical use of educational electronic resources, the ability to create new resources, the ability to actively use projection equipment in the educational process.
3. The ability to provide students with understandable educational resources, select and use the programs necessary for this;
4. Test programs and the ability to organize the educational process, actively using tools;
5. Ability to search, find, process, evaluate and correctly present information stored in digital educational resources in accordance with the tasks set in the learning process;
6. Ability to competently change existing information and create new resources for the purpose of preparing educational material;
7. Ability to practically use Internet resources and other information technology capabilities to prepare and conduct lessons;
8. Formation of a digital portfolio of students;
9. Organizing students' work in network projects, including organizing quizzes that can be conducted and controlled remotely, and assessing their

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results. Innovations that will appear in this area in the future can be added to the teacher's ICT competence.

The current stage of development of continuous professional education is characterized by the transition from traditional reproductive-illustrative training to professional-applied training. Educational theorists and practitioners note the need to form special "competencies" focused on the ability to apply them in professional pedagogical activity. Professional competence can be considered as a sum of interrelated competencies consisting of personal and professional abilities, reflecting the theoretical and practical preparation of a specialist for his professional activity, the successful fulfillment of his professional mission [10].

The professionalism and competence of a teacher are formed from the synthesis of many qualities necessary for him. The technology of acquiring these qualities begins with the correct choice of this profession and the effective organization of its acquisition. As the main criteria of pedagogical professionalism and competence in the work of a teacher, such qualities as the presence of a high culture of communication in relation to students and knowledge of the intricacies of modern pedagogical science are also important.

A teacher can further develop his/her skills and abilities by regularly working towards his/her professionalism. Self-education and self-development are an integral part of a teacher's activities. Competence is the ability to effectively apply the acquired knowledge and skills in the process of specific pedagogical activity. Competence is a set of knowledge, skills, abilities, values, qualities that are necessary for the implementation of specific work and are effectively applied in professional activities.

Competence includes knowledge, skills, values and qualities, abilities necessary for personal development and effective professional activity. In conclusion, we note that these qualities form the characteristics (knowledge, skills, abilities, values) necessary for effective professional activity and continuous education in modern conditions. Competence is an integral feature of the teaching profession. Each period has its own requirements, specific skills arising from these requirements are gradually specified and developed.

In the global digital world we live in, teacher competencies include:

- literacy: the ability to use modern educational technologies, ICT tools, the ability to teach students to teach, the ability to transform acquired knowledge into life skills, etc.;
- creative thinking: the ability to coordinate the information received with each other, thereby creating new information from known information;

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- communication skills: the ability to establish communication between teacher and student, student-teacher-parent based on communication skills, social qualities;
- consistency: each process, work, lesson must have a result.

The mechanisms of the dynamics of professional competence of a teacher can be presented as follows:

- Participation in various courses and trainings, individual self-education, use of modern teaching technologies and ICT;
- Preparation and holding of creative lessons, creative reports, participation in various competitions, etc.

Teacher competence is a very important basis for students' competence. A teacher with creative knowledge and skills develops in students and pupils the ability to work with ICT, the ability to transform information into knowledge, effective communication skills, as well as the ability to teach based on individual knowledge and skills, and to conduct high-quality training. A creative teacher creates the opportunity to develop the thinking of each student, establishing a creative learning process [12].

ICT competence of a subject teacher is understood as his/her readiness to effectively use ICT in his/her professional activities, skills of free use of technologies. This quality does not depend on the level of professional training of the subject teacher, the level of effective use of ICT potential in teaching his/her subject. ICT competence of a subject teacher also depends on the allocation of a place for this area in teaching other subjects and organization of training using new technologies. This work requires the use of ICT in all areas.

Little attention is paid to the use of ICT capabilities by future subject teachers when organizing individual lessons and extracurricular activities, and the formation of students' ICT competence is practically not taken into account. Some disciplines can make a direct contribution to this work. Like all subjects, the computer science course belongs to this list of subjects. In terms of its content, ICT in computer science teaching can be used in different forms, in different types of classes – lectures, seminars, laboratory classes, self-study, when checking educational material.

ICT competence of a teacher is a complex concept. ICT competence of a teacher is a purposeful and effective application of technical knowledge and skills in real educational activities. ICT competence of a teacher is an integral part of the professional competence of a teacher.

"ICT competence has three main directions:

1. Having a sufficiently high level of functional literacy in the field of ICT.

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2. Effective and justified use of ICT to solve pedagogical problems in educational activities.

