Development of information competence of the teacher technology in postgraduate education

Abstract

**Purpose.** With the development of information society the main task of training future and current teachers is to teach them to use modern information and communication technologies in the educational process, causing the need for changes in the traditional system of education of teachers. The development of science and technology requires teacher training in the effective use of its achievements, competently directed personal development of students creatively working to improve the educational process, use and demonstrate the use of modern information technology.

**Methods.** The effective development of information and communication competencies of teachers technologies during training in the system of postgraduate education depends on the orientation of the educational process on the principles of person-centered and activity approaches learning and application of methods, tools and organizational learning, which involve the use of information and communication technology.

**Results.** Developed and implemented methodological elements of the system based on determining components of information competence of the teacher of technology to new levels of professional training of teachers technologies. It should be noted that the use of modern information and communication technologies in learning technologies (lessons work) significantly improves the level of teaching, provides a choice of place, time, content and learning, promotes better learning students; In addition, these technologies allow you to create a complete online learning space for students and teachers of self.

**Keywords:** key competence of teachers, teacher information technology expertise, methodology of information competence, postgraduate education, and teacher training.

**Introduction**

In the context of Ukraine’s accession to the Bologna Process national higher education system is undergoing significant and substantial structural changes. Today the problem of high school is to build the students’ scientific outlook, modern system of professional knowledge, development of creative abilities and professional qualifications. But now not only have the knowledge and skills acquired by young professionals while learning to adapt to market conditions. Increasing requirements of today’s labour market to the
educational level changes caused education systems of most countries and Ukraine in particular, led to finding ways to reform the educational process.

One of the main tasks of the State program of higher education by 2020 was providing innovation towards higher education and its proactive nature and deepening international cooperation, the integration of Ukrainian higher education system into the European and world educational and scientific space, increasing the participation of higher education institutions, researchers and students in international research projects (Sokhan’, 2003). This way of education focuses on the importance of competence approach as a factor that brings the educational system.

Law of Ukraine “On the Concept of the National Informatisation Program” (Kuz’mina, 1989) outlined the main ways to modernise education in Ukraine through the introduction of information and communication technologies. Information teacher competence is determined by one of the important characteristics of the teacher, contributing to its successful careers, social security under conditions of an information society. This, in turn, necessitates upgrading teacher training, which activates the development of information competence. Defined problem is particularly relevant for Postgraduate Education, which aims to promote improvement and self-improvement of professional skills of teachers of secondary schools, develop their creative inclinations, providing educators competitiveness in the labour market.

In modern psychological and pedagogical research, both foreign and Ukrainian scientists much emphasis on the process of formation and development of information competence of teachers. In particular, the problem of information competence of future professionals dedicated scientists S. Gunko, M. Zhaldak, N. Morse, O. Spirin, A. Snigur, Y. Trius, A. Schiemann and others. Development of information competence of teachers in postgraduate education in view of their scientific achievements A. Kravtsova, A. Nikulochkina, E. Trybulska-Smirnov and others.

However, analysis of works of scientists shows that the problem of formation of information competence of teachers studied primarily in the context of the preparation of students of different specialities Pedagogical University. Much less attention is paid to the contemporary research advanced training of teaching staff in institutions of postgraduate education, providing further educational use of ICT. Is also an urgent need to study the problem of information competence of teachers technologies due to lack of sound scientific and methodological support professional development of teachers and their specific professional activity in conditions of informatization of educational institution.
The hypothesis of the study is that the development of ICT competencies of teachers technologies during training in post-graduate education will be more effective if the educational process in pedagogical universities will be based on the principles of person-centred and activity approaches teaching modern information and communication technologies, the use of, tools and organizational learning, which involve the use of information and communication technologies, and are designed individual components of methodical system will improve the professional training of teachers technologies.

