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ICT COMPETENCE FOR SECONDARY SCHOOL TEACHERS AND STUDENTS IN THE CONTEXT OF EDUCATION INFORMATIZATION: GLOBAL EXPERIENCE AND CHALLENGES FOR UKRAINE

Abstract. The paper is focused on the role of ICT education as a key component in the education systems in EU, USA and Ukraine. The research results show that the use of ICT in education and training has been a priority in most European countries during the last decade. It has been determined that the possession of ICT-competency has been proclaimed an important component of successful schooling and lifelong learning, further professional development, effective management of the learning process, and the use of ICT in learning activities in a modern digital society. It has been revealed that in the European countries, the standards of ICT-competency are developed and implemented at all levels of education, the systems of mandatory monitoring and certification of ICT-competency of students, teachers and heads of general educational institutions are in operation. Results show that teachers mainly focus on the development of technical ICT skills, whereas the ICT curriculum centres on the integrated use of ICT within the learning and teaching process. Analysis of foreign experience on modern approaches to the assessment has shown that the assessment of the pupils' ICT competency in Ukraine is extremely important in the context of modern reforms, since in Ukraine standards for assessing ICT-competency are valid only within the subject "Informatics" at the level of secondary school, while the worldwide tendency is the end-to-end using of assessment tools for students' ICT-competency. Inference should be drawn that building digital competence by embedding and learning ICT should start as early as possible, i.e. in primary education, by learning to use digital tools critically, confidently and creatively, with attention paid to security, safety, and privacy. Teachers need to be equipped with the digital competence themselves, in order to support this process. The authors of the paper made conclusion about the necessity for Ukraine both to study the progressive European experience and to synchronize the education policy in ICT-education with the strategies of the EU and the member states.

Keywords: ICT competence for teachers; ICT competence for school students; general secondary education; foreign countries.

1. INTRODUCTION

The problem setting. The studies of tendencies in the education development in the world represent the large-scale introduction of modern information technologies in pedagogical practice of various foreign countries, including computer technologies. Using a computer in a classroom allows to make the learning process mobile, strictly differentiated and individual-oriented, enhance motivation and cognitive activity through a variety of forms of work, intensify and enhance the effectiveness of the educational process as a whole. One of the main tasks of education in the context of the development of the information society is to teach students and teachers to use modern information and communication technologies

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(ICTs). The implementation of modern ICTs will ensure further improvement of the educational process, accessibility and efficiency of education, training of the younger generation for life in the information society, help solve the problem of the qualitative impact on the content, methods and organizational forms of education. Moreover, pedagogically weighed, theoretically and experimentally substantiated use of modern ICT in education makes it possible to form knowledge that underlies many modern professions associated with new information and production technologies in institutions of secondary education [1]. ICT skills and competencies increasingly affect a person's career opportunities. Using ICT is crucial for training specialists who can navigate the information space, own and operate information according to the needs of the labour market. ICT competencies are associated with qualities of a technically and technologically educated person, prepared for life and active work in the conditions of modern high-tech information society, covering the main components of students' informational culture, based on rational coexistence with the techno sphere, according to their professional self-determination taking into account individual possibilities [2]. The scientific results presented in this article are obtained in the framework of the academic research work carried out by the Department of Comparative Education of the Institute of Pedagogy of the National Academy of Educational Sciences of Ukraine on the problem of educational transformations in the EU countries and the US, as well as the National University of Food Technologies on the problem of the use of innovative technologies in the educational process.

The purpose of the article is to conduct a comparative study focusing on the problems of the formation and evaluation of information and communication competence in the system of secondary education in EU countries with the aim of implementation of promising results in Ukraine.

The analysis of recent studies and publications. Currently, the number of studies has grown significantly, the subject of which is the use of ICT in the educational process. This topic in Ukraine was researched by such scholars as V. Bykov, Y. Bulakhova, O. Bondarenko, V. Zabolotny, G. Kozlakova, O. Mischenko, O. Pinchuk, O. Shestopal and others. Issues related to the selection and interpretation of the concept "ICT competencies" are displayed in the studies of W. Wembra, A. Gurzhiya, O. Kuzminskaya, N. Morse, O. Ovcharuk, S. Spirin and others. Issues of informatization of education are introduced in the works of such scholars: V. Bykov, M. Zhaldak, I. Zakharova, Y. Mashbits, N. Morse, E. Polat, S. Sysoeva, I. Robert. Approaches to the consideration of the structure of ICT competence have been studied by V. Adolf, M. Goryunova, A. Semibratov, A. Yelizarov, M. Lebedev and A. Shilov, M. Holodnaya. The phenomenon of virtual educational systems has been researched by scientists in many countries all over the world (e.g., Howard Reingold, Karen Swon, Peter Shi (USA); Etienne Wenger, Sabina Soifert (Switzerland); S. Bondarenko, M. Moiseyeva, Y. Patarakin, E. Polat, A. Khutorsky, N. Churaeva (Russia); V. Bykov, M. Zhaldak, N. Zadorozhna, S. Litvinova,V. Kukharenko (Ukraine), etc.). Problems of educational monitoring in the field of ICT are highlighted in the works of such native scientists as V. Bykova, Y. Bogachkova, Y.Zhuk, O. Kuzminskaya, N. Morse, etc. This problem abroad has been studied by following researchers: R. Anderson, B. Bloom, D. Hopkins, R. Kozma, N. McGinn, T. Neville-Posltwyth, U. Pelgrum, F. Raymers, A. Tayjman, R. Tyler, R. Thorndike, T. Husen, etc.