3. Understanding ICT as a new paradigm of education, serving ICT as a subject of the information society for the development of students, creating new knowledge through it" [7].

ICT literacy means knowledge of information about a personal computer, software products, their functions and capabilities, the ability to "press the right buttons", computer networks. ICT competence – in addition to the ability to use various information tools, assumes their effective use in pedagogical activities. There are serious differences between the requirements for ICT competence of students in pedagogical training and scientific and pedagogical requirements that are not adequate to its implementation. This reality emphasizes the importance of ICT competence of subject teachers; it is necessary to implement these competencies not only when teaching subjects focused on computer science, but also when teaching other subjects that serve to prepare students for professional activities.

These issues on the use of ICT in the process of professional training of future teachers must be resolved:

1. The use of ICT in teaching subjects, the problems of scientific and pedagogical support for this process must be resolved.

2. Implementation of projects that involve conducting micro-research using ICT.

3. Preparation of teaching aids for teaching subjects focused on computer science.

4. Preparation of didactic materials on the main sections of the subject for all types and forms of teaching the subject when working with information sources, Internet capabilities and student resources.

5. Preparation of assignments for competence diagnostics.

In addition, subject teachers must have certain skills in the field of ICT.

This includes the following:

1. Obtain information through the use of ICT, create new knowledge on this basis, and be able to use it in professional activities.

2. Use of ready-made electronic resources on a specific subject, use of Internet resources in the educational process.

3. Be able to prepare new methodological materials using ICT.

4. Improve, enrich, and process previously prepared electronic educational resources, and be able to effectively use them in the educational process.

5. Prepare text and graphic information on a specific topic, be able to use it in professional activities.

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6. Be able to create various illustrative tables.

7. Ability to use presentation programs in the process of teaching the subject (knowledge of the structure of slides, providing dynamic information (animation effects), using sound effects, creating a table, providing information in video fragments).

Every work done, every step taken towards the formation of ICT competence in computer science classes of students is the beginning of a more effective and adequate education of the next generation. The professionalism and competence of a teacher are formed from the synthesis of many qualities necessary for him. The technology of acquiring these qualities begins with the correct choice of this profession and the effective organization of its acquisition.

Some authors consider information competence as one of the main competences of a modern specialist, which has objective and subjective aspects. The objective side is manifested in social requirements imposed on the pedagogical activity of a teacher. The subjective side reflects the change in the objective side, such as the individuality of a specialist, his interest in improving and developing his information competence. In clarifying the content of the concept of "information competence", some researchers present the emergence of information culture as a result of education. Information culture is associated with the categories of human thinking, behavior, culture of activity, reflects the degree of mastery of the means and methods of collecting, storing, processing and transmitting information and is characterized as a subsystem of its general culture.

In relation to the teaching profession, information competence is an integral part of his professional competence, an important component of pedagogical activity, a qualitative characteristic of the information focus of scientific and educational activity. Information competence is manifested in the system of knowledge, skills, abilities and reflexive instructions necessary for interaction in the field of ICT [1].

The information competence of a teacher includes:

- the formation of cognitive abilities in a student, the ability to independently acquire knowledge in pedagogical activities, the implementation of educational, research activities, understanding the features of information processes and the logic of development aimed at automated management systems of an educational institution and the educational process;
- understanding the features of professional information and the possibilities of using ICT for its selection;
- knowledge of the main types of ICT used in the field of education, the ability to work with them, and try to study new ICT possibilities;

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- educational and communicative interaction and ICT tools for solving pedagogical problems, understood as the need to use ICT based on the conscious acquisition of skills. There are a number of reasons for including information competence in the professional and pedagogical competence. At the stage of their professional development, future teachers are on the border of the transition from basic educational competences to professional and pedagogical competences.

The formation of teachers' information competence should occur simultaneously with the formation of their communicative competence. By communicative competence we shall understand the unity of theoretical and practical preparation for communicative activity, ensuring communicative activity at a high professional level through communicative competencies, and the integral quality expressed by its communicative focus.

The communicative competence of teachers is closely linked to their ability to use ICT to provide access to information, its organization, implementation and transmission for the purposes of effective professional and pedagogical activity in the modern information and educational space.

ICT competence can be defined as a complex concept reflecting the way of life of an individual and consisting of the purposeful and effective application of technical knowledge and skills in real life. At the same time, it can be assessed as modern literacy, consisting of a person's ability to actively and independently process information, make fundamentally new decisions using technological means in unforeseen situations.