The definition of “information competence of the teacher”

Problems associated with the emergence of a competency-based education, studying international organizations such as UNESCO, UNICEF, United Nations Development Programme (UNDP), the Council of Europe, the International Standards Department, Organization of European Cooperation and Development, etc., and a large number of foreign and Ukrainian scientists including I. Babin, V. Baydenko, L. Vasilchenko, A. Dubasenjuk, E. Zeyer, I. Zymnyaya, I. Zyazyun, V. Kozyrev, I. Ermakov, John Raven, N. Radionova, S. Sysoiev, Y. Habermes, A. Khutorskoi and others.

However, the appropriate psychological and pedagogical literature differently interpret the essence of the key concepts of this approach. In particular, the Council of Europe experts believe that each person should have expertise and competencies that contribute to success in life and meet the diverse areas of life and allow you to be tolerant of another worldview peacefully resolve conflicts; and several isolated groups: Intercultural – enable the individual to live in a multicultural society and respect for other peoples and their traditions; communication – allow people to communicate effectively with others; Information – reflect the possession of information technology; competence, self – enable the implementation of human desire to improve them throughout life.

Department of International standards for training, education and achievement in their documents the term “competence” defined as the ability to operate effectively, perform tasks, any job. Structure competence should consist of specific knowledge, skills and attitudes that are the foundation for their professional functions, to achieve professional standards in the industry. Assessment criteria are competence can be certain knowledge, abilities, skills, educational achievement.

Experts program “DeSeCo” (Definition and Selection of Competencies. Theoretical and Conceptual Foundations) the term “competence” is de-
fined as the individual’s ability to meet individual and social needs, act and perform tasks; with each competency based on a combination of mutual attitudes appropriate cognitive and practical skills, values, emotions and behavioral components, knowledge and skills, all that can be mobilized for active actions; manifested in the activities of the individual in different contexts; shaped by family, work, mass media, religion, etc. (Bibik, Vashchenko, 2004, p. 9).

At the International Conference of UNESCO (2004) “competence” was defined as “the ability to use effectively and creatively knowledge and skills in interpersonal relationships - situations that involve interaction with others in a social context as well as in professional situations” (Halfdan Farstad Competencies for Life, 2004, p. 6).

So characteristic interpretation of the term “competence” by various international organisations are focusing on interpersonal human interaction in the process of dealing with a problem situation, and “competence” is both a person’s ability to interact effectively and the result of this interaction.

The Law of Ukraine “On education” the underlying concept is defined as “a dynamic combination of knowledge and practical skills, ways of thinking, professional, philosophical and civic qualities, moral and ethical values that defines the person’s ability to successfully carry out vocational and further training activities and is the result of training at some level of higher education “(Zakon Ukrayiny “Pro vyshchu osvitu”).

So today scientists and experts of international organizations (UNESCO, UNICEF, UNDP, Council of Europe, International Department of Standards, Organization of European Cooperation and Development, etc) consider the notion of key competencies, ie the competencies that allow the individual to participate in most social spheres and contributing to improve the quality of society and contribute to personal success (based on European Cooperation and Development) (Bibik, Vashchenko, 2004, p. 10); Multidimensional formation containing cognitive, emotional, motivational and valuable elements (Bibik, Vashchenko, 2004, p. 25); the most common methods of action that allow people to understand the situation, to achieve results in their personal and professional lives.

Key competencies integrate into their personal and social education, reflecting the comprehensive set of mastering the ways of life; they are not at all, and in a particular case or situation (Bibik, Vashchenko, 2004, p. 46). “Key competencies should be favourable to all members of society, that is relevant to all regardless of gender, class, race, culture, marital status and language. In addition, key competencies should be consistent not only with ethnic, eco-
nomic and cultural values and conventions of the society but also to meet the priorities and objectives of education and be personality oriented nature” (Bibik, Vashchenko, 2004, p. 13). In the scientific literature emphasised that “the key competencies Multifunctional above subject, provide considerable intellectual development, based on different cognitive processes” (Bibik, Vashchenko, 2004, p. 38).