2. RESULTS OF RESEARCH

2.1. ICT competence of a student

For the successful development of a competitive Europe, its innovative potential, the creation of a knowledge society as defined by the Europe 2020 Strategy (Europe 2020) it is necessary to have highly educated and well trained workers [4]. The training of qualified personnel within the needs of the current labour market is one of the components and key to the successful development of a state. Formation of skills of the 21st century starts at school and lasts for a lifetime. Under modern conditions ICT competence becomes one of the main requirements of the labour market, training students to successful future – a requirement of time, which is confirmed by various analytical data. Digital or ICT competence, as one of eight key competencies is determined by EU as a reliable and critical use of ICT for work, learning, self-development and participation in the life of society. It relates to digital and media literacy, which consists in the ability to use digital media and ICTs, understand and critically evaluate various aspects of digital media and media content, and to communicate effectively in a variety of contexts. According to the European educators, ICT competence is broader than ICT skills. Most students who already have ICT skills may not always use a critical approach of choosing technologies that can be useful for them in the learning process or may not have appropriate skills in the way of self-development [5]. Virtual educational communities that extend and integrate into the educational process of schools in foreign countries provide the opportunity for creating and developing students' ICT capabilities corresponding with their needs and skills for the 21st century. Due to the rapid development of ICT and the high interest of students, teachers are trying to implement innovative teaching methods using the latest ICTs, Internet services, virtual education (training) communities. Currently, there are a large number of virtual communities that are relevant to education, which may vary due to content and purpose: virtual educational communities that have quite broad meaning and include virtual learning communities, communities of practice, virtual management communities, virtual community school, etc. All of them are aimed at raising the quality and relevance of education to the level matching the educational requirements and challenges in the 21st century [6].

The popularity of social networking sites and social media among students community, the motivation of schoolchildren to quickly master various innovative technologies for communication prompted and accelerated the creation and use of virtual learning communities in secondary schools around the world and in Ukraine. This creative and innovative learning environment has become part of the educational process. The process of teaching/learning in virtual learning communities has its own peculiarities: on the one hand, it is personally oriented, on the other hand, it is the cooperation of a certain circle of students, during which they are learning critical approaches to ICT, information seeking, problem-solving, creativity, mutual respect and support, etc., which contributes to their intellectual and personal development. Furthermore, the whole learning/teaching process is based on the use of ICT, which greatly contributes to the formation of ICT competence.

Ukrainian scientists O. Spirin and O. Ovcharuk [7] identified the characteristics/components of ICT competencies on the basis of ISTE (International Society for Technology in Education) approach:

- ✓ ICT Vision: understanding and comprehension of the Role and Importance of ICTs for Work and Lifelong Learning.
- ✓ ICT culture: a way of understanding, constructing, world-view vision of digital technologies for life and work in the information society.

- ✓ ICT knowledge: a set of factual and theoretical knowledge that reflects the ICT field for learning and practical activities.
- ✓ ICT practice: the practice of applying the knowledge, skills, abilities in the field of ICT for personal and social professional and educational purposes.
- ✓ ICT-Improvement: the ability to improve, develop, generate something new in the sphere of ICT with ICT tools for learning, professional development, personal development.
- ✓ ICT-Citizenship: confirmed quality of a personality to demonstrate a conscious attitude through an action related to the use of ICT for responsible social interaction and behaviour.

Such specific characteristics help to identify the forms and methods for the formation and development of ICT competence of secondary school students. From the experience of European countries (the study of the educational network Eurydice "Key Data on Learning and Innovation through ICT at School in Europe 2011"), the acquisition of ICT competencies in schools starts with basic knowledge: computer usage, information retrieval, the use of office applications and sometimes – mobile devices, the development of programming skills, which is included in the curriculum and syllabi of many European countries. Most of these programs cover average and higher levels of secondary schools, although there is a tendency to lower the age of students (Poland, Spain, Slovenia, etc.).

In addition, ICT literacy in some foreign schools is defined as one of the main objectives of education (Bulgaria, Germany, Greece, Spain, Latvia, Hungary, Malta, Poland, Slovakia and the United Kingdom). Every European country chooses its own personal way to achieve ICT competence. For example, Great Britain, Latvia and Estonia maintain a focus on educational computer games and database analysis, and Poland pinpoints attention upon the use of mobile devices.

There is a practice of using ICTs and digital media through the entire curriculum, but teachers use ICT in the teaching of natural sciences more often. In schools in most European countries there are online platforms, forums, blogs, websites, networks, virtual learning environments that help learners collaborate, distribute educational information, materials, hold discussions, workshops for both teachers and students [8].

The educational European community pays great attention to the creation of innovative, virtual learning environments that are integrated into the educational process of the school and are sometimes formed within virtual learning communities. The "Universe" project is committed to this issue, conducted within the framework of the Innovative Learning Environments project, launched by the Centre for Educational Research and Innovation (CERI), which is part of the Organization for Economic Cooperation and Development (OECD). The project was attended by 150 schools from 22 different countries from all over the world – Australia, Austria, Great Britain, Hong Kong, Denmark, Israel, Spain, Mexico, Germany, Norway, New Zealand, Slovenia, USA, Hungary, Czech Republic, Sweden, Switzerland, etc. [9].