In relation to the specifics of the professional activities of primary school teachers, the concept of ICT competence is interpreted as the ability of a teacher to effectively use ICT in multidisciplinary and multifunctional propaedeutic pedagogical activities in the process of teaching and developing children of primary school age. conditions for early inclusion in the information and communication educational environment. Any competence includes motivation and preparation for self-development in this area. The use of modern technologies, methods and technical means is one of the important conditions for the development of a teacher as a specialist. Thus, the study of ICT technologies in the professional activities of primary school teachers is both an indicator of the formation of competence in this area and a factor in increasing the level of this competence.

The use of ICT tools affects the efficiency of solving pedagogical problems, thus, the requirement of effective performance of professional duties, which is included in the definition of competence, is also met. Research analysis shows the importance of teachers having a certain level of ICT competence along with

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professional and pedagogical competences [4].

ICT competence provides a person with the ability to work with information coming from different sources, having different content and forms of presentation. The computer acts as a means of transmitting, storing and processing information. This justifies the choice and study of ICT competence as an integral component of professional competence.

According to the professional standard, the general user component includes the following: the use of ICT tools to start work, stop work, use termination methods, troubleshoot, provide consumables, prevent information ideological processing, video recording of what is happening in the learning environment, keyboard input, audio-video-text communication, and browsing the Internet. The general pedagogical component involves the implementation of pedagogical activity in the information environment, the organization of the educational process: the transfer of knowledge to students, recording the final and intermediate results of students, compiling an electronic portfolio of students and themselves, providing remote consultations to students, maintaining interaction between the teacher and the student, monitoring the health of students.

Thus, there is a need to give a precise definition of the ICT competence of a primary school teacher. The rapid development of this IT is explained by the dynamism of its content, conditioned by the formation of ICT literacy of students by the primary school teacher and an exemplary educational program, the specifics of professional activity. In this regard, the ICT competence of a primary school teacher is understood as “the ability to carry out professional activities with the help of ICT and to develop ICT literacy in students, the readiness to quickly master new technologies and apply them in school practice in accordance with the development trends of the information society” [9].

RESEARCH METHODS / МЕТОДИ ДОСЛІДЖЕННЯ

The following research methods were used in the article:

- theoretical (analysis of psychological, pedagogical, scientific and methodological, specialized literature on research issues; analysis of curricula and teaching and methodological complexes and other regulatory documents; modeling);
- empirical (survey, interview, conversation, study of pedagogical documents, observations, generalization of the experience of university teachers, pedagogical experiment, etc.);
- statistical (scaling, mathematical processing of the results obtained during the study).

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RESEARCH RESULTS / РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

The conducted research allowed us to come to the following results:

The article presents a methodical system for developing ICT competence in computer science classes for future teachers. The content of the methodical system for developing ICT competence, constructed on the basis of the proposed model, is determined by the subject-profession, and its purpose is determined by the social level. Attention was paid to important elements of his professional activity in order to bring the model for developing ICT competence to the level of practical use and effective implementation in computer science classes for future teachers.

The development of ICT skills in computer science classes for future teachers occupies an important place in the preparation of a competitive specialist and the development of his/her professionalism. The issue of developing ICT competence in computer science classes has been studied in a number of studies. There are different approaches to the concept of competence in research activities. This is due to the adaptation of traditional pedagogical principles to competence-based education.

A systemic approach to the formation of the model and structure of ICT competence in computer science classes for future teachers allows us to analyze, research and develop this process as a single system. The concepts of "competence" and "competency" are widely used in professional training of personnel. These concepts allow us to build an educational process based on a competence-based approach. Here, the main attention is paid to the teacher, his personal qualities, organizational and communicative skills, professionalism, methodological and didactic techniques.

CONCLUSIONS / ВИСНОВКИ

The quality of education depends on the competitiveness of future teachers, their readiness to live in a rapidly changing complex world, and the system of competencies they master. The development of the information society requires future teachers to be active and creative members of the information society. The level of ICT competence of future teachers increases the efficiency of the process of informatization of education. In the research work with the aim of forming the ICT competence of future teachers in computer science lessons, developing the understanding abilities of students, learning motivation, interest in learning, forming communication skills and abilities, as well as the work system, various subject areas were identified.

Attention should be paid to important elements of teachers' professional

activity in order to bring the model of ICT competence formation to the level of practical use and effective implementation in computer science classes of future teachers. Real forms and conditions of future teachers' activity related to direct participation of schoolchildren in educational work have been modeled, and on this basis a methodical system of formation of their ICT competence in computer science classes has been developed.

