

INCREASING TEACHERS' ICT-COMPETENCY LEVEL IN THE AFTER-GRADUATE EDUCATION PROCESS

ПІДВИЩЕННЯ ІКТ-КОМПЕТЕНТНОСТІ ВЧИТЕЛІВ У ПРОЦЕСІ ПІСЛЯДИПЛОМНОЇ ОСВІТИ

The relevance and problems of improving levels of non-informational teachers' ICT competencies are presented in the article. The researches and publications, which consider various competencies concept aspects concerning the use and possession of information and communication technologies and these competencies levels are analyzed.

The advanced training courses "Implementation of Information Technologies in the Educational Process" are conducted at Sumy Makarenko State Pedagogical University, which acquire the basic skills of using information technologies, global network services and the theoretical knowledge. The program content of the indicated courses is presented in the article. The motivation problems analysis concerning the teachers' use of information technologies in their own professional activity was conducted. The courses urgency and demand is explained by the fact that adult people spend much time developing new technologies and soon lose their already acquired skills due to the irregular practice, which requires repetition of working methods with technical means and applications, are unsure working with technical means, feel fear of doing wrong actions, in many cases, require individual training under constant assistant's presence, which reduces the self-employment effectiveness. The courses purpose is to form the students' ability to solve professional problems and problems through the information technology introduction in the educational process.

Also important is the inverse cooperation with students after such course's completion. During the survey and questionnaire, it was found out that during further self-training some teachers, who had attended time courses, improved their knowledge and skills. Thus, the next ICT competence level was formed. In this case, Moodle – educational content environment was used in teachers' practical work; computer testing programs, authors' blogs, cloud data storages, multimedia presentations for lectures, seminars, speeches at departments meetings; scientific repository of the university scientific library and the science-research base of Google Scholar was updated and more.

Key words: *competence, information and communication technologies, ICT competence, teacher's ICT competence, higher educational*

institutions, postgraduate education, certification training.

У роботі представлено актуальність та проблеми підвищення рівня ІКТ-компетентності викладачів неінформатичних дисциплін. Проаналізовано дослідження й публікації, у яких розглядаються різні аспекти поняття компетентностей щодо застосування та володіння інформаційно-комунікаційними технологіями, а також рівнів зазначених компетентностей.

У статті представлено зміст програми вказаних курсів. Проведено аналіз проблем мотивації щодо використання інформаційних технологій викладачами у власній фаховій діяльності. Актуальність і затребуваність курсів пояснюється тим, що люди старшого покоління витрачають значно більше часу на освоєння нових технологій, що вимагає повторення демонстрацій прийомів роботи з технічними засобами і прикладними програмами, вони не впевнені під час роботи з технічними засобами, відчують страх зробити неправильні дії, у багатьох випадках потребують індивідуального навчання, що вимагає постійної присутності помічника-консультанта, тощо. Мета курсів – сформувати у слухачів здатність розв'язувати професійні завдання та проблеми через упровадження в освітній процес інформаційних технологій.

Важливим є також зворотний зв'язок зі слухачами після закінчення таких курсів. У ході опитування та анкетування було з'ясовано, що протягом подальшого самонавчання деякі викладачі, які свого часу пройшли курси, удосконалювали свої знання й навички. При цьому у практичній роботі вони почали використовувати середовище самонавчання контенту Moodle, програми комп'ютерного тестування, авторські блоги, хмарні сховища даних, мультимедійні презентації до лекцій, семінарів, виступів на засіданнях кафедр, а також вносять наукові доробки до наукометричної бази Google Scholar тощо.

Ключові слова: *компетентність, інформаційно-комунікаційні технології, ІКТ-компетентність, ІКТ-компетентність викладача, заклади вищої освіти, післядипломна освіта, підвищення кваліфікації.*

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Problem formulation. Informatization implementation in higher education occurs not only in the context of facilities provision, but also teachers' certain competence level formation in the information and communication technologies use. And if the first problem aspect in the overwhelming majority could be solved, the second is being relevant for a long time, requires attention and the solutions search. New technologies and technological processes are updated all the time so that a specialist does not have enough previous professional knowledge, skills and abilities for the entire productive professional life

period. Thus, specialists are often on the sideline of their profession because, are unable to obtain new, more modern, effective professional knowledge and skills on time. This problem is getting more complicated. In a large number of cases, people, who are a bit older than 40 years old, are uncomfortable in their professional activities.