The analysis of the received reports from the project carried out by Ukrainian scientists showed that in all participating schools the creation of an innovative learning environment is based on the use of ICT, the practice of an innovative learning environment in the form of virtual learning communities is also widespread. Almost all schools participating in the project practice a mixed type of learning: academic style (face to face) along with online learning in virtual learning environments created at schools. The use of ICT alone in the educational process is no longer considered as innovative. It should be noted that not all schools taking part in the project have the goal of completely switching to an online learning process, creating virtual learning environments, introducing distance education. One-third of schools are limited to the use of information and communication technologies in teaching

certain subjects, not covering the entire educational process. One of the reasons for this situation is the inadequate level of technical equipment of schools, the absence of the necessary number of teachers with an appropriate level of ICT competence, which greatly complicates the creation and operation of an effective virtual learning environment.

The general approach of European schools remains the involvement of ICTs in education and teaching various subjects at the highest level of general secondary education – schoolchildren aged 10-18, who are most motivated to quickly master ICTs and can consciously use them for learning.

From the analysis of the reports of schools participating in the "Universe" project, it is evident that the success of the formation and activity of the virtual learning environments depends largely on the selection, implementation and skilful use of the capabilities and tools of the platforms on which they are formed.

The main platform used by schools is the Moodle ((Modular Object-Oriented Dynamic Learning Environment), known as the Learning Management System (LMS) or the Virtual Learning Environment (VLE). This platform is used by educators for providing online (distance learning/training). Other online platforms, such as WizIQ (an online platform that provides the ability to create virtual classes, conduct online conferences, forums and webinars) or Vyew (a virtual learning environment for lessons, projects, workshops) in online mode are integrated into the Moodle environment or used separately. In the course of the project activity Twining space platform (platform for creation of a virtual educational/educational environment) has been occasionally used. All of these platforms are aimed at teaching/learning, creating virtual learning environments and providing the following capabilities: collaborative exchange of thoughts, ideas, experiences with colleagues, students, regardless of their geographical location, synchronously or asynchronously; increasing the professional level of online training; improving ICT skills; participating in presentations in an interactive mode and/or reviewing pre-submitted and recorded presentations; conducting valuable lessons with students (regardless of geographical location) [3].

Of course, the effective use of virtual learning environments depends on technical and software level of schools, trained teachers, such as in the Austrian school BRG/BORG Landeck. Each school class has access to the Internet and the school intranet. In addition to traditional teaching aids, each classroom is equipped with a stationary computer and a video projector. The server software is Windows 2008 and Linux Ubuntu Hardy Heron Server. The school has three computer classes with 70 stationary computers that can be freely accessed by teachers and students at any time.

There is another computer class with 25 computers designed to conduct tests on relevant subjects. Facilitators are teachers who have passed ECDL and INTEL courses, have ICTs skills, and can work with the Moodle platform. Both at this school and in another – the Austrian school BRG & WRG 8, Felgasse the concept of "360 degree learning" is supported, which is aimed to create a continuous learning process that prepares and supports students for lifelong education.

The achievement of a high level of learning efficiency, the formation of ICT competencies among virtual learning communities is possible through the implementation of various methods such as: collaborative, problem-oriented, personally oriented, interactive learning. A bright example of the successful implementation of such methods can be Slovenian School PS Skofja LokaMesto and the Spanish School Jacint Verdaguer. In the Slovenian school PS Skofja Loka-Mesto, a virtual learning environment "Internet Class" was created, aimed at individualization of student learning, promoting creativity and innovation, and training for the safe and critical use of ICTs.

Such “Internet class” offers students various activities in order to deepen the learning process, the possibilities of using different means for learning and getting knowledge.

The virtual environment allows optimizing the learning environment for both gifted children and for children who have difficulty in learning because it is much easier for pupils to adjust their learning process according to their own individual abilities.

According to school teachers, the use of ICTs provides students with support in developing their creativity and innovation, which increases their level of motivation to study. According to the teachers, the main goals (viz. to give students encouragement to developing key competencies, initiative and creativity, motivation for lifelong education, formation of ICT competence) have been successfully achieved.

In the Spanish school Jacint Verdaguer virtual learning environment covers the entire learning process and all its participants (students, teachers, administrators, parents) and as a result a virtual school community was created. Compulsory school attendance by students is three times a week.

On the other days, the training is carried out remotely, both individually and in teams where younger students are supported by teachers and senior students.

Among the modern international benchmarking tools of assessment that use the general assessment of student IC competencies there are PISA tests involving 15-year-old students from different countries. Thus, during the test students demonstrate their reading, math and science skills, as well as basic ICT skills: ability to work with the keyboard, mouse, touchpad, buttons, stroller, menus, hyperlinks. The student's ability to work with digital texts, tables, interface, various links, etc. is also assessed. It should be emphasized that such an assessment occurs when students solve problems and provide answers to questions from other fields (reading, mathematics, science). In Ukraine, the assessment of the level of knowledge, skills and abilities of students in the field of ICT occurs when they study the subject “Informatics”. Its peculiarity is the focus on preparing students for the use of computers and ICT tools in practical activities, everyday life, forming information and communication competence. The practical use of a computer in the classroom and at home requires the development of appropriate methods and forms of measuring students’ knowledge and skills. Students’ ability to evaluate their own knowledge and skills independently according to the level of preparedness plays a significant role here. A rational combination of academic performance rating and self-assessment is one of the conditions for increasing the efficiency of acquiring the required ICT competencies. The way students evaluate themselves, their abilities and competencies, understand mistakes were made, realize what they have not learned and what they need to master is also very important. Thus, it is important to familiarize students with the criteria of assessment and the requirements of the teacher. The analysis of modern approaches to the evaluation based on foreign experience suggests that the assessment of the pupils’ ICT competence in Ukraine is extremely important in the context of modern reforms. At present, on the level of general secondary education in Ukraine, the standards of evaluation of the mentioned competence exist only within the subject “Computer Science”, while there is a global tendency of end-to-end using of tools for assessment of students’ ICT competencies.