In particular, international experts of European Cooperation and Development outline the basic criteria for the definition and selection of key competencies that contribute to a high level of results; is an appropriate way to important and complex needs and challenges in the broader context; are important to the individual. These experts are three categories of competencies as a conceptual basis for determining their list. The first category - autonomous activities: the ability to protect and take care of the responsibilities, rights, interests and needs of others; ability to make and implement plans and personal projects; ability to act in a large (wide) context. The second – the interactive use of the ability to interactively use language, symbols and texts; ability to use knowledge and information literacy; the ability to use (new) interactive technologies. Third – the ability to function in socially heterogeneous groups: the ability to successfully interact with others, to cooperate, to solve conflicts (Bibik, Vashchenko, 2004, pp. 10-11).

Based on selected categories of documents of the Council of Europe identified the following types of key competencies: 1) Multicultural; 2) information; 3) social; 4) political; 5) communication; 6) general cultural; 7) cognitive-intellectual; 8) labour, business; 9) home (Bibik, Vashchenko, 2004, p. 47).

Analysing the above material, we note that common to these lists of key competencies is the mandatory inclusion of information competence, stimulated by intensive development and use in various spheres of society ICT.

The key competencies defined by Ukrainian scientists also has competence in information and communication technologies, which involve the ability of the individual to navigate the information space, own and operate according to the information needs of the labour market. They are associated with the qualities of technically and technologically educated person, prepared for active life and work in today’s high-tech information society (Bykov, 2009, p. 46).

At the present stage of informatisation of educational technology for teachers is characterised by broad use in a profession of information technology. This applies in particular information and communication technologies and developed on the basis of electronic educational resources – educa-
tion, research, information, reference materials and tools developed electronically and presented in media of any kind or placed in computer networks that play with the help of electronic and technical means necessary for the effective organization of educational process in regards its content quality teaching materials; these resources are “part of the educational process, with educational and methodological purpose and used for training of pupils, students and considered a key element of information-educational environment” (Ofitsiyyny sayt ECDL, 2016).

Organising and conducting classes, especially the labs of Technology (lessons work) on the basis of relevant electronic educational resources in the modern school enhances the effectiveness of teaching and educational process of students. In addition, the use of electronic educational resources and another software-based ICT provides education appropriate clarity, the use of which requires considerable effort from the teacher, and her presence is important for the teaching of these subjects; simplification and automation of technical calculations and more.

Also in the framework of the state program “Information and communication technologies in education and science” for 2006-2010 and “One hundred percent” up to 2015 secondary schools supplied specialized computer classes to teach different subjects, resulting in the need for classroom technology in practical ability, knowledge of methodological aspects regarding the use of ICT and e-learning resources in their professional activities.

Therefore, the concept of “information technology teacher competence is understood as” the ability and willingness based on a combination of knowledge, skills and practical skills to use information technologies, especially information and communication technologies and electronic educational resources to support professional activities of student learning technologies”.

So, given the above material, the term “development of information competence of the teacher” mean a systematic and logical process of a progressive change individual teacher, according to the requirements of modern society, about the ability of information technology in their professional and daily activities.

As defined problem of our research is relevant for teachers of secondary schools and its solution provides for progressive change on individual teacher’s ability to use information technology in their professional and everyday activities, the development of information technology competence of teachers in postsecondary education within consider training teachers in institutions of postgraduate teacher education. In view of the foregoing, the term “development of information competence of teachers technologies in
the system of postgraduate education” mean the systematic and logical process of the progressive change individual teacher during training on the ability of information technology, especially information and communication technologies and electronic educational resources, their professional and daily activities.