Quite acutely this problem occurs in the teachers' professional activity of higher educational institutions. The teacher's activity requires constant contact with younger generations, who use gadgets, network services and available software all the time. This

problem concerns non-informatics disciplines teachers. The older generation teachers are lack of methodical experience, namely methodical skills of using modern technological advances in the professional activity. The mental and technological gap does not allow to fully transfer enormous life and professional experience, to realize the acquired theoretical knowledge and practical skills.

These circumstances require the teachers of all specialties regular training at higher educational institutions in order to form competence elements for the use of information and communication technologies, which in turn provides an opportunity to improve the teaching work efficiency.

Analysis of scientific sources. The problems analysis related to the increase of the specialist's competence of information and communication technologies means application and this competence components formation is reflected in the researchers' scientific works: V. Bykova [1], A. Gurzhii [2], M. Zhaldak [3], N. Morse [4], O. Ovcharuk [2], V. Petruk [5], L. Petukhova [6], L. Chernikova [7], and others.

Studies on the competencies acquisition in the use of information and communication technologies concern mostly students of general secondary and higher educational institutions. As for the specialists' professional development, including mastering the working skills with services, information technologies, technical means, this issue is relevant and has a number of aspects worth paying attention to. The scientific researches analysis on the competency's definition concerning the use and possession of information and communication technologies has been revealed in the article.

In the USA educational system, terms are used: digital literacy, technology literacy, information and technology literacy. These terms are interpreted as the ability of an individual, working independently or with others, to use tools, resources, processes, and systems responsibly to access and evaluate information in any medium, and to use that information to solve problems, communicate clearly, make informed decisions, and construct new knowledge, products, or systems [8, p. 1].

Anusca Ferrari, the European Commissioner for Science and Technology, uses the term digital competence and interprets it as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society [9, p. 1].

The Argentinean researcher H. Romani (Cristobal Romani) uses the term e-competencies, which are defined as a set of capabilities, skills and abilities to exploit tacit and explicit knowledge, enhanced by the utilisation of digital technologies and the strategic use of information [10, p. 22].

M. Zhaldak uses the concept of socio-informatics or computer skills and believes that such competencies

formation is characterized by the following qualities acquiring: the ability to navigate the information space; ability to search, process, organize, store, submit, transfer various information using modern ICT tools; Ability to apply information and communication technologies in self-study and everyday life; to evaluate the process and achieve technological results; understanding of methodological and technological aspects of the ICT use for solving individual and socially important tasks, etc. [3, p. 46].

The Concept of a new Ukrainian school uses the category of information and digital competence, which involves the confident and, at the same time, critical application of information and communication technologies for the realization, search, processing of data exchange in professional activity, public sphere and private communication [11].

The thorough, systematic, and multilevel analysis of the teachers' ICT competencies was conducted by an international team under UNESCO (ICT Competency Framework for Teachers) [12–15]. The guiding documents idea is that the teacher's proficiency with the relevant competencies stimulates successful work in the information filled educational environment.

The researchers' attention all around the world has been focused on determining competencies content, components and ways of information and communication technologies formation for a long time. Thus, the problem of introducing ICT elements into the educational process is important, but the problem of teachers' ICT competencies formation at higher school in postgraduate education has not been sufficiently studied. The social request regarding the pedagogical workers training in the new information society, and their real state training, largely does not meet modern requirements.

The article purpose is to refine and theoretically analyze the problems of teachers' ICT competencies formation of higher educational institutions, as well as to analyze effective ways to overcome this problem.

Results and discussions. Definitions analysis of the information and communication technologies competence makes it possible to conclude that theoretical knowledge and practical skills allow to orient in the information space; process, store, transmit and present data, create new information products with the latest technology; apply ICT to enhance professional skills in everyday life. Thus, ICT competence is an individual integrative quality characterized by the ability to use information and communication technologies and resources effectively for informational purposes (data search, analysis and systematization, presentation in a form understandable to consumers, as well as the creation and dissemination of affordable individual forms) when solving all tasks in the chosen professional activity, having a constant awareness of the need for

new knowledge, new experience and improvement and practical skills and abilities [16, p. 44].