At the level of different national education systems, a number of programs for assessing ICT competencies have been introduced:

- ✓ UK – “Computing for Key Learning Stages” KS1-KS3;
- ✓ The Flemish Community of Belgium – A large-scale study of students’ learning achievements, National program of assessment entitled “Peilingen”;
- ✓ Flanders (Belgium) – the program “Acquisition and Processing of Information and ICT”;

- ✓ Norway – "Digital Competence Program 2004-2008", after which the Norwegian Center for ICT in Education was established, which introduced a standardized digital skills test for students;
- ✓ Czech Republic – 2009-2013 "Strategy for the Development of ICT in Education for 2009-2013", aimed at supporting schools in achieving a high level of ICT use as a standard tool for teachers and students;
- ✓ Slovakia – Information Education. The pupils and students' IC competence is assessed within the framework;
- ✓ Lithuania – in 2005-2007 implementation of the national program on introduction of ICT (Strategy and Program for the Introduction of ICTs into Lithuanian Education in 2005-2007), as a result of which the Centre for Information Technologies was created under the management of the Ministry of Science and Education;
- ✓ Estonia – National "Tiger Leap" project, which provides online assessment of teachers and students in the field of ICT use and supports the national program of teacher training on the use of ICT in professional activities [10].

In 2011, the European Commission initiated the "Dig Comp" project, which was aimed to create a working framework for measuring digital competency with descriptors for all levels; finally a description of the industries, a set of digital competencies and the DigComp 2.0 Conceptual Reference Model of Digital Competence were developed [13].

During the implementation of the DigComp project in the same year, the research "School Surveys: ICT in Education" was conducted on such indicators of digital competence in the field of education that correlate with the indicators and key areas of the Digital Competence Framework, namely: responsible use of the Internet (information); skills of using social media (communication); operational skills (content creation); safe Internet use (security) [12].

On average, for EU countries, the highest achievable scores are students' confidence in their ability to use the Internet safely (2.98), followed by their operational skills (2.63), and responsible use of the Internet (2.53). Students are also confident in their use of social media (2.41). Among the EU member states, the confidence of students in their ability to use the Internet safely is the highest in Lithuania (3.18), Poland (3.18), Portugal (3.11), Finland (3.10) and Norway (3.09), and the lowest in Luxembourg (2.56), Bulgaria (2.57), Latvia (2.65), Denmark (2.67) and Greece (2.68). Concerning the students' confidence in their ability to use the Internet responsibly, the countries where students report the highest degree of confidence are Poland (2.99), Estonia (2.81), Hungary (2.81), Norway (2.76) and Finland (2.75). Countries in which the 8th grade students are the least confident in these skills include Luxembourg (2.21), Belgium (2.41), Denmark (2.44), Spain (2.45), Malta (2,49), Latvia (2.49), Austria (2.49).

8th grade students, who are the most confident in their operational skills, live in Poland (3.01), Portugal (2.81), France (2.80), Norway (2.77) and Lithuania (2.74). Students who are less confident in their skills represent Luxembourg (2.26), Turkey (2.40), Belgium (2.42), Ireland (2.45), and Greece (2.45). The comparatively low level of confidence in the skills of using social media is reported by pupils from Luxembourg (2.08), Malta (2.18), Greece (2.22) Italy (2.23), and Turkey (2.24). Countries in which students report a higher level of confidence include Poland (2.82), Estonia (2.72), Sweden (2.66), Portugal (2.65) and Finland (2.64). Poland is on the top of the rating (3.0) because the results of the survey indicate the first place in three of the four competencies, followed by Portugal (2.82), Lithuania (2.82), Norway (2.80), Estonia (2.80), France (2.79). In the lower part of the rating there is Luxembourg (2.28), which occupies the lowest position in all competencies, followed by Greece (2.47), Denmark (2.49), Bulgaria (2.50), Turkey (2.52) and Romania (2.53). Study data testify that students are most confident in their safety in the Internet [12].

According to the results of the World Economic Forum and the Global Information Technology Report 2016, Ukraine ranked 64 out of 139 countries in 2016 in terms of the level of information and communication technologies development (in 2011 Ukraine ranked 90th), showing better results in comparison with Romania and Bulgaria [14]. It is indicated that the main characteristics of the new school are integration, competence development, and the development of the information space of Ukraine. Owning an ICT competence has been proclaimed an important part of successful schooling and lifelong learning, further professional development, effective management of the learning process, and the application of ICT opportunities in learning activities in a modern information society. At the same time, standards of ICT competence at all levels of education are developed and implemented in European countries (for example, Sweden, Denmark, Great Britain, Austria, Poland, Germany, etc.). In the EU there are systems of mandatory monitoring and certification of ICT competence of students, teachers and managers of educational institutions. Therefore, analysis and synthesis of the experience of the EU countries, initiatives of important international organizations (UNESCO, ECDL, MICROSOFT, INTEL, etc.) as well as an opportunity for modern Ukrainian education to be assessed by programmes for the international assessment of students competencies (PISA, TIMSS, PEARLS) are important for Ukraine. Thus, the use of modern information technology in education is one of the most important and stable trends in the development of the world educational process. In the Ukrainian secondary school in recent years, computer technology and other means of information technology have become very popular in use in the study of most educational subjects. Informatization has significantly influenced the process of acquiring knowledge. New learning technologies based on information and communication can intensify the educational process, increase the speed of perception, understanding and depth of assimilation of a vast array of knowledge and skills. On the other hand, Ukraine's European choice necessitates a thorough study of the best practices of European countries in the field of ICT education as well as implementation of European experience in Ukrainian education.