Methods of Information technology competence of teachers in the system of postgraduate education

The problems of education and self-education of adults, including the study of adults who are learning and teaching, learning the process for the organisation considers andragogy. Therefore, the above principles generally accepted pedagogical training should be supplemented. Analysing the work abroad (M. Knowles, P. Jarvis, J. Kalinowski, S. Zmyeyeva, M. Hromkovoyi) and national (N. Protasov, V. Oleynik, V. Putsova, T. Sorochnany) researchers highlight the following:

- the principle of joint activity – involves a joint activity of the student, so he teaches, as well as other members of the planning, implementation, evaluation and correction of the learning process, including a teacher, along with the audience determine the content of education; further functions are teacher planning and management processes and procedures which can facilitate assimilation of content;

- individualization of learning – teaching subjects jointly create a customised training programme that focuses on the specific educational needs and learning objectives, based on experience, training, psycho-physiological characteristics of students;

- the principle elektyvn training – providing one who taught a certain freedom of choice of objectives, content, forms, methods, sources, tools, time, time, place of learning, assessment of learning outcomes;

- the principle problem-situational training, according to which education should be based not on substantive, and the problem situational features that will allow the specialist to operate independently and effectively in a variety of situations;

- the principle of mainstreaming learning outcomes – the immediate practical application of obtained knowledge, skills, qualities as particularly important diversity of forms, methods and organisation of workshops, conducting practices, training, etc;

- the principle of educational needs – the construction of the learning process so that a form of learning new educational needs which specify a particular purpose after learning, and assessment of learning outcomes is done
by identifying the real degree of learning and identification of problems, which is impossible without consideration achieve the goal of education;

- the principle of independence and self-stimulation in training implemented through appropriate methods of teaching, evaluation and control of the learning process and so on.

It should be noted that the principles of adult learning principles do not contradict didactic pedagogy. Partly they develop them, correlate them. Their action in concrete terms of adult education is defined by certain characteristics that allow largely use them in the system of postgraduate education.

The characteristic andragogical learning model is the consideration of the individual characteristics and professional needs of students, their experience, training; joint planning education programmes by those who teach and learners etc., that study this model is more individualised.

Since the information competence of the teacher defined as the ability and willingness from previously received a combination of knowledge and practical skills to use information technology to support professional activities of student learning, the course content of training for each group of teachers of a particular subject should be different because the use of information technology teachers in their professional activities may be the same as well as excellent, given the characteristics of subjects (humanitarian, technical and natural-mathematical cycles), class teaching and so on.

In addition, differentiation of training relevant for teachers and another subject as each of them has its own life, social, professional experience, which includes the experience of the use of information and communication technologies. The learning process that will ensure the development of information competence of teachers in the group has featured as andragogic and pedagogical models of learning. As experience in ICT who will be learning is different or non-existent, forcing the teacher to plan the educational process, identify their needs and formulate goals, learning activities thus comes to technology transfer expertise.

Meanwhile, orientation in education should be aimed at solving a particular problem because the adult learning process ceases to be the leading activity, but only a means to achieve other goals, for it is important not discipline, study, and its role in solving problems of life problems that arise in certain situations. Therefore, you should organize the learning process to comply with the principle of independence and self-stimulation in education as the main aim of postgraduate education is not so much load weapons specialist knowledge and certain skills, but primarily focus its search for new independent (Sokhan’, 2003, p. 45), in our case - to encourage independent study.
ICT, based on the minimum required knowledge gained this category of teachers in the classroom. Teachers should create a psychological climate informal learning, based on mutual respect and joint ventures, including joint evaluation of training programmes that will enable its effective adjustment in the future.

Using these principles will help to effectively develop information competency of the teacher, as each of them, choosing their own training content, the result can solve it relevant to the issue of the use of information and communication technologies in their professional activities.

Therefore the description of cognitive activity component of information technology competence of teachers feasible based on cognitive and functional approaches. With this in mind are the following components of cognitive activity components of information competence of teachers, operating competence in the use of information and communication technologies; methodical competence using ICT in the learning process.