For the effective development of ICT skills of future teachers in computer science lessons, certain organizational and didactic conditions are necessary: the presence of an information and educational environment based on ICT, modernization of methodological work in computer science, creation of conditions for the formation of ICT competencies of students, modeling, design and management of the educational process, formation and implementation of competence.

Prospects for further research in this direction / Перспективи подальших досліджень у цьому напрямі. One of the important elements of ICT competence of future teachers is the use of ICT in the educational process. For this, future teachers must be familiar with the preparation of educational materials using MS Office programs, the creation of a knowledge control system based on ICT, a system of electronic references, a fund of electronic textbooks, and the work of electronic document management in computer science.

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ФОРМУВАННЯ ІКТ-КОМПЕТЕНТНОСТІ МАЙБУТНІХ УЧИТЕЛІВ

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Анотація. Інтеграція та розвиток глобального інформаційного простору, зокрема й інформаційно-освітнього, вимагають від студентів становлення рівноправних членів сучасного суспільства. Така освітня система вимагає активізації діяльності в цьому напряму з боку всіх учасників. Одним із ключових педагогічних завдань є підвищення їх компетенцій у сфері ІКТ для забезпечення якісної підготовки майбутніх спеціалістів на рівні вимог інформаційного суспільства. Природно, що вирішення цієї проблеми має починатися ще під час навчання у ЗВО. Освітня стратегія торкається багатьох важливих питань, зокрема інформатизації освітньої системи: у документі наголошується на покращенні співвідношення кількості учнів і комп'ютерів у середній освіті та покращенні підключення шкіл до Інтернету з року в рік. Це створює нові можливості для використання сучасних засобів ІКТ в освіті. Рівень професійної компетентності у сфері ІКТ у студентів та педагогічного колективу визначається загальною ефективністю процесу інформатизації освіти. Водночас ефективність процесу інформатизації в освіті також залежить від рівня володіння учасниками ІКТ-компетентністю. Взаємодія цих двох факторів вимагає комплексного вирішення питання. У сучасному світі життя кожної людини, незалежно від віку чи професії, тісно пов'язане з ІКТ. ІКТ стали найважливішим інструментом для учнів, студентів і вчителів. Без

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базових комп'ютерних навичок і компетенції кожному важко досягти значного успіху в сучасному житті. Зараз ІКТ активно використовуються в багатьох сферах. Існують також великі перспективи використання ІКТ у сфері освіти. ІКТ-компетентність стосується практичного застосування технологій, які забезпечують доступ до інформації, пошук, пошук, обробку та передачу інформації. Ця компетентність необхідна для якісного життя та успішної професійної діяльності в сучасному інформаційному суспільстві. Найбільш придатним предметом для розвитку ІКТ-компетентності майбутніх учителів є інформатика. Важливо розрізняти поняття ІКТ-грамотності та ІКТ-компетентності для вчителів. ІКТ-грамотність стосується загальних навичок, таких як самостійна робота з програмними продуктами, використання комп'ютера та ефективна навігація в Інтернеті. ІКТ-компетентність, з іншого боку, передбачає не лише управління інформацією, а й практичне використання конкретних інформаційних засобів та їх інтеграцію в навчальний процес. Сюди ж відноситься вирішення інформаційно-комунікативних завдань на сучасному етапі розвитку та в практичній діяльності. Як загальновизнано, ІКТ-компетентність є однією з основних навичок у сучасній професії вчителя. Використання ІКТ покращує якість навчання предмету, робить процес навчання більш персоналізованим, підвищує його загальну ефективність. Завдяки навичкам роботи вчителів з використанням ІКТ учні не тільки краще сприймають матеріал, що викладається, але й підвищується їхній інтерес до уроків. Професійний розвиток вчителів постійно підвищується відповідно до вимог і потреб інформаційного суспільства. Вчителі оволодівають основними навичками ІКТ, щоб підвищити власний професіоналізм і розвинути свою ІКТ-компетентність. Ця динаміка вимагає постійного удосконалення педагогічного процесу на основі постійної модернізації ІКТ. Організовуючи освіту сьогодні, необхідно ретельно враховувати особливості, вимоги та потреби інформаційного суспільства.

Ключові слова: інформаційне суспільство; компетентність; учень і вчитель; навики ІКТ; ІКТ-грамотність та ІКТ-компетентність; педагогічний процес.

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