2.2. ICT competence of a teacher

Training of competent teachers today is one of the priority tasks of modern further education. It is the competence that helps a specialist to deal effectively with various tasks related to the professional activities. Competent specialists are different from qualified specialists by the fact that they implement professional knowledge, skills and abilities in their work; they always engage in personal development and go beyond the scope of their discipline; they consider their profession a great value [15].

It should be noted that almost all scholars distinguish competence in the field of information and communication technologies (ICT) as one of the key components of teacher's professional competence. This competence implies the ability of the teacher to apply various information tools in teaching, working with pupils, parents and the public effectively. Use of ICT knowledge by a teacher makes it possible to highlight the novelty of educational material effectively and affordably during the lesson; demonstrate interdisciplinary relationships; to give examples of practical application of knowledge, skills and abilities on a particular subject; implement problem and heuristic learning, demonstrate complex natural processes, etc. [7]. The importance of such competence is due to the current changes in education caused by the development of information technology. The modern teacher faces a difficult task: learning and adapting to new conditions in accordance with the new requirements of time, to teach and prepare others [15].

In many countries of the EU and the USA, the standards of information and communication competence applied in the field of education have been developed and

adopted. In these countries, the scientific and methodological questions of reorganization of educational courses are brought to the foreground in order to make ICT mastering most effective in line with the current level of technology development [16].

In the education system of the United States of America, the notion of information and communication literacy has become identical with such concepts as digital literacy, technology literacy, information and technology literacy, which means "the ability to work individually or collectively, using tools, resources, processes and systems that are responsible for accessing and evaluating information received through any media resources, and using such information for solving problems, communicating, creating informed decisions, as well as for gaining new knowledge, creating new products and systems" [17].

The level of technological literacy that students must achieve during their schooling is given a lot of attention in the United States. National Education Technology Standards (NETS•T) Performance Indicators for Teachers (2008) have been introduced in this country. According to the document, the main tasks of forming the ICT competence of the teacher are the following:

- Facilitating and stimulating the learning and creativity of students, namely: promoting, supporting and modelling creative, innovative thinking and resourcefulness; engaging students in problem research and resolution using digital tools and resources; motivating students to study, using collaboration so that students could develop conceptual thinking, development of planning skills, creative processes; modelling the design of cognitive collaboration by engaging students, colleagues in virtual and traditional learning environments in joint education.
- Design and development of digital learning and assessment experiences: designing or adapting relevant learning experiences that combine digital tools and resources to promote students' learning and creativity; the development of a technologically rich learning environment that enables all students to meet their own interests, become active participants in achieving educational goals, manage learning and evaluate their own progress; implement an individual approach to student learning, taking into account the diversity of learning styles, learning strategies and abilities, using digital tools and resources; provide students with a variety of final evaluations that are related to content and technological standards, use results for further teaching.
- Modelling digital activities and learning: teachers demonstrate the innovative professionalism of knowledge, skills and work processes important in a global and digital society; demonstrate the fluency of technological systems and transfer of knowledge in the field of new technologies; collaborate with students, colleagues, parents, community members using digital tools and resources to support student achievements and innovation; familiarize students, parents and colleagues with new information, using digital technologies; model and promote the use of existing and new digital tools for placement, analysis, evaluation and use of information resources to support research and education.
- Facilitating the formation of digital citizenship and responsibility: teachers are aware of local and global social issues and responsibilities through engagement in digital culture, demonstrate ethical and legitimate behaviour in their professional practice; protect, simulate and teach the safe, legitimate and ethical use of digital information and technologies, including copyright and intellectual property; respond to different student problems using personality-oriented strategies, provide the necessary access to relevant digital tools and resources; promote, support and model digital etiquette and appropriate social interaction with the use of technology and information; develop and model cultural understanding and global awareness by collaborating with colleagues and students from other cultures, using digital communication and collaboration tools.

- Professional development and leadership: teachers constantly improve their professional practices, provide lifelong education and demonstrate leadership in the professional community by promotion and demonstration of the effective use of digital tools and resources; participate in local and global learning communities for the purpose of creative use of technology aimed at improving the quality and level of education of students; demonstrate leadership by proclaiming the vision of technology integration by participating in overall decision-making, community building, leadership development and technological skills; study research, professional practice conducted to use new digital tools and resources effectively to support student learning; promote the efficiency, vitality and prestige of the profession of teacher, their school and community [18].

It is common for the European Community to evaluate the information competence as a component of media competence and the wider ability "to be able to learn" and ICT competency that, actually, is related with the possibilities of appropriate use of the corresponding telecommunication facilities. At the same time, information literacy means that a person understands the necessity of different information that one can find, can evaluate it and use and, necessarily, it is proposed to differentiate the notion of information and communication literacy, network literacy, Internet literacy, digital literacy, media literacy and computer literacy [19].