Consider these components in the context of the study of the problem. Operating treated competence as a combination of knowledge and skills, and experience that allows you to effectively solve problems that arise in the use of software and hardware. It should be noted that the teacher does not have to be an expert, but should reach this level of hardware and software to be able to independently and quickly without specialised help solve the urgent problem when using ICT in the learning process. As for the personal computer hardware teacher should:

- know the basic components of the personal computer functions that they perform, and the characteristics of such devices;
- be able to complement the simple PC peripherals (projector, printer, scanner, etc.) that are necessary for work;
- be prepared to use multimedia devices, digital video camera, voice recorder, projector, interactive whiteboard and more.

As for the personal computer software teacher should:

- perform basic operations on Windows and Linux;
- perform standard operations among the major software components of the package Microsoft Office;
- be prepared to use external data carriers and accompanying software (programmes archiving, recording media, file managers, programmes that restore data on corrupted media, etc.);
- be ready to install the software and general educational purposes;
- be able to install new peripherals and use it (eg, projector, printer, scanner, etc.);
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- be able to optimally configure the operating system to the needs of the lesson;
- have an understanding of programming in one of the modern object-oriented languages, for example, Visual Basic for Application, since the use of the language when writing so-called macros significantly enhances the software package Microsoft Office.

Note that the hardware and software used to implement communications-based information technologies, the use of which teacher will provide him with the opportunity to conveniently and quickly find the necessary information, communicate with colleagues, get acquainted with the best educational experience, improve skills through distance learning, inform parents students on their achievements and challenges in education, to collaborate with them in solving educational and educational problems, students report their evaluation, provide necessary advice and more. Under these conditions, the teacher should:

- have the skills to use the local network to search, and data transmission, software installation, etc;
- know how to use the most common programmes access the Internet, search engines and finding the necessary data in this environment;
- be able to adjust if necessary internet connection on your work computer, including using the and mobile phones;
- have skills to use e-mail, social networking;
- be able to create and accompany Websites devoted to school subjects that can be placed in a local school network and on the Internet;
- be prepared for the use of hardware and software for video conferencing both within the institution and with other institutions.

Methodical competence using ICT in education – the teacher must know how to use the potential of modern information and communication technologies to improve the methods of teaching their subject. Therefore, the teacher should:

- know the basic teaching of the theory of the educational process and how they evaluated the use of information and communication technologies;
- to plan lessons using modern technique of modern information and communication technologies in teaching different technologies (eg, personality-oriented learning; the training in cooperation, individual training, etc.);
- to understand the project method and technology of its implementation and place of ICT in it;
- know about the advantages and disadvantages of distance learning and to understand the methodology of implementation based on freely distributed platforms;
- be able to create educational materials for a particular school subject using a text editor, image editor, spreadsheets, multimedia applications, etc;
- be able to effectively use electronic educational resources – electronic display educational materials, teaching materials, encyclopaedias, dictionaries, textbooks, laboratory workshops, etc;
- be able to create their own electronic educational resources, including a multimedia presentation that has several significant advantages of teaching in learning, contextual and temporal interactivity.

Therefore, the programme teacher training technologies in teaching postgraduate education system includes the following modules:

1) „Modern information and communication technologies in education” – to familiarize teachers with modern techniques of information and communication technologies in educational activities and a social, cultural, legal problems arising from this; and the skills of effective use of modern information and communication technologies in teaching various subjects to students of different age groups with innovative pedagogical technologies;

2) „Software pedagogical tools” - to familiarise teachers with modern educational software, during which teachers will develop they’re operational and methodological competence using ICT;

3) „Media in didactics” – to familiarise teachers with didactic principles of creating and using multimedia products in the learning process (presentations, videos, etc.);

4) „Package Microsoft Office in training” – familiarise teachers with basic teaching principles used in the educational process text, spreadsheet and multimedia editors (Microsoft Word, Excel, Outlook);

5) „Internet services in education” – familiarize teachers with the basic methodological principles used in the educational process of cloud technologies, including distance and to control knowledge, solving problems of education and training, reporting, training and involvement in the educational process of all stakeholders (eGroupWare, Google Apps for Education, Microsoft Live@edu, etc.).