Characteristics of the teachers' ICT competence levels formation are presented in the methodical recommendations of the information and communication competences standardization in the educational system of Ukraine, which are developed by the Information Technologies and Training Tools Institute of the National Sciences Academy of Ukraine. To formulate the teachers' ICT competence, it is proposed to use six levels (initial, minimal-basic, basic, advanced, research, expert) and to define the cognitive, operational and reflexive components) [17, p. 61].

The recommendations authors believe that the approach developed by the International Society for Technologies in Education (ISTE) [18], which is the leading organization in the United States that supports innovations in education, should be used to determine the ICT competence level development, namely:

- initial – the teacher's ICT competencies level that shows understanding the importance and necessity of information and communication technologies for the education development;
- minimum basic – the teacher's ICT competencies level that shows ability to use ready-made software products in activities;
- basic – the teacher's ICT competencies level that shows ability to use the basic ICT concepts;
- advanced – the teacher's ICT competencies level that shows freely operation with the ICT knowledge in professional activities;
- research – the teacher's ICT competencies level that allows to operate freely with ICT knowledge, Internet resources and use them in research, project activities;
- expert – the teacher's ICT competencies level that allows to operate freely with ICT knowledge, Internet resources, evaluate the innovative ICT development and act as an expert on the ICT implementation in the educational process.

Relying on the Ukrainian and world scholars' achievements, training courses "Implementation of Information Technologies in the Educational Process" for higher educational institutions teachers have been organized in Sumy Makarenko State Pedagogical University. These courses are designed to help problem solving of ICT implementation in the university educational process, increase its efficiency, informality, practicality and accessibility.

It has been revealed that the improvement of teachers' qualifications of ICT management has several methodological aspects that should be taken into account while working with such students' category:

1) adult people poorly perceive information (especially text) from the monitor, that's why printed teaching materials are required;

2) adult people spend more time on developing new technologies and soon lose their already acquired skills due to their irregular practice, that's why repetition of working methods with technical tools and applications are required;

3) adults are uncertain working with technical means, feel fear to do wrong actions, which involves consolidating the individual working skills with technical means;

4) in many cases, individual training is required, which reduces self-employment efficiency and the constant assistant's presence is required;

5) younger teachers are involved in the process and this creates some discomfort among the students.

The selected aspects also influence students' age characteristics and the fact that they are students of completely different, precomputer teaching methods.

Therefore, for their professional activity, other teaching methods are mastered. All of the above have a direct impact on the content and methodology of higher schools teachers who have the ability to apply ICTs to solve problems in their professional activities and everyday lives.

The improving qualification is designed for 90 training hours. 60 classroom hours (20 hours – theoretical classes, 40 hours – practical) and 30 hours of independent work.

The courses purpose: to form the students' ability to solve professional problems through the information technology introduction in the educational process.

The course program is presented in table 1.

As courses result, students present realization of the following tasks:

1. The lectures summary with elements of interactive discipline training in PDF format.
2. The presentations set to accompany lectures on discipline.
3. Computer tests in discipline in the specialized software My Test.
4. Created profile in the repository of the scientific library and a scientific works list.
5. Created profile in the science-based database of Google-Scholar and add some of his scientific papers to it.
6. Created your own blog draft.
7. Educational materials in the educational content – Moodle.

So as these courses result, it can be confirmed that the students' majority form the basis of the core competencies. During further self-study, some teachers who had attended time courses, improved their knowledge and skills, which is corresponded to the advanced level. This was clarified by testing and practical task performing with voluntary participation.

Since 2014, 82 teachers from Sumy Makarenko State Pedagogical University, Sumy National Agrarian University and Sumy Regional Institute of Postgraduate Pedagogical Education have been

Table 1

The program of advanced training courses “Implementation of information technologies in the educational process”