The UNESCO ICT Competency Framework for Teachers, or ICT CFT approach is used in the European community for assessing teachers' ICT competencies. The relevant assessment standards were developed in 2006 and implemented in school practice in 2008 [13]. In the global sense, UNESCO's standards are based around the three approaches to education reform, which are founded on the development of human abilities in the following areas: technical literacy, knowledge deepening and creation; UNESCO's standards also include such components of the education system as policies, programs, pedagogy, ICT, organization and teacher training.

Technical literacy involves improving the basic skills of literacy with the help of technical means, which is reflected in the changes in the teaching methodology and concerns the use of various techniques, devices and resources of the Internet in working with the whole class, group or individual tasks. Technical literacy is associated with an increase in the efficiency of ICT tools. In the early stages of development, the teacher's competence in this aspect includes the simplest digital literacy skills, as well as the ability to select and use ready-made software teaching materials and Internet resources to achieve the goals of the standard curriculum. The competence of the teacher, which corresponds to the knowledge-based approach, includes information competence, the ability to work out the sequence of problem solving and to select the appropriate software. Teachers must be able to use network resources in order to help students collaborate, receive information and communicate with external experts, if necessary, to analyse or find solutions to specific problems. Teachers should be able to use ICT to develop and control individual or group plans of students. Teachers who are competent in applying a knowledge-based approach must be able to develop textbooks and ICT classes; use ICT to develop knowledge and critical thinking skills of students; to support the constant process of thinking; to create a society of knowledge based on the principles of innovation and lifelong learning using ICT for students and colleagues [7].

The general tendency of integration of National Education into the European educational space provides for the reform of educational standards and their harmonization with international ones. In Ukraine, the process of adopting information and communication competence standards used in the field of education continues. In 2011, the National Qualifications Framework was approved, indicating that it intends to coordinate the Ukrainian system for evaluating the qualifications that are provided in the field of education with the

international one. This framework emerges as a tool for comparing qualifications on a single criterial basis, which is a competence-based approach [20].

A number of studies have been conducted by Ukrainian scholars that discover the content of key competencies in the application of information and communication technologies. The informational competence has been determined as a confirmed ability of the individual to use information technologies for the guaranteed assimilation and reporting of information for satisfying their own individual needs and meeting the public requirements about the formation of general and professional competencies of a personality [21]. Taking into account different aspects of the consideration of the concept "Teachers' ICT competence" in works of Ukrainian scholars, we can conclude that the information and communication competence of the teacher can be interpreted as the combination of professional knowledge, skills and experience of the teacher, expressed in the technology of solving pedagogical tasks by means of modern information-communication technologies. In addition, it should be noted that teachers' ICT competence is the quality of a specialist, formed throughout one's professional activities. It is also necessary to distinguish between ICT literacy and ICT competence. ICT literacy is determined as knowledge of what is a personal computer, software products, their functions and capabilities, knowledge about the existence of computer networks (including the Internet). ICT competence is not only the use of various information tools (ICT literacy), but also its effective using in teaching activities.

To form the basic ICT competence, you need:

- ✓ Formation of positive motivation to use ICT.
- ✓ Availability of ideas about PC operation and didactic capabilities of ICT.
- ✓ Mastering the methodological foundations for visual and teaching materials through Microsoft Office.

It should be noted that the time for teacher's lesson planning involving the use of ICT at the initial stage is undoubtedly increasing, in addition to that, the methodological base is accumulating gradually, which greatly facilitates this training in the future.

The next level of the teacher's ICT competence involves the ability to:

- ✓ Find, evaluate, select and display information from digital educational resources (for example, use of materials from electronic textbooks and other guides on disks and the Internet) in accordance with the given educational tasks.
- ✓ Install the program on a demonstration computer, use projection technique, possess methods of creating own electronic didactic material.
- ✓ Modify and present information in an effective way to solve educational tasks, compile own teaching material from accessible sources, generalize, compare, contrast, update various data.
- ✓ Select and use software (text and table editors, booklets, sites, presentation software (Power Point, Flash) for best demonstration of the various materials needed for the learning process (lesson materials, thematic planning, monitoring, various reports, etc.).
- ✓ Effectively apply the tools of organization of students' educational activity (testing programs, electronic workbooks, systems of organization of students' class activity, etc.).
- ✓ Form a digital portfolio and a paper-based portfolio.
- ✓ Choose the form of giving the information to students, parents, colleagues and school administration competently (school network, e-mail, social network (diary), site/section of the site, forum, etc.).
- ✓ Organize the work of students in the framework of network communication projects (competitions, contests, quizzes), supporting the educational process remotely if necessary.

To increase the level of ICT competence, the teacher must:

- ✓ Participate in seminars of different levels on application of ICT in educational practice.
- ✓ Take part in professional contests, online forums and pedagogical councils; use a wide range of digital technologies and tools during the preparation to lessons (text editors, image processing programs, presentation preparation programs, spreadsheets, electives, and project activities); be able to use digital educational resources and Internet resources; manage to form a bank of educational tasks, which are carried out with the active use of ICT; develop their own projects about the use of ICT, etc.

In order for the teacher to be able to do all of the tasks above, the organization of methodological, organizational, technical and motivational support is necessary.