For further information competence development and intensification of this process teachers technologies, between course period recommended for remote training course „Modern information and communication technologies in education”, which is available on the website „Postgraduate education” Institute of retraining and advanced training of the National Pedagogical University named after M. Dragomanova. The main purpose of the course is to help everyone who wants to develop the basic skills needed to confidently start using a personal computer (Sayt “Pislyadyplomna osvita”).
Working distance course includes the following components: 1) Computer Basics; 2) The Internet and Web; 3) programmes to improve performance; 4) computer security and privacy; 5) digital lifestyle. Each of the components meets distance learning module. It should be noted that the course can be passed in either online, or offline (training material available to download and view on your computer without the direct use of the Internet). After training, you can make the certification test, which covers topics from all five components (Sayt “Pislyadyplomna osvita”).

For training courses with a high level of information competence recommended passage of a distance course on The European Computer Driving Licence, European Computer law (ECDL) – a leading global certification of skills possession of personal computers that began operations since 1990, whose founder – Finnish computer Union (FIPA) (ECDL, 2016).

The objective of this program – improving competence in information and technology around the world; improve the skills of possession of a personal computer and basic software products among the citizens of Europe and other countries; ensuring users understand the benefits of information technology and the need for a personal computer in daily activities; equal access to information resources for all, regardless of age, sex, physical condition, occupation, place of residence and education, enhance the mobility of graduate schools and higher education institutions to facilitate employment and provide social protection, adaptation to the information society for people with disabilities; improving the efficiency of the staff of private companies and government agencies through efficient use of information technology capabilities; creating the conditions for total computerization of the population.

Distance course consists of seven modules with compulsory certification upon graduation.

Module 1 „Basic knowledge of information technology.” The candidate should have an understanding of the components of a personal computer – hardware and software, means of storage and be able to use them; information networks and applications; the use of computers in everyday life; safety factors and the harmful effects of computer to health; data protection, copyright and legal issues associated with computers and information and communication technologies.

Module 2 „Using your computer and work with operating systems.” The candidate must be able to perform basic operations in the operating system environment and make its settings if necessary; be able to use antivirus software.
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Module 3, „Text Editor”. The candidate must be able to perform basic formatting operations, editing or further printing; use special features and more.

Module 4 „Spreadsheets”. The candidate must be able to create and edit tables using basic formulas to perform mathematical and logical operations on numerical data, build charts and graphics and more.

Module 5 „Databases.” The candidate shall be aware of the basic concept of simple databases; be able to create and make changes to tables, forms, to sample data and generate reports; work with existing databases.

Module 6 „Presentations”. The candidate should be able to create and edit presentations, using graphics and animation capabilities of the software.

Module 7 „Information and communication”. The candidate should know the basics, terms and safety regulations relating to the Internet; be able to navigate the Web-pages, search for information; demonstrate the ability to work with e-mail.

Conclusions

Effective development of ICT competencies of teachers technologies during training in the system of postgraduate education depends on the orientation of the educational process on the principles of person-centred and activity approaches teaching modern information and communication technologies, and the use of methods, tools and organizational learning, which involve the use of information and communication technologies. Developed and implemented methodological elements of the system based on determining components of information competence of the teacher of technology to new levels of professional training of teachers technologies.

It is a modern development of scientific and technical progress, changes in the social environment require teachers to effectively use them in learning achievement, personal development competently steers students creatively working to improve the educational process, use and demonstrate the use of modern information technology. It should be noted that the use of modern information and communication technology in learning technologies (lessons work both girls and boys) significantly improves the level of teaching, provides a choice of place, time, content and learning, promotes better learning students; In addition, these technologies allow you to create a complete online learning space for students and teachers of self.
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