Contents of educational material	Expected results of educational and cognitive activity
Application of data processing technologies for creating educational materials	
Theme 1. Setting, formatting, editing, reviewing and storing text documents. Structuring a text document. Creation of literature lists, illustrations and indexes.	<p>Cognitive component. Knows special symbols set, formulas, literature lists, illustrations, indexes, and hyperlinks creation, the notion of formatting, editing, document reviewing, and the structured document features.</p> <p>Operating component. Is able to format, edit, review text, add formulas, diagrams, tables, illustrations, structure text, create automated document content, set footers, create hyperlinks, use clipboard, save text in formats.</p> <p>Reflexive component. Understands and justifies the need to comply with the requirements for text document stylistic design and structuring.</p>
Theme 2. Creating computer presentations. Methodical features of computer presentations creation.	<p>Cognitive component. Knows the concept and stages of presentation creation, recommendations for its design, slides types, slides presentation principles.</p> <p>Operating component. Is able to create linear and branching presentations, add animation elements, audio and video elements to the presentation, make presentations in accordance with the methodological recommendations.</p> <p>Reflexive component. Evaluates presentations quality and adherence to the requirements for its design.</p>
Theme 3. Using programs to work with tables for data analysis. Data types. Formulas. Built-in features. Diagrams and charts construction.	<p>Cognitive component. Knows the concept of table processor, spreadsheet, data, formula, logical, mathematical and statistical functions, autocomplete, stages of diagrams and graphs construction</p> <p>Operating component. Is able to format and edit basic data types, use autocomplete, built-in logical, mathematical and statistical functions, build charts and graphs apply formulas.</p> <p>Reflexive component. Realizes the perspective of using the table processor for statistical analysis of pedagogical experiments results.</p>
Application of Internet technologies in the educational process	
Theme 4. Library repository. Google Scholar Google services	<p>Cognitive component. Knows the purpose of the library repository and the science-research base of Google Scholar, the requirements for registration and making work on the resources, the capabilities of other Google services.</p> <p>Operating component. Is able to register to the university library repository and Google-Scholar science-based database, use Google Drive, YouTube and other services.</p> <p>Reflexive component. Realizes the perspectives of using network resources and library repository.</p>
Theme 5. Creating educational blogs.	<p>Cognitive component. Knows how blogger works, tips for creating an educational blog.</p> <p>Operating component. Is able to use blogger, create and edit an educational blog.</p> <p>Reflexive component. Realizes the perspectives of pedagogical activity with their own blog.</p>
Creation of electronic teaching and learning complexes	
Theme 6. Use of programs for creating and conducting computer tests	<p>Cognitive component. Knows the environment for creating computer tests, tests types.</p> <p>Operating component. Is able to create various types tests, run and configure network computer testing, analyze computer tests results.</p> <p>Reflexive component. Realizes the expediency and effectiveness of computer testing of educational achievements.</p>
Theme 7. The environment of distance learning Moodle	<p>Cognitive component. Knows the possibilities of Moodle, structure of the distance learning methodological complex.</p> <p>Operating component. Is able to create a distance learning methodological complex, organize educational work using the Moodle.</p> <p>Reflexive component. Realizes the efficiency and mobility of the electronic teaching and methodological complex.</p>

studying at courses. In September 2018, a survey was conducted among former students of advanced training courses. 68 teachers from the mentioned educational institutions were involved. Working out the questionnaire results it is noted that after the study:

- 13% of teachers began to use the educational content Moodle in their practical work;
- 74% of teachers regularly use computer testing methods;
- 88% – prepare multimedia presentations for lectures, seminars, speeches at chairs meetings, etc.;
- 97% – make scientific contributions to the repository of the university scientific library and the science-research base – Google Scholar;
- 9% – began to use authors' blogs in their work;
- 16% – began to use cloud storage;
- 44% – answered that preparation for lessons took less time, and 22% – more time;
- 91% – spend less time searching the necessary information on the Internet;
- 94% – believe that the courses allowed to diversify the methods of filing and fixing the educational material.

Conclusions. Conducting courses on the ICT competence formation, the results elaboration of listeners' skills diagnosing at the end, teachers' questioning makes it possible to highlight conclusions:

1. Teachers' ICT competencies formation contributes improving the educational activities efficiency.
2. The transition to distance and mixed learning forms provides the opportunity to individualize the educational process.
3. Teachers' ICT competencies formation contributes to the formation of information and educational environment at the university, changes in approaches to the educational process.
4. Teachers' ICT competencies formation contributes changing the methodology and technology of the educational process.
5. Different ICT competence levels require an individual approach in the postgraduate education process.

Prospects for further scientific work are aimed at deepening research in the ICT competence development for different age groups teachers and future teachers, as well as studying the possibilities of expanding the ICT use in the educational process.

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