The study identified one of the main trends characterizing the requirements for the level of ICT competence of a modern teacher – a shift in emphasis from the tasks of the technological level (relating to the learning of specific tools, specific software products) to the tasks of the pedagogical level. In other words, a modern teacher should be purposefully and independently, with knowledge of requirements for professional life, implement ICTs in the process of education, methodological, research activity and their own lifelong professional pedagogical activity. Based on the analysis of pedagogical situations, the teacher must see and formulate teaching tasks and find the best ways to solve them with maximum use of ICT opportunities. Teachers with a high level of ICT competence use ICT in educational activities fundamentally in a different way, referring to them not only as a means for presentation of educational material (presentations) but also for the creation of various types of individual informational banks aimed at supporting and developing their professional activities (methodologies, testing programs, electronic workbooks, student learning organization systems, portfolio, etc.), thereby expanding the overall informational environment of the learning process. In this regard, the ICT competence of a modern teacher is one of the most important indicators of the success of teachers' activity and, at the same time, is a prerequisite for further enhancement of one's professional competence.

Thus, informatization of education leads to a change of the role of a teacher, to emergence of new methods and organizational forms of planning and conducting lessons. Inclusion of ICT in the process of education forces teachers to develop a completely different approach to teaching. It requires changing the role of the teacher from a lecturer to a developer, since the teacher in today's environment must be able to choose and use computer programs for the best demonstration of material, develop new digital materials, organize distance learning, apply completely new teaching and learning methods in the classroom, etc. Successful use of ICT in the learning process depends on the teacher's ability to organize the learning process in a new way of combining new information and pedagogical technologies for exciting, informative activities, as well as promoting educational cooperation and collaboration among schoolchildren. It requires a number of new skills from the teacher to manage the work of the class.

The skills that such a teacher must possess include the ability to identify new ways of using ICTs to enrich the learning environment, the development of ICT literacy, the acquisition of knowledge and the ability to produce new knowledge. It is not enough to give a certain amount of knowledge, it is necessary to teach to navigate in the flow of information, to systematize and choose what is necessary. The teacher must develop in students the skills needed by the person of the 21st century: the responsibility and adaptability, critical and systematic thinking, the ability to work with information and media, to set and solve problems directed at self-development, creativity, inquisitiveness, etc.

3. CONCLUSION AND PROSPECTS FOR FURTHER RESEARCH

The conducted research has showed that knowledge of information and communication competence is an important component of the successful schooling and lifelong learning, further professional development, effective management of the learning process, and the use of ICT in learning activities in a modern information society. Facilitating the formation of information and communication competence of teachers and students today is based on two international standards – "Recommendations on the structure of ICT competency for teachers/students" (UNESCO ICT Competency Framework for Teachers/Students, 2006), developed under the auspices of UNESCO, as well as "National Educational Technology Standards for Teachers/Students", 2008, developed by the International Society for Technology in Education ISTE. These two standards have authority with the developers of standards for ICT competence of teachers and students in many countries around the world. Regarding the pedagogical ICT competence of teachers, both standards include two groups of skills that a teacher is expected to master: 1) those related to the development of knowledge, skills and competences in the field of ICT; 2) as well as those that are necessary for teachers to prepare students for life in the information society. The standard of ISTE is one-dimensional and opens a broad direction for assessing the professional activity of the teacher. The framework of the UNESCO standard is made in the form of a two-dimensional matrix and already outlines some levels of ICT competence not only for the educator but also for the educational organization as a whole. Most Ukrainian scientists distinguish two levels of teachers' ICT competence: basic and subject-oriented. Basic level means the invariant of knowledge, skills and experience necessary for the teacher to solve educational problems, primarily, by means of computer technologies of general purpose. At this level, ICT competence includes the use of information technologies of the modern society (computer, multimedia Internet, electronic media, mobile phones) for searching, accessing, storing, developing, representing and exchanging information, as well as communication between people. The subject-oriented level involves the development and formation of readiness for implementation in the educational activities of specialized technologies and resources developed in accordance with the requirements of the content of a particular educational subject. The content of the subject-professional ICT competence of the teacher depends directly on the needs of the subject field. Mastering any given computer technology and facility should be conditioned by teachers' needs and their professional activities. As to the ICT competence of students, it can also be considered in two aspects: the one that determines the level of knowledge formation, abilities, personal attitudes and value orientations in the field of ICT and the ability to apply them in the process of learning and life, and the one that measures the level of ICT competence required in a particular discipline.

An overview of foreign experience in creating framework, strategic documents and implementation of common for the European community approaches to assessment of students' and teachers' ICT competences has made it possible to state that these issues are extremely important today, especially in the context of educational reforms. Taking into account the experience of international evaluation programs is a prerequisite for the integration of Ukrainian education into the educational space of the leading countries of the world and the key to the successful implementation of educational reforms in Ukraine. After all, the monitoring of the ICT competence of students and teachers has been identified by the international and Ukrainian educational community as a necessary tool for measuring the effectiveness of school education in the field of ICT, the interpretation of which results in improving its quality. The current stage of informatization of school education in Ukraine has contributed to the emergence of such a strategic goal as the harmonization of the Ukrainian system of assessment of qualifications with the international one. The National Qualifications Framework was established, which became a tool for comparing qualifications based on a competent approach. At this stage, studies are ongoing on the development of standards for

information and communication competencies. Information and communication technologies are being introduced, aimed at intensifying the educational process, implementing the ideas of developing education, improving the forms and methods of organizing the educational process, ensuring the transition from mechanical learning to mastering the students' skills in independent acquisition of new knowledge.

Global rationalization of intellectual activity by information technologies, increasing the efficiency and quality of students' training depends on mass computer literacy and the formation of teacher's information culture, that is, the ability to use the means of information technology in their professional activities. This requires methodological, organizational, technical and motivational support. Therefore, the introduction of national policies and concepts on standards development, monitoring and improvement of procedures for assessing the ICT competence of subjects of the educational process, in terms of integration into the European educational space, remains the priority direction of Ukraine's educational policy.

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ІКТ-КОМПЕТЕНТНІСТЬ УЧИТЕЛІВ ТА УЧНІВ У КОНТЕКСТІ ІНФОРМАТИЗАЦІЇ ОСВІТИ: ЗАРУБІЖНИЙ ДОСВІД ТА ПЕРСПЕКТИВИ ДЛЯ УКРАЇНИ

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Анотація. У статті основна увага зосереджена на ролі ІКТ в освіті як ключового компонента освітніх систем ЄС, США та України. Результати дослідження показують, що питання використання інформаційно-комунікаційних технологій у навчально-виховному процесі є пріоритетним напрямом освітньої політики європейських країн протягом останніх років. Визначено, що володіння ІК-компетентністю проголошено важливою складовою успішного навчання в школі та навчання впродовж життя, подальшого професійного розвитку, ефективного управління навчальним процесом і застосування можливостей ІКТ у навчальній діяльності в умовах сучасного інформаційного суспільства. З'ясовано, що у країнах Європи розроблені та впроваджуються стандарти ІК-компетентності на всіх рівнях освіти, працюють системи обов'язкового моніторингу та сертифікації ІК-компетентності учнів, учителів та керівників загальноосвітніх навчальних закладів. Результати показують, що вчителі в основному зосереджуються на розвитку технічних навичок в галузі ІКТ, тоді як навчальна програма з ІКТ спрямована на комплексне використання ІКТ у навчально-виховному процесі. Аналіз зарубіжного досвіду щодо сучасних підходів в оцінюванні засвідчив, що питання оцінювання ІК-компетентності учнів в Україні є надзвичайно важливим в умовах сучасних реформ, оскільки на рівні загальної середньої освіти в Україні діють стандарти оцінювання ІК-компетентності лише в межах предмета «Інформатика». У світі ж спостерігається тенденція наскрізного використання інструментів оцінювання ІК-компетентності для учнів. Слід зробити висновок, що формування цифрової компетентності шляхом запровадження та вивчення ІКТ повинно розпочинатися якомога раніше, тобто у

початковій ланці освіти через уміння критично, впевнено та творчо використовувати цифрове освітнє середовище, приділяючи увагу захисту, безпеці та конфіденційності. Для підтримки цих процесів учителі самі мають володіти цифровою компетентністю. Автори статті дійшли висновку про необхідність для України вивчати прогресивний європейський досвід та синхронізувати освітню політику в сфері ІКТ зі стратегіями ЄС.

Ключові слова: ІКТ-компетентність учителів; ІКТ-компетентність школярів; загальна середня освіта; зарубіжні країни.

ИКТ-КОМПЕТЕНТНОСТЬ УЧИТЕЛЕЙ И УЧАЩИХСЯ В КОНТЕКСТЕ ИНФОРМАТИЗАЦИИ ОБРАЗОВАНИЯ: ЗАРУБЕЖНЫЙ ОПЫТ И ПЕРСПЕКТИВЫ ДЛЯ УКРАИНЫ

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Аннотация. В статье основное внимание сосредоточено на роли ИКТ в образовании как ключевого компонента образовательных систем ЕС, США и Украины. Результаты исследования показывают, что вопросы использования информационно-коммуникационных технологий в учебно-воспитательном процессе являются приоритетным направлением образовательной политики европейских стран в последние годы. Определено, что владение ИК-компетентностью провозглашено важной составляющей успешного обучения в школе и обучения в течение жизни, дальнейшего профессионального развития, эффективного управления учебным процессом и применения возможностей ИКТ в учебной деятельности в условиях современного информационного общества. Установлено, что в странах Европы разработаны и внедряются стандарты ИК-компетентности на всех уровнях образования, работают системы обязательного мониторинга и сертификации ИК-компетентности учащихся, учителей и руководителей общеобразовательных учебных заведений. Результаты показывают, что учителя в основном сосредотачиваются на развитии технических навыков в области ИКТ, тогда как учебная программа по ИКТ направлена на комплексное использование ИКТ в учебно-воспитательном процессе. Анализ зарубежного опыта современных подходов в оценке показал, что вопросы оценки ИК-компетентности учащихся в Украине являются чрезвычайно важным в условиях современных реформ, поскольку на уровне общего среднего образования в Украине действуют стандарты оценки ИК-компетентности только в рамках предмета «Информатика». Тогда как в мире наблюдается тенденция сквозного использования инструментов оценки ИК-компетентности для учащихся. Следует сделать вывод, что формирование цифровой компетентности путем внедрения и изучения ИКТ должно начинаться как можно раньше, то есть в начальном звене образования через умение критически, уверенно и творчески использовать цифровую образовательную среду, уделяя внимание защите, безопасности и конфиденциальности. Для поддержки этих процессов учителя сами должны обладать цифровой компетентностью. Авторы статьи пришли к выводу о необходимости для Украины изучения передового европейского опыта и синхронизации образовательной политики в сфере ИКТ со стратегиями ЕС.

Ключевые слова: ИКТ-компетентность учителей; ИКТ-компетентность школьников; общее среднее образование; зарубежные страны